March 6, 2008

Administrative Judge
Ann Marshall Young, Chair
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Administrative Judge
Paul B. Abramson
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Administrative Judge
Richard F. Cole
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

In the Matter of
ENTERGY NUCLEAR OPERATIONS, INC.
(Pilgrim Nuclear Power Station)
Docket No. 50-293-LR; ASLBP No. 06-848-02-LR

Dear Administrative Judges:

Enclosed please find the NRC Staff Response to Initial Presentations on Contention 1, Rebuttal Testimony and Response to Board Questions, Staff Rebuttal Testimony, Certifications of Staff Witnesses, Exhibits and Certificate of Service. Please note that Dr. Davis' signature on the Certification is a facsimile because Dr. Davis is on official travel. We will provide the original signature to the Office of the Secretary upon Dr. Davis' return to the office on Monday, March 10, 2008.

Sincerely,

/RA/

Kimberly A. Sexton
Counsel for the NRC Staff

Enclosures: As Stated

cc w/ enclosures: Service List

March 6, 2008

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF RESPONSE TO INITIAL PRESENTATIONS ON CONTENTION 1, REBUTTAL TESTIMONY AND RESPONSE TO BOARD QUESTIONS

INTRODUCTION

Pursuant to 10 C.F.R. §§ 2.1207(a)(1) and 2.337(g)(2), the Atomic Safety and Licensing Board Panel's ("Board") December 19, 2007 Order,[1] and the Board's February 21, 2008 Order and Notice,[2] the Staff of the U.S. Nuclear Regulatory Commission ("Staff") submits its written response and rebuttal testimony in response to Pilgrim Watch's initial statement of position and testimony.[3] In accordance with the Board's Order and Notice, the Staff also submits its responses to questions posed by the Board. Appended to this filing is the Staff testimony and certifications of Dr. James A. Davis, Terence L. Chan, and Andrea T. Keim. For the reasons set forth below and in the testimony filed herewith, the Staff submits that a careful evaluation of the

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[1] Order (Revising Schedule for Evidentiary Hearing and Responding to Pilgrim Watch's December 14 and 15 Motions), (Dec. 19, 2007) (unpublished) ("Scheduling Order").

[2] Order and Notice (Regarding Hearing, Limited Appearance Session, and Additional Questions for Parties), (Feb 21, 2008) (unpublished) ("Order and Notice").

[3] Pilgrim Watch Presents Statements of Position, Direct Testimony and Exhibits Under 10 CFR 2.1207 (Jan. 29, 2007) ("PW Statement" or "Pilgrim Watch's Statement of Position").

evidence demonstrates that the aging management programs ("AMPs") for buried piping at the Pilgrim Nuclear Power Station ("Pilgrim") are adequate to manage the effects of aging in accordance with 10 C.F.R. Part 54, and that Pilgrim Watch's challenge to the license renewal application ("LRA") for the Pilgrim operating license filed by Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc. (collectively, "Entergy") cannot be sustained.

DISCUSSION

I. Legal and Regulatory Requirements

The issue, as clarified, in this proceeding is:

> whether or not monitoring wells are necessary to assure that the buried pipes and tanks at issue [that is those that contain or may contain radioactive liquids[4]] will continue to perform their safety function during the license renewal period — or, put another way, whether Pilgrim's existing AMPs have elements that provide appropriate assurance as required under relevant NRC regulations that the buried pipes and tanks will not develop leaks so great as to cause those pipes and tanks to be unable to perform their intended safety functions.[5]

The adequacy of the Staff's review of Entergy's application is not at issue; instead, "the sole focus of the hearing is on whether the application satisfies NRC regulatory requirements." Final Rule, "Rules of Practice for Domestic Licensing Proceedings-Procedural Changes in the Hearing Process," 54 Fed Reg. 33,168, 33,171 (Aug. 11, 1989) (*citing Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2)*,* ALAB-728, 17 NRC 777, 807, *review declined,* CLI-83-82, 18 NRC 1309 (1983)). The overall burden is on Entergy to demonstrate that its AMPs for the buried pipes and tanks systems within the scope of license renewal are

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[4] *See, e.g.,* Order (Denying Pilgrim Watch's Motion for Reconsideration) (Jan. 11, 2008) at 8 (unpublished).

[5] *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-07-12, 66 NRC ___ (Oct. 17, 2007) (slip op. at 18) ("Summary Disposition Order").

adequate to manage aging effects so that their intended safety function will be maintained during the period of extended operations. *See* 10 C.F.R. § 2.325. Pilgrim Watch, however, must come forward with evidence supporting its claim that Entergy's AMPs are inadequate. *Louisiana Power & Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1093 (1983).

Although a plant's current licensing basis ("CLB")[6] will be reviewed during the course of license renewal, the Commission has determined that intervenors may not challenge the CLB because "such issues: (1) are not germane to aging management concerns; (2) previously have been the subject of thorough review and analysis; and, accordingly (3) need not be revisited in a license renewal proceeding." *AmerGen Energy Co.* (Oyster Creek Nuclear Generating Station), LBP-07-17, 66 NRC __ (Dec. 18, 2007) (slip op. at 14, n.17); *see also Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), CLI-01-17, 54 NRC 3, 10 (2001) ("Issues . . . which already are the focus of ongoing regulatory processes - do not come within the NRC's safety review at the license renewal stage."). Further, "a finding of compliance of a plant with its [CLB] is not required for issuance of a renewed license." Final Rule, "Nuclear Power Plant License Renewal," 56 Fed. Reg. 64,943, 64,951 (Dec. 13, 1991)). Therefore, the CLB is only reviewed to determine whether "there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB." *See* 10 C.F.R. § 54.29(a).

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[6] The CLB consists of "the NRC regulations contained in 10 C.F.R. parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 52, 54, 55, 70, 72, 73, 100 and appendices thereto; orders; license conditions; exemptions; and technical specifications [plus] . . . the plant-specific design-basis information [contained] . . . in the most recent final safety analysis report (FSAR) . . . and the licensee's commitments . . . [made through] responses to NRC bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports." 10 C.F.R. § 54.3.

The Commission's requirements regarding the adequacy of Pilgrim's program to manage aging of the buried pipes during the license renewal period have been described in the Staff's initial prefiled testimony[7] and in the rebuttal testimony filed herewith.[8] Specifically, as set forth in the Staff's NUREG-1891, "Safety Evaluation Report Related to the License Renewal of Pilgrim Nuclear Power Station" (Sept. 2007, Published Nov. 2007) ("SER"), the applicable legal standard for the Staff's approval of Pilgrim's program is whether Entergy has demonstrated "that the effects of aging [of Pilgrim's buried pipe and tank systems] 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).

II. Staff's Witnesses

In the attached Staff Rebuttal Testimony, the Staff rebuts statements made by Pilgrim Watch in testimony filed January 29, 2008, and answers the questions posed by the Board in the Order and Notice. The professional qualifications of the Staff witnesses were attached to the Staff's January 29, 2008 filing.[9] Each witness has signed a certification attesting to their statements.

III. Staff Rebuttal

Pilgrim Watch's Statement of Position contains a multitude of speculative and immaterial statements and unsupported assertions, reiterations of issues that have already been dismissed

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[7] *See* NRC Staff Testimony of Dr. James A. Davis Concerning Pilgrim Watch Contention 1 (Jan. 29, 2008) ("Davis Testimony"); NRC Staff Testimony of Terence L. Chan and Andrea T. Keim Concerning Pilgrim Watch Contention 1 (Jan. 29, 2008) ("Chan and Keim Testimony") (collectively, "Staff Testimony").

[8] Rebuttal Testimony and Responses to Board Questions by Dr. James A. Davis, Terence L. Chan and Andrea T. Keim Concerning Pilgrim Watch Contention 1 (Mar. 6, 2008) ("Staff Rebuttal Testimony").

[9] *See* NRC Staff Initial Statement of Position on Contention 1 (Jan. 29, 2008) ("Staff Statement").

by the Board, and claims that essentially amount to entirely new contentions that do not merit consideration.

As an initial matter, the Commission's regulations require that immaterial or irrelevant parts of an admissible document be segregated and excluded so far as is practicable. 10 C.F.R. § 2.337(a). Further, evidence at hearing is limited to relevant, material, and reliable evidence which is not unduly repetitious. *Id.* Experts providing pre-filed testimony must be qualified by '"knowledge, skill, experience, training, or education'" and their opinions must have an adequate factual basis and not merely constitute bare assertions, "'subjective belief or unsupported speculation.'" *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-04, 61 NRC 71, 80-81 (2005) (*quoting* Federal Rule of Evidence 702 and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 589-90 (1993)). Expert opinions must be adequately stated and explained in affidavits. *Id.* at 81. This is especially important in Subpart L proceedings, such as this case, because there is generally no cross-examination and the only questioning is that by the presiding officer at oral sessions based upon the written presentations of the parties. *Id.* Finally, expert opinion is admissible only if it would assist the trier of fact in understanding the evidence or determining a fact in issue. *Id.* at 80. If the testimony and/or statement of position do not meet these requirements, the Board should not consider it.

While some of the statements in Pilgrim Watch's Statement of Position are merely irrelevant to Contention 1, there are many occasions where Pilgrim Watch makes statements that are so far outside the scope of the contention as admitted that they amount to entirely new contentions. For a late-filed contention to be admissible, petitioners must meet a three-part test showing that the: (1) information upon which the amended or new contention is based was not previously available; (2) information upon which the amended or new contention is based is materially different than information previously available; and (3) amended or new contention

has been submitted in a timely fashion based on the availability of the subsequent information. 10 C.F.R. §§ 2.309(f)(2)(i)-(iii). If a petitioner fails to satisfy any of the three requirements, a Board will reject the submittal as non-timely. *See Amergen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), LBP-06-22, 64 NRC 229, 234 (2006). Further, any late-filed contention must still satisfy the general contention admissibility requirements of 10 C.F.R. § 2.309(f)(1). *Id.* at 234-5.

A. Reasonable Assurance

The Commission utilizes a "reasonable assurance" standard when making safety-related determinations during license renewal. *See* 10 C.F.R. § 54.29(a). Pilgrim Watch is incorrect when it asserts that reasonable assurance requires 95% confidence. Pilgrim Watch Statement of Position at 4-10. The Commission has not provided a specific numerical definition of reasonable assurance, much less defined it as being equivalent to a 95% confidence standard. In fact, the agency has not adopted any mechanical verbal formula, set of objective standards, or specific confidence interval as the measure of reasonable assurance. *See Union of Concerned Scientists v. NRC,* 880 F.2d 552, 558 (D.C. Cir. 1989). On the contrary, utilizing an approach that is not formalistic and has passed muster with federal courts, the NRC makes reasonable assurance determinations "based on sound technical judgment applied on a case-by-case basis." *Amergen Energy Co., LLC* (License Renewal for Oyster Creek Nuclear Generating Station), LBP-07-17, 66 NRC ___, slip op. at 15 (Dec. 18, 2007) (*citing Union of Concerned Scientists*, 880 F.2d at 558, and *North Anna Envtl. Coal. v. NRC,* 533 F.2d 655, 667 (D.C. Cir. 1973)).

Pilgrim Watch cites no Commission case law or regulations that would require applicants to satisfy a 95% confidence standard (or other rigid numerical standard) in order to demonstrate reasonable assurance. Indeed, there is none, as the Oyster Creek license renewal Board recently observed when rejecting arguments similar to those Pilgrim Watch raises here. LBP-

07-17, 66 NRC ___, slip op. at 15-16 n.18 (Dec. 18, 2007).[10] The Commission itself has also expressly rejected the notion that reasonable assurance "denotes a specific statistical parameter." *See* "Disposal of High-Level Radioactive Wastes in a Proposed Geological Repository at Yucca Mountain, Nevada," 66 Fed. Reg. 55,732, 55739-40 (Nov. 2, 2001). The ambiguous language that Pilgrim Watch quotes from a single NRC Staff member's answer to a question during a 2001 Advisory Committee on Reactor Safeguards ("ACRS") meeting, does not demonstrate otherwise. S*ee* PW Statement at 7-8. Accordingly, the Board should reject Pilgrim Watch's call to substitute a 95% confidence standard (or other rigid numerical standard) for the NRC's well established, and rule-mandated, reasonable assurance standard.

The case law cited by Pilgrim Watch[11] at pages 5-6 of its Statement of Position does not demonstrate that the Commission, or the Board, must reject this longstanding agency approach to applying the reasonable assurance standard. Pilgrim Watch's cited cases address a threshold evidentiary question of whether particular scientific evidence should be admitted at trial.[12] These cases, which define *evidentiary admissibility standards* under federal and state

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[10] Pilgrim Watch's references to the Staff's review of the condition of the Oyster Creek drywell shell (which, the Staff notes, do not cite to any specific portion of any specific document) center upon the specific issue of the Oyster Creek drywell shell's *present condition*. *See* PW Statement at 9. In Oyster Creek, the reasonable assurance standard was applied to the issue raised by the admitted contention, i.e., whether the aging of the drywell shell would be managed adequately during the period of extended operation. These references to the Oyster Creek proceedings, therefore, do not demonstrate that reasonable assurance has been deemed equivalent to 95% confidence. After all, the Board in Oyster Creek expressly ruled that the applicant did *not* need to meet a 95% confidence standard in order to demonstrate reasonable assurance regarding the aging management program at issue in those proceedings. *See* Oyster Creek (LBP-07-17), 66 NRC __ (slip op. at 15-16, n.18).

[11] *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 723-24 (Tex. 1997); *U.S. v. Chase*, 2005 WL 757259 (D.C. Super. Ct. 2005); *Daubert v. Merrell Dow Pharm.*, 509 U.S. 579 (1993).

[12] Substantial portions of Pilgrim Watch's arguments promoting a 95% confidence standard are identical to portions of the post-hearing proposed findings of fact pleading filed by Citizens, the intervenors in the Oyster Creek license renewal proceeding. Pilgrim Watch, though, appears to have accidentally truncated the source of the quotation that forms the second sentence of the first full paragraph on page 6 of its Statements of Position. According to Citizens' filing in Oyster Creek, the (continued. . .)

rules of evidence, simply have no bearing upon proper interpretation by the NRC of a *regulatory compliance standard* that the NRC itself has created pursuant to its own unique statutory authority. Indeed, the statutory basis for the NRC's reasonable assurance standard – the Atomic Energy Act of 1954, as amended ("the Act")[13] – is "virtually unique in the degree to which broad responsibility is reposed in the administering agency, free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives." *Siegel v. Atomic Energy Commission*, 400 F.2d 778, 783 (D.C. Cir. 1968); *see also Union of Concerned Scientists*, 880 F.2d at 558 (quoting the Siegel language to support deference to the NRC's "determination of what constitutes 'adequate protection' under the Act"). These unique considerations of deference to the NRC's interpretations of the Act clearly played no role in the evidence-law cases cited by Pilgrim Watch. Pilgrim Watch's cited cases, therefore, do not dictate how the NRC must interpret reasonable assurance. The Board should thus leave undisturbed the NRC's longstanding case-by-case approach to determining whether reasonable assurance has been demonstrated.

B. Pilgrim Watch's Restatement of the Issue and Questions Directed to the Board

Despite the numerous Board orders issued clarifying the scope of the issue at hand, Pilgrim Watch continues to attempt to broaden and change the issue as admitted. In its introduction, Pilgrim Watch claims:

> The key issues are: (1) Without both comprehensive prevention and detection systems, including monitoring wells, it is unlikely a

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(. . .continued)

source of this quotation is a law journal article about causation in the context of Tort law. *See* Citizens' Post-Hearing Proposed Findings of Fact and Conclusions of Law at 53 (Oct. 10, 2007) (ADAMS Accession No. ML073100089).

[13] 42 U.S.C. §§ 2011-2297h.

> small leak will be noticed so that the secondary steps such as further inspections, testing and calculations will follow; (2) these steps take time and we do not want to risk that there may not be sufficient time; and (3) corrosion or small leaks may be exacerbated by a design basis event.

PW Statement at 12. While Pilgrim Watch acknowledges the formulation of Contention 1 as admitted in the Memorandum and Order (Ruling on Standing and Contentions of Petitioners Massachusetts Attorney General and Pilgrim Watch)[14] and as clarified in the Summary Disposition Order, PW Statement at 4, the fact that a mere eight pages later Pilgrim Watch incorrectly restates the issues it plans to address shows, at best, that the numerous Board orders have not been understood.

Further, one of Pilgrim Watch's two witnesses, Arnold Gundersen, entirely misapprehends the substance of Contention 1. Mr. Gundersen states that:

> Contention 1, as delineated in this proceeding, is that the frequency of the monitoring proposed by the Applicant is insufficient to ensure that the required safety margins would be maintained throughout any extended period of operation. The Board appropriately suggested a possible weakness in the Applicant's (Pilgrim Nuclear Power Station) Aging Management Program to detect leaks, and this problem seems to be borne out by the recently discovered on-site Tritium leaks.[15]

Earlier, Mr. Gundersen states that "[t]he information provided by the AMP is vague and non-specific and cannot be used to conclude that any and all underground piping will ever be examined during the license extension period." Gundersen Testimony at 9. Later, Mr. Gundersen "conclude[s] that the applicant has not shown with 95 percent certainty that the proposed AMP will in fact be able to detect any defects in the underground pipes and tanks."

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[14] *Entergy Nuclear Generation Co. and Entergy Nuclear Operations Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257 (2006) ("Memorandum and Order on Contentions").

[15] Declaration of Arnold Gundersen Supporting Pilgrim Watch's Petition for Contention 1 at 18, (Jan. 29, 2008) ("Gundersen Testimony").

Id. at 10. Mr. Gundersen wholly misses the mark on interpreting the contention as admitted and further clarified, by analyzing the LRA with respect to out of scope issues like monitoring, tritium leaks, all underground piping, and general defects.

Finally, Pilgrim Watch appears to misunderstand both its and the Board's role in the proceeding. Without providing any support for its position, Pilgrim Watch outlines detailed inquiries that "[t]he ASLB will be asked to determine."[16] Later, Pilgrim Watch gives two detailed lists of "many questions to be answered," though provides no reference to whether it expects Entergy or the Board to give the answer or how it expects to receive these answers. PW Statement at 49-50. Even if Pilgrim Watch could direct the Board to make the investigations it desires,[17] the specific information is not directly relevant to Contention 1, and is essentially a list of information that has previously been requested,[18] and subsequently denied, by the Board.[19]

C. Out-of-Scope Issues

1. Monitoring

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[16] Pilgrim Watch wants the Board to determine the "specific age of each part of the buried pipes within scope;" "what the warranties were for the various parts making up the components under consideration;" "what parts remain that are counterfeit or substandard;" "what pipes or pipe sections were replaced; and, more important, to see the specific reports that show the analysis of why they were replaced, what went wrong, and whether a root cause analysis was performed;" and finally "how this corporate framework [i.e., the Buried Piping and Tanks Inspection and Monitoring Program] will be applied to Pilgrim Station and to document the rationale for their specific plan." PW Statement at 21, 31.

[17] While parties may seek to have the Board ask certain questions, it must be accomplished through the proper pre-hearing motions and cover appropriate topics, and even then the Board may chose not to entertain them. *See* Order (Denying Pilgrim Watch's Motion for Clarification) (Jan. 11, 2008) at 4-5; 10 C.F.R. § 1207(a)(3).

[18] *See* Pilgrim Watch Motion for Clarification (Dec. 21, 2007).

[19] Order (Denying Pilgrim Watch's Motion for Clarification) (Jan. 11, 2008).

Pilgrim Watch apparently does not accept that monitoring for groundwater contamination is not within the scope of this hearing, regardless of how the issue is formulated.[20] In an attempt to bring monitoring into scope, Pilgrim Watch claims that Entergy's omission of monitoring from Pilgrim's AMPs renders the LRA inadequate.[21] However, even this claim cannot bring monitoring into scope. The Board clearly stated in its January 11, 2008 Order (Denying Pilgrim Watch's Motion for Reconsideration): "As we have said on numerous occasions, monitoring is not proper subject matter for license extension contentions."[22]

2. Monitoring Wells

Pilgrim Watch presents two main arguments in its Initial Statement of Position, one of which is a continuation of an argument that has been rejected multiple times by the Board: that "a robust monitoring well system to *detect* leaks is a necessary part, or supplement to, Pilgrim's

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[20] "Ongoing monitoring is not within the scope of this proceeding; only challenges to errors or omissions from the Applicant's Aging Management Program (AMP) are properly within the scope." Scheduling Order at 1.

[21] After discussing the Bathtub Curve, Pilgrim Watch says that "Pilgrim's AMP's do not provide the required 'condition-monitoring activities.'" PW Statement at 21. Further, when addressing Entergy's CS surveillance programs, Pilgrim Watch says that one "potential problem" is if "[t]he indicators and the monitoring of those indicators could be flawed. For example in 1992, 1994 and 2001 NRC Inspection Reports for Pilgrim discussed the failure of a monitoring level device needed to show the water level over the core. An example demonstrating that monitoring devices do not always work according to design." *Id.* at 61. Later, Pilgrim Watch explicitly states that "Pilgrim Watch and their experts have reviewed the Aging Management Program for Pilgrim Station and conclude that the applicant has not addressed the monitoring of its underground components that are within scope to assure their integrity if Pilgrim's license is extended to operate an additional twenty years to 2032." *Id.* at 81. Finally, Pilgrim Watch concludes that "[b]ecause it is necessary to both detect and prevent leaks and for all the aforementioned reasons discussed in this Statement, Pilgrim Watch objects to leaving the monitoring program as a "voluntary" program." *Id.* at 95.

[22] Order (Denying Pilgrim Watch's Motion for Reconsideration) at 5 (Jan. 11, 2008) ("Reconsideration Order") (*quoting Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-12, 64 NRC 257, 274-277 (2007); *Florida Power & Light Co.* (Turkey Point Nuclear Generation Plant, Units 3 and 4), CLI-01-17, 54 NRC 3, 7 (2001); Final Rule, "Nuclear Power Plant License Renewal; Revisions," 60 Fed. Reg. 22,461, 22,481-82 (May 8, 1995); *Nuclear Management Co., LLC* (Monticello Nuclear Generating Plant), LBP-05-31, 62 NRC 735, 754 (2005)).

Aging Management Program in order to actually provide reasonable assurance that the relevant components will perform their intended functions during the license renewal period." PW Statement at 2. Pilgrim Watch states "that monitoring wells clearly belong back in the discussion" and that "monitoring wells are a necessary supplement to the AMP at this site in order to decrease risk and can not be properly excluded from these proceedings." *Id.* at 87, 89. However, the Board could not have been more clear that monitoring wells are not a part of this discussion when, in one of the multiple ways it has attempted to clarify the issue, the Board stated that "the performance of, or need for, monitoring wells is not relevant unless and until the Applicant advises that it intends to rely upon such wells to make the ["the determination whether buried pipes and tanks containing radioactive fluids are leaking at rates so great as to render them incapable of satisfying their intended safety functions"]." Reconsideration Order at 4-5. The Board went on to say that parties "are incorrect if they intend to assert that monitoring wells WILL be relevant if the existing AMPs are ultimately determined to be insufficient, and the speculation that monitoring wells MAY become relevant in those circumstances is insufficient to make monitoring wells relevant NOW without a determination by the Applicant that it will rely upon them for the subject determination." *Id.* at 7.

Pilgrim Watch essentially argues that simply because Pilgrim installed four monitoring wells in November, 2007, that Entergy has therefore placed monitoring wells back into contention. PW Statement at 87. However, at no point has Entergy stated that it will rely on monitoring wells to assure leaks will not occur at such a great flowrate such that the intended safety function of the in-scope buried pipes will not be satisfied. *See* Reconsideration Order at 4. Therefore, as stated and restated by the Board, monitoring wells remain irrelevant.

3. Leaks That Do Not Challenge In-Scope Buried Pipes' Intended Safety Function

Pilgrim Watch continues to focus its energy on leaks of all sizes and spends considerable time discussing the need to detect small leaks, rather than the specific type of leak the Board accepted as part of Contention 1. For instance, Pilgrim Watch discusses leaks in the general sense, saying their "contention is principally concerned with leakage" and later claiming that "[a] leak in a pipe/tank will cause the component to eventually fail; leaks do not fix themselves and get worse over time. Murphy's Law's humorous prediction that 'Left to themselves, things always go from bad to worse' applies here." PW Statement at 12. Pilgrim Watch also makes many statements about small leaks such as "[m]onitoring wells and a more robust inspection protocol are necessary to detect small leaks from buried piping/tanks that, left alone, could become larger leaks. Whereas small leaks do not pose a serious challenge by themselves . . . small leak[s] could be indicative of deteriorating conditions that could lead to a pipe break." *Id.* at 19. Clarifying their statement, Pilgrim Watch goes on to state that "[a] small leak in a buried pipe connected to this tank is unlikely to be caught by the tank's installed level monitoring instruments, and the Applicant never demonstrated with 95% certainty that it would." *Id.* Finally, Pilgrim Watch concludes that "there is no proof provided by the Applicant that [the level monitoring systems] will show anything other than a large break, but not a small break preceding." *Id.*

Mr. Gundersen has made the same error in scope. He states that "the record to date in these proceedings support my conclusion that the AMP may not be adequate to prevent or detect leaks in underground pipes and tanks." Gundersen Testimony at 13. Further, he states that "[i]n [his] opinion the factual record submitted by the applicant Entergy does not meet the burden of proof required by a licensee, much less with 95% certainty, that the Aging Management Program <u>will identify</u> leaks, or that any leaks already identified by the AMP will not expand further in the pipes or tanks thereby leaving the Pilgrim Nuclear Power Station and its environs without a critical back-up safety system." *Id.* at 15 (emphasis in original).

The Board has been more than clear in stating and restating that the leaks at issue are only those that involve such great flowrates that the buried pipes and tanks at issue cannot perform their intended safety function. For instance, in an effort to be as explicit as possible, the Board in its Summary Disposition Order clarified twice in the same paragraph which types of leaks it would and would not consider:

> To begin with, we note that prevention of leaks *per se* is not a stated objective of any relevant aging management program. On the other hand, *prevention of an aging-induced leak large enough to compromise the ability of buried piping or tanks to fulfill their intended safety function is indeed a clear goal of an AMP*. Thus, at issue here is the following fundamental question: Do the AMPs for buried pipes and tanks, by themselves, ensure that *such safety-function-challenging leaks* will not occur, or must some sort of leak detection devices such as the monitoring wells proposed by Intervenors be installed to meet that obligation?

Summary Disposition Order at 17 (emphasis added). The Board reiterated the point in its Scheduling Order:

> The single admitted contention relates to whether or not Applicant's AMPs are sufficient to enable it to determine whether or not certain buried pipes and tanks are *leaking at such great rates that they cannot satisfy their respective intended safety functions*. Therefore, unless and until the Applicant expressly advises this Board and the Agency that it intends to rely upon monitoring wells for making its determination that buried pipes and tanks are not *leaking at such great rates that they cannot satisfy their intended safety functions*, information related to monitoring wells is irrelevant to the issues at hand before this Board.

Scheduling Order at 1-2 (emphasis added). Finally, in its Reconsideration Order the Board again asserted that only those leaks that occur at such great rates so as to cause the in-scope buried pipes and tanks that contain or may contain radioactive liquids to fail to satisfy their

intended safety functions would be considered.[23] In addition, the purpose of the AMP is to manage aging, not to prevent leaks, *per se.*

This issue represents only a small portion of a much larger effort on the part of Pilgrim Watch to bring in issues that have been explicitly excluded by the Board.

4. Tritium

Pilgrim Watch and its expert witnesses make extensive references to "newly discovered Tritium leaks," *see e.g.* PW Statement at 85-86, to provide support for their view that "a rigorous and expanded Monitoring Well program should be ordered and immediately undertaken at and around the Pilgrim Nuclear Plant Site." *Id.* at 86. For example, Mr. Gundersen claims that "the recently discovered Tritium releases show that undetected leaks may already have occurred, in Pilgrim's underground pipes and tanks, thereby causing them to malfunction in such a way as to be '*unable to perform the intended safety functions'*." Gundersen Testimony at 15. Further, Dr. Ahlfeld, talks about the discovery of "tritium at levels up to about 3000 pCi/L in monitoring wells on site," which "highlight[s] flaws in the monitoring systems at PNPS and provide a contrast to appropriate monitoring design." PW Statement at 91; Declaration of David P. Ahlfeld, PhD, PE

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[23] *See e.g.* Reconsideration Order at 5 ("Nonetheless, imbedded in Pilgrim Watch's original contention was the concept that the application and the Applicant's AMPs appear to fail to set out programs which enable the Applicant to determine whether those buried pipes and tanks containing radioactive fluids are *leaking at such great rates that they would fail to satisfy their respective safety functions* – and that inquiry is proper subject matter for a challenge to a license extension application. Thus we reformulated the contention when we admitted it to focus upon this latter inquiry.") (emphasis added); *Id.* at 6 ("a contention must be relevant to the determination the Agency must make – in this instance whether or not the Applicant has programs and procedures in place which enable it to determine whether buried pipes and tanks containing radioactive fluids are able to satisfy their intended safety functions despite leaks - i.e. to determine that there are not *leaks at such great rates so as to cause those pipes or tanks to fail to satisfy those safety functions*.") (emphasis added); and *Id.* at 8 ("As our earlier Orders have made consummately clear, currently before the Board is the contention that either the application omits to describe the programs and procedures by which it will determine whether or not buried pipes and tanks containing radioactive fluids are *leaking at such great rates that they cannot satisfy their respective designated safety functions*, or that there are no such programs.") (emphasis added).

Regarding Groundwater Monitoring Requirements for PNPS, (Jan. 29, 2008) ("Ahlfeld Testimony").

Neither of Pilgrim Watch's witnesses have provided any concrete link between the tritium discovered onsite and potential leaks in buried pipes and tanks. Dr. Ahlfeld even acknowledges that the tritium might not have come from a leak in a buried pipe or tank. Ahlfeld Testimony at 4. He goes so far as to speculate about the numerous alternative ways tritium may have migrated into the existing monitoring wells, without even postulating that it had to have been from a leak in an underground pipe or tank. *Id.* Without that critical piece of evidence, the mere fact that tritium was discovered onsite has no probative value or relevance to the issue at hand. Further, any discovery of tritium, even if it had originated from a leak in a buried pipe or tank, is a current operating issue and thus not a proper subject for license renewal proceedings. *See e.g., Turkey Point*, CLI-01-17, 54 NRC at 10 ("Issues . . . which already are the focus of ongoing regulatory processes - do not come within the NRC's safety review at the license renewal stage.").

In sum, monitoring wells are "not relevant unless and until the Applicant advises that it intends to rely upon such wells to make the ["the determination whether buried pipes and tanks containing radioactive fluids are leaking at rates so great as to render them incapable of satisfying their intended safety functions"]." Reconsideration Order at 4-5. Entergy has not stated that they intend to use the four existing wells as part of the AMPs; therefore, there is no litigable issue regarding discovery of any previous tritium leaks in relation to those wells' performance.

5. Seismic Activity

Pilgrim Watch claims that the AMPs are inadequate because there is "no evidence that the buried pipes were analyzed for potential seismic events" during the period of extended operation. PW Statement at 35-36. This is an entirely new issue and should not be entertained

because Pilgrim Watch has failed to address the criteria for late filing required by 10 C.F.R. § 2.309(e)(2). Even if Pilgrim Watch had addressed the criteria for late-filed contentions, this issue would be inadmissible. The adequacy of a plant's seismic analysis is a design issue and is part of a plant's CLB.[24] It is outside the scope of license renewal and is, therefore, not appropriate for consideration in a license renewal proceeding. *See Turkey Point*, CLI-01-17, 54 NRC at 6. Furthermore, seismic activity is not an aging effect. The AMPs were never required to address potential seismic events and the issue is irrelevant to Contention 1.

6. Radioactive Contamination of Groundwater

Pilgrim Watch continues to discuss radioactive contamination of groundwater, PW Statement at 63-64, Gundersen Testimony at § 12.4.5.5, even though the Board has explicitly stated that it is not in dispute here, a fact which Pilgrim Watch even acknowledges.[25] Pilgrim Watch however contends that because the Applicant has addressed radioactive contamination in its LRA, therefore the potential health effects of any such contamination are still within scope of Contention 1.[26]

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[24] When nuclear power plants are first licensed, all "cooling water, component cooling, and auxiliary feedwater systems or portions thereof, including the intake structures, that are required for (1) emergency core cooling, (2) post-accident containment heat removal, (3) post-accident containment atmosphere cleanup, (4) residual heat removal from the reactor, or (5) spent fuel storage pool cooling" are designated as Seismic Category I structures, systems, and components; therefore, they must be built to withstand the effects of safe shutdown earthquakes ("SSE") and remain functional. "Seismic Design Classification," NRC Regulatory Guide 1.29, Rev. 4 at 3-4 (Mar. 2007).

[25] PW Statement at 62 ("although not of interest to the ASLB, a leak of contaminated water into Cape Code Bay could negatively impact public safety.").

[26] "The high safety risk has little to do with whether the pipes carry enough water from point A to point B; instead the risk rests only on one thing – public and worker's health may be adversely affected because of the leakage from pipes carrying radioactively contaminated water. Any acceptable AMP must ensure, with not less than 95% confidence that the public health will not be affected by such leakage. The procedures that Entergy has provided will not provide 95% confidence that leakage will be detected before it gets to a place where it could affect public health – into Cape Cod Bay and on our beaches and dinner tables – or affect worker's health." PW Statement at 88.

Simply because the Applicant may have addressed the subject of radioactive contamination in their LRA does not automatically make it a litigable issue, especially when a Board specifically excludes it from litigation. *See* 10 C.F.R. § 2.309. The Board was clear in its Summary Disposition Order about peripheral issues that were not in scope:

> Our statement in ruling on the admissibility of Contention 1, that (while doses not in violation of NRC regulations could not be litigated) issues relating to doses in violation of NRC regulations "may be litigated," should not be interpreted to mean that we see any relevant, litigable dispute at this point regarding any health effects of leaking radioactive liquid.

Summary Disposition Order at 18. The Board went on to elaborate in footnote 81:

> It goes without saying that detection of leaks would indeed protect the public health — whether by assuring that components perform intended functions, by otherwise preventing doses to the public in violation of NRC regulations, and/or by any other means. But issues concerned with monitoring of radiological releases, or determinations of how leakage could harm health or the environment, are not legitimately in dispute here, because they do not relate to aging and/or because they are addressed as part of ongoing regulatory processes. *See*, *e.g.*, *Pilgrim*, LBP-06-23, 64 NRC at 275-77.)

Id. The Board again addressed this matter in its recent Reconsideration Order. It stated that:

> where Pilgrim Watch's original formulation of its contention focused upon the potential for surface and groundwater contamination from radioactivity contained by certain of the Applicant's buried pipes and tanks, that subject is a matter managed by the Applicant's ongoing monitoring programs, and is therefore outside the scope of matters properly considered in license extension hearings. Therefore, we denied admitting a contention directed at that particular subject.

Reconsideration Order at 5. This issue is thus clearly not in contention and is therefore irrelevant to Contention 1.

7. Leak Before Break

Pilgrim Watch attempts to apply the concept of "leak before break" to the underground piping at Pilgrim, saying: "Whereas small leaks do not pose a serious challenge by themselves

to the ability of the buried piping in the condensate system, for example, to get the required water volume from the condensate storage tank to the RCIC/HPCI systems, the 'leak before break' concept suggests that the small leak could be indicative of deteriorating conditions that could lead to a pipe break." Pilgrim Watch Statement of Position at 19. However, as testified to by Dr. Davis, leak before break is not applicable to Pilgrim. Staff Rebuttal at A6. It is applicable to high energy piping in pressurized water reactors ("PWR") and concerns high energy pipe breaks, such as during postulated loss of coolant accidents ("LOCA"), where a pipe will leak and the leak will be detected before a flaw reaches the fracture mechanics critical flaw size and the pipe ruptures. *Id.* It is used to analyze the behavior of cast stainless elbows, for instance. Leak before break does not apply to the condensate storage ("CS") or salt service water ("SSW") buried piping at the Pilgrim site. *Id.* Leak before break also does not apply to buried stainless steel, carbon steel, or titanium piping. *Id.*

8. Leakage Events at Other Plants

Pilgrim Watch's Statement of Position and witness testimony make extensive references to leakage events at other plants in an attempt to demonstrate Pilgrim's supposed inadequate leak detection program.[27] Pilgrim Watch never attempts to draw any real correlation between characteristics or specific events at those plants and Pilgrim. And, in fact, the events cited by Pilgrim Watch cannot be correlated to this case.[28] More importantly, the Board clearly stated in their scoping comments from the Summary Disposition Order that those types of tenuous anecdotes are not appropriate for consideration in this proceeding. Summary Disposition Order at 18-19 ("For clarity, we also note that the following matters are not in dispute: . . . leakage

[27] *See e.g.,* PW Statement at 22-23 (references to Byron, Palisades, and Catawba to show that "[t]he 'epidemic' of reported leak events recently demonstrates the correlation between aging and corrosion . . ."); 78 (five monitoring wells at Palisades were installed after the SER concluded "that the effects of aging would be managed to their satisfaction" and that "22,000 pico-curies per liter" were discovered; interestingly however, Pilgrim Watch never expanded on exactly what substance it was that Palisades discovered); Pilgrim Watch Ex. 1 at 5. ("All parties involved in these proceedings to evaluate the viability of a 20-year life extension to the aged Pilgrim Nuclear Power Station are certainly aware that leaks in underground piping and tanks have frequently occurred at other operating nuclear power plants").

[28] Although the Board has excluded evidence regarding other plants, the Staff believes that comment is appropriate here and notes that in its discussion of Byron (PW Statement at 22-23),Pilgrim Watch never explains how a leak in a *non-buried* section of pipe at different plant (Byron) demonstrates that there are deficiencies in Pilgrim's plans for managing aging of its own *buried* pipes and tanks. *Id*; Byron Station, Units 1 and 2 Special Inspection – Degradation of the Essential Service Water Riser Piping to the Cooling Tower Basin 05000454/2007009(DRS) AND 05000455/2007009(DRS) and Preliminary White Finding, Summary of Findings at 5, (Feb. 21, 2008) (Staff Ex. 25) (describing the relevant sections of piping at Byron as being housed in above-ground vaults). Unlike the buried pipes at Pilgrim that are within Contention 1's scope, the Byron pipes were above ground and exposed to air-water mist from cooling towers, and rainwater being channeled towards the vault's drainage system; furthermore, unlie the Pilgrim buried pipes, which are either made of corrosion-resistant materials or protected against corrosion by various measures (*e.g.* coatings, linings, etc.) these Byron pipes were made of uncoated, unprotected carbon steel. *See id.* ("The riser pipe leak was caused by a loss of pipe wall thickness due to external corrosion induced by the wet environment surrounding the unprotected carbon steel pipe."), Finally, Byron has not applied for a renewed license, therefore the leak at Byron clearly did not relate to any license renewal related aging management plans. It is unclear, therefore, how Pilgrim Watch's reference to the Byron leak relates in any material way to the adequacy of Pilgrim's specific plans for managing aging of its buried pipes and tanks.

events at other plants are not directly relevant to the issue at hand. While these events may provide relevant information regarding the potential usefulness of monitoring wells in detecting leaks, what is relevant, as Pilgrim Watch appears to agree, is the uniqueness of the Pilgrim plant and what may be required with regard to it.").

9. Cathodic Protection

Pilgrim Watch alleges that cathodic protection, along with other methods, is required to decrease risk. PW Statement at 42-43. But, as pointed out by Dr. Davis, there is no requirement by either the NRC or the American Society of Mechanical Engineers ("ASME") to use cathodic protection for buried pipelines. Staff Rebuttal Testimony at A8.

10. Other Issues

Pilgrim Watch cites a proposed rule relating to decommissioning planning to reduce the proliferation of legacy sites with insufficient funds to decommission.[29] PW Statement at 89; PW Ex. 24. The proposed rule would require licensees to survey and keep records of residual radioactivity on their sites. *Id.* Pilgrim watch also cites the Groundwater Contamination (Tritium) at Nuclear Plants Task Force—Final Report (Sept.1, 2006). *Id.* at 70. Neither of these issues are relevant to the matter at hand. Both of them are concerned with current operating issues and thus are out of scope for license renewal.

D. In-Scope Systems

Contrary to Pilgrim Watch's Initial Statement of Position and the testimony of Dr. David P. Ahlfeld, the standby gas and fuel oil systems[30] are not in scope for Contention 1 as admitted

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[29] PW Ex. 24: Decommissioning Planning, Proposed Rule, 73 Fed. Reg. 3,812 (Jan. 22, 2008).

[30] Dr. Ahlfeld refers to both the offgas and fuel oil systems as in scope (Ahlfeld Testimony at 1), whereas Pilgrim Watch's Statement of Position only says that the standby gas system is in scope (PW Statement at 10, 14).

by the Board. When the Board admitted Contention 1, it limited the contention's scope "to those underground pipes and tanks that do fall within those described in 10 C.F.R. Part 54."[31] Pilgrim Watch's Contention 1 addresses only those buried pipes and tanks within the scope of license renewal "that contain radioactive liquid . . . BOTH by design and not by design."[32] As explained in the Staff Statement and Testimony, while there are six buried piping systems[33] and one buried tank[34] within the scope of license renewal, of those buried pipes, only the CS system contains radioactive water by design. Davis Testimony at A7. There is a small possibility that the SSW system, which contains non-radioactive cooling water, could become cross contaminated. *Id*. Pilgrim Watch claims that "when the plant shuts down, [for any reason including regularly scheduled refueling] radioactive water could collect in and leak from the offgas system piping." However, there is no possibility for the standby gas system to contain radioactive liquid, either by design or not by design. Therefore, for purposes of Contention 1, the only systems that need to be addressed are the CS and SSW piping systems.

E. Intended Safety Functions

In the Scheduling Order, the Board specifically asked the parties to "clearly identify each buried pipe and tank which may potentially contain radioactive fluids" and "identify the intended *safety* function of such pipe or tank." Scheduling Order at 2-3 (emphasis added). Contrary to Pilgrim Watch's Statement of Position, the CS and SSW systems have clearly delineated

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[31] Memorandum and Order on Contentions at 66.

[32] Pilgrim Watch Answer Opposing Entergy's Motion for Summary Disposition of Pilgrim Watch Contention 1 (June 27, 2007) at 9.

[33] The CS system, SSW system, the standby gas service system, the fuel oil system, the station blackout diesel generator system, and the fire protection system. Davis Testimony at A7.

[34] The fuel oil diesel tank, but it does not contain any radioactive liquid. Davis Testimony at A7.

functions, which are vastly different than the ones outlined by Pilgrim Watch. Pilgrim Watch claims that all buried pipes and tanks have the same four intended safety functions:

> (1) keeping the liquid inside the component and not to allow leakage into the ground, the principle function of any pipe; (2) service the system it feeds; (3) prevent radioactive contamination from entering the ground that could result in significant harm to the health and safety of the public; and (4) prevent future legacy sites.

PW Statement at 90, with "their primary intended function" being to "isolate[] the liquid from the environment, *id.* at 99.

Rather than providing expert testimony to support this position, as required by 10 C.F.R. § 2.337(a), Pilgrim Watch merely hypothesizes about what it feels the intended safety functions should be. Experts must be qualified by ''knowledge, skill, experience, training, or education'" and their opinions must have an adequate factual basis and not merely constitute bare assertions, "'subjective belief or unsupported speculation.'" *See Savannah River*, LBP-05-04, 61 NRC at 80-81 (*quoting* Federal Rule of Evidence 702 and *Daubert*, 509 U.S. at 589-90). Without providing the appropriate basis for their statements, to questions specifically asked by the Board in the Scheduling Order at 2-3, the Staff submits that Pilgrim Watch's answer should not be credited.

The Staff, on the other hand, provided appropriately supported responses by qualified experts with the knowledge, skill, experience, training and education to respond that the CS system does not provide a credited safety function. Staff Rebuttal Testimony at A18; Chan and Keim Testimony at A7. It does, however, provide the preferred supply of water to the high pressure coolant injection ("HPCI") and reactor core isolation cooling ("RCIC") systems. *Id*. The SSW system provides a heat sink for the reactor building closed cooling water ("RBCCW") system under transient and accident conditions. Chan and Keim Testimony at A11. Therefore, these are the only intended safety functions that should be analyzed by the Board when judging the sufficiency of the AMPs.

F. Baseline Analysis

Pilgrim Watch and Mr. Gundersen contend at multiple points throughout the Initial Statement of Position and testimony that baseline analyses are needed to assure an adequate AMP. *See* PW Statement at 32 ("it is important that every weld should be inspected from the inside and the damage assessed to establish a 'baseline' analysis for any future AMP."), 54 ("the aging management program must be enhanced and Pilgrim required including a complete and thorough base line analysis prior to license extension."), 56, 63 ("Any program worth its salt would require a thorough baseline inspection along the entire length of pipe."), 77, 83-84, and 100. However, baseline inspections are not required. Staff Rebuttal Testimony at A12. Nevertheless, Entergy's Specification No. 6498-M-306 (Entergy Ex. 3 at 3) still contains what is essentially a baseline inspection. Staff Rebuttal Testimony at A13.

G. Office of the Inspector General ("OIG") Report

Pilgrim Watch refers to the Inspector General's report on its audit of the license renewal program,[35] insisting that "[u]ntil the problems identified by the OIG are fixed and proper NRC staff inspections performed at Pilgrim, the license application should be put on hold."[36] PW

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[35] Office of Inspector General (OIG) Report, *Audit of NRC's License Renewal Program* (OIG-07-A-15) (Sept. 6, 2007) ("OIG Report").

[36] The OIG Report has served as the impetus for a joint petition filed with the Commission on January 3, 2008, by Pilgrim Watch and intervenors (and prospective intervenors) in other license renewal proceedings (specifically, Vermont Yankee, Oyster Creek, and Indian Point). This Commission petition requests that the Commission (1) order an "overhaul" of the Staff's license renewal review process and (2) suspend the Pilgrim proceeding and the other renewal proceedings pending the completion of this requested "overhaul." A Commission decision on the petition is still pending. The petition, the NRC Staff's response, and other related filings were served upon the Board when initially filed.

The Staff also notes that its response to the petition disputed the petitioners' claims regarding the significance of the OIG Report's findings. Accordingly, the Staff opposed the petitioners' call for the Commission to suspend ongoing renewal proceedings. *See generally* NRC Staff Answer to Petition for Suspension of License Renewal Reviews Pending Investigation of NRC Staff License Renewal Process (Jan. 18, 2008).

Statement at 80. Pilgrim Watch, however, acknowledges that "Entergy's License [Renewal] Application is at issue here, and not the quality of the NRC Staff's review and Final [Safety Evaluation] Report." PW Statement at 77. Yet, after admitting the well-settled fact that the Staff's review is *not* material, and notwithstanding that it is an untimely challenge, Pilgrim Watch goes on to contend that the Staff's review *is* material. According to Pilgrim Watch, its alleged concerns about the Staff's license renewal SER for Pilgrim[37] would support either (1) a Board finding against the Applicant[38] or (2) a suspension of the current proceedings.[39]

As the Commission has repeatedly made clear, "[i]t is the license application, not the NRC staff review, that is at issue in our adjudications."[40] Pilgrim Watch cites no statutes, regulations, or case law to support its proposition that alleged concerns about the quality of the Staff's review could justify a Board ruling against the Applicant, or even a Board ruling that the case should be suspended.[41] Indeed, even suspension of ongoing proceedings has been

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[37] The OIG Report did not, as even Pilgrim Watch notes, address the SER for Pilgrim's renewal application. PW Statement at 78.

The Staff also notes that its response to the petition disputed the petitioners' claims regarding the significance of the OIG Report's findings. Accordingly, the Staff opposed the petitioners' call for the Commission to suspend ongoing renewal proceedings. *See generally* NRC Staff Answer to Petition for Suspension of License Renewal Reviews Pending Investigation of NRC Staff License Renewal Process (Jan. 18, 2008).

[38] PW Statement at 101.

[39] *Id.* at 80.

[40] *Duke Energy Corp.* (Oconee Nuclear Station Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 338 (1999) (*quoting Baltimore Gas & Electric Co.* (Calvert Cliffs Nuclear Power Plant, Units 1 and 2), CLI-98-25, 48 NRC 325, 350 (1998)); *see also* Changes to Adjudicatory Process, Final Rule, 69 Fed. Reg. 2,182, 2,202 (Jan. 14, 2004) (stating that the "adequacy of the applicant's license application, not the NRC staff's safety evaluation, is the safety issue in any licensing proceeding" and that "contentions on the adequacy of the [safety evaluation report, or SER] are not cognizable in a proceeding").

[41] The Staff also notes that, although the OIG Report was published on September 6, 2007, Pilgrim Watch's Initial Statement of Position, filed on January 29, 2007, is Pilgrim Watch's first attempt in these proceedings to argue before the Board that the OIG Report supports a challenge to the adequacy (continued. . .)

deemed by the Commission to be a "drastic action" that will rarely, if ever, be appropriate. *See Vermont Yankee Nuclear Power Corp. & AmerGen Vermont, LLC* (Vermont Yankee Nuclear Power Station), CLI-00-20, 52 NRC 151, 173-74 (2000) (stating that only "immediate threats to public health and safety" could justify granting suspensions); *Duke Energy Corp.*, (McGuire Nuclear Station Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-01-27, 54 NRC 385, 390 (2001) (noting that the Commission did not suspend ongoing proceedings while reexamining its rules following the Three Mile Island accident); *Pacific Gas & Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Installation), CLI-02-23, 56 NRC 230, 240 (2002) (refusing to suspend licensing proceedings pending Commission's post-September-11th review of security requirements for nuclear facilities).[42] Further, to the extent that Pilgrim Watch's request to put these proceedings "on hold" constitutes a motion to suspend the proceedings, it is certainly not based upon any new information that arose within the ten (10) days prior to its January 29th filing, making it untimely under 10 C.F.R. § 2.323(a).

In light of the Commission's clear direction that the NRC Staff's review is not at issue in licensing adjudications, as well as the other factors discussed above, the Board should reject

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(. . .continued)

of the Applicant's AMPs for buried pipes and tanks. Thus, in addition to raising immaterial concerns, Pilgrim Watch's attempt to expand the scope of this hearing is also untimely.

[42] The Staff notes that Pilgrim Watch also fails to demonstrate either (1) the sort of immediate threat to public health or safety necessary to support a suspension based on safety concerns, *see Vermont Yankee*, CLI-00-20, 52 NRC at 173-74, or (2) the irreparable harm necessary to satisfy the stay requirements under 10 C.F.R. § 2.342(e), *see Entergy Nuclear Vermont Yankee, LLC, & Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station), CLI-06-8, 63 NRC 325, 237 (2006). Given that the extended operation period would not take effect until June of 2012, the safety consequences, if any, of the renewed license are still at least four years away – plenty of time for the Commission to revisit the adequacy of the Applicant's buried pipes and tanks AMPs should doing so prove appropriate in response to the OIG Report. The Staff also notes that the Board would lack the authority to order the Staff to redo its safety review of the Pilgrim renewal application. *See Arizona Public Service Co.* (Palo Verde Nuclear Generating Station, Units 2 and 3), LBP-83-36, 18 NRC 45, 48-49 (1983).

Pilgrim Watch's untimely arguments that alleged shortcomings of the Staff's safety review justify either ruling against the Applicant or suspending the proceedings.

H. GALL Report

As outlined in the Staff Statement at 11-12, in September 2005, the NRC issued the Generic Aging Lessons Learned Report, NUREG-1801, Vol. 2, Rev. 1 (Sept. 2005) ("GALL Report"), which created a series of general AMPs the Staff determined are adequate to manage the aging effects of particular systems, structures and components that are subject to aging management reviews ("AMR"). Applicants may reference the GALL Report in their LRA, thus committing to the use of the generic AMP. Pilgrim's AMPs for their in-scope piping systems are consistent with the GALL Report, with some exceptions. The Board was clear that compliance with the GALL Report was "insufficient, for the purposes of contention admissibility considerations, to overcome [ ] factual challenges;" however, the Board stated that it would re-consider that argument on the merits "at the appropriate stage of the proceeding."[43]

Pilgrim Watch insinuates in some instances that a failure to comply with the GALL Report evidences an inadequate LRA. *See e.g.,* PW Statement at 43, 53-54, and 58-59. However, in other places, Pilgrim Watch claims that conformance with the GALL Report does not provide evidence of an adequate LRA. *See e.g., id.* at 51, 53, 56-57, and 72. Both of these broad arguments are inappropriate. Conformance or non-conformance with the GALL Report's generic AMPs must be evaluated on an AMP-by-AMP basis. General statements that the GALL Report is either sufficient or inadequate, especially when both inconsistent arguments are made in the same pleading, are inappropriate absent specific technical reasons with expert testimony providing support.

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[43] Memorandum and Order on Contentions at 64, n. 255.

I. Rates of Aging and Corrosion

Pilgrim Watch cites to a Union of Concerned Scientists article that correlates a NASA-created "Bathtub Curve" to the aging of nuclear power plants to allege that "aging of mechanical components follow the 'bath-tub' curve and the mere fact that it is a curve means that the failure rate is non linear" and is in fact "exponential." PW Statement at 20, 24. However, as explained by Dr. Davis, the bathtub curve is not relevant to the buried piping at Pilgrim because the stainless steel and titanium piping would not show bathtub curve behavior. Staff Rebuttal Testimony at A9. In addition, Pilgrim Watch's reliance on Dr. Bellanger's research[44] is misplaced, since the research is not relevant to or comparable with light-water reactors. *Id.*

J. Condition Reports

Pilgrim Watch takes issue with the portion of the Buried Pipes and Tanks Inspection Program ("BPTIP") that requires condition reports ("CR") to be written if acceptance criteria are not met. PW Statement at 52. However, the complaints voiced by Pilgrim Watch and its witness evince a lack of understanding of the CR process. Pilgrim Watch complains that '[t]he only requirements if acceptance criteria are not met are to write a report (there is no indication that the report is shared outside of Pilgrim) and to leave any decision about what to do, or not do, to the engineering department. This can hardly be interpreted as providing 'reasonable assurance' to the public." *Id.* There is a clear implication, with no basis, that even if the acceptance criteria are not met, the only action that is required is the writing of a CR. *Id.* at 67; Gundersen Testimony at § 12.4.8.3.

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[44] Pilgrim Watch cites to Dr. Gilbert Bellanger's publication *Corrosion Induced by Low-Energy Radionuclides: Modeling of Tritium and Its Radiolytic and Decay Products Formed in Nuclear Installations* in an attempt to show that "low energy radionuclides will hasten degradation in pipes carrying radioactive material by degrading the passive oxide layer." PW Statement at 26.

As explained by Dr. Davis, Appendix B, § XVI to 10 C.F.R. Part 50 requires that measures be established "to assure that conditions averse to quality . . . are promptly identified and corrected." Staff Rebuttal Testimony at A15. A root cause analysis is also required. *Id.* Documentation and retrievable records (10 C.F.R. Part 50, App. B, § XVII) are required. *Id.* Pilgrim's Appendix B program is fully applicable to all AMPs. *Id.* Thus, Pilgrim Watch's concerns are without a valid basis.

K. Flow Accelerated Corrosion ("FAC")

Pilgrim Watch claims that because Entergy did not address FAC that there is no assurance that leaks in the buried pipes in scope will not leak at such great rates such that their intended safety function will not be compromised. PW Statement at 32-33. Entergy has submitted a Flow-Accelerated Corrosion AMP in its LRA, which the Staff satisfactorily reviewed in the SER. LRA § B.1.14 at B-50-51; SER § 3.0.3.1.4 at 3-17-18. However, FAC is not a factor in the degradation of the buried pipes at Pilgrim. Staff Rebuttal Testimony at A5. FAC has never been observed in service water piping or buried CS piping. *Id.*

Moreover, this concern essentially amounts to a late-filed contention. Pilgrim Watch has neither met, nor even discussed, any of the late-filed contention requirements; therefore, it should not be considered by the Board.

L. Technically Incorrect and/or Unsupported Statements

Pilgrim Watch makes numerous technically incorrect and/or unsupported statements. These include statements about corrosion,[45] Staff testimony,[46] debris and the Bernoulli

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[45] For example: "Stainless steel and titanium are known as passive metals which form a "passive" oxide layer on their surface that makes it immune to general corrosion until the oxide layer is breached, which *will eventually happen*; then corrosion occurs on the bare metal underneath. The oxide layer can be breached by a variety of factors." PW Statement at 26. *See also id.* at 40-41, 58, 75-76.

[46] *See* PW Statement at 72, 79.

principle,[47] and a Brookhaven Report[48]. While the Staff has addressed these and other inaccurate statements in the Staff Rebuttal Testimony filed herewith, the Staff will provide a brief summary of a selection of the issues below.

Contrary to what Pilgrim Watch states about corrosion rates, if the oxide layer is ruptured, titanium and stainless steel will spontaneously repassivate at a rate too fast to accurately record. Staff Rebuttal Testimony at A9. Thus, they will not show the bathtub curve behavior discussed by Pilgrim Watch. *Id.*

Also, Pilgrim Watch misrepresented Dr. Davis' initial testimony, by implying that he was of the opinion that reliance on industry practice regarding the prevention of corrosion needed to be qualified. PW Statement at 72. As explained by Dr. Davis in the Staff Rebuttal Testimony, Entergy has a procedure for testing the aggressiveness of soil and takes several precautions to ensure that the piping is not buried in an aggressive environment. Staff Rebuttal Testimony at A4. Pilgrim also uses protective coatings and inspections to mitigate corrosion. *Id.* at A10. Pilgrim also has a program to prevent damage to the buried piping. *Id.* There is no evidence that the coatings on the buried piping have been damaged. *Id.* Dr. Davis concluded that the coatings have not suffered any damage and were not placed in an aggressive soil environment. *Id.*

It is correct that the Brookhaven Report referenced by Pilgrim Watch, "Risk Informed Assessment of Degraded Buried Piping Systems in Nuclear Power Plants," does address age-

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[47] "Corroded pipes not only allow liquid to leak into the ground/groundwater in violation of their intended function; but also allow debris to enter the pipe through the crack or hole and risk harming the system down-stream . . . The higher the velocity of the liquids moving inside the pipes; the greater the opportunity for debris from outside to get inside the pipe." PW Statement at 18-19. *See also* Gundersen Testimony at § 17.2.

[48] *See* PW Statement at 12, 17-18, 20, 25-18, 30-31, 41, 43, 45-56, 50, 58, and 82; PW Ex. 8.

related degradation of buried piping at nuclear power plants and creates guidance for NRC Staff to analyze and assess the condition of such degraded buried piping. Staff Rebuttal Testimony at A21. However, it does not attempt to conclude what leakage is acceptable or not acceptable, nor does it address the capability of a system which contains the degraded buried piping to fulfill its intended safety function. *Id.* For instance, Pilgrim Watch misquotes a section of the Report in a way that makes it appear the Report concludes that degraded piping could "impact the overall safety" of nuclear power plants. PW Statement at 17. The Report however is careful not to conclude that all degradation has the potential of impairing the safe operation of a system. Staff Rebuttal at A22.

Finally, regarding Pilgrim Watch's statement that the Bernoulli principle somehow supports its theory that debris from outside the piping will enter the pipes due to increasing velocities of the liquid inside the pipe,[49] (*see* n. 47, supra.), the normal pressure inside the piping will readily overcome the negative contribution of the Bernoulli principle, such that the liquid will leak out of the pipe, rather than any debris being pulled into the pipes. *Id.* at A23.

VI. Staff Response to the Board's Questions

The Staff has provided the following answers to the Board's questions.[50]

Qa. In follow-up to the Board's questions of January 31, 2008, we direct the Licensee to address the following fundamental question regarding the Condensate Storage System ("CSS"): How large of a leak can the CSS withstand before its ability to satisfy its intended safety function is challenged, and how small of a leak is certain to be detected? The other parties may reply to this inquiry to the extent of their capability to do so.

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[49] *Id.* at 18, n.24.

[50] *See* Staff Rebuttal Testimony at A15.

Aa. (ATK) The Staff does not have detailed design information for this system. However, the Staff notes that the CS system does not have a credited safety function.

Qb. With regard to corrosion-induced small leaks that might grow rapidly into large enough leaks to challenge the ability of the CSS to satisfy its intended safety function, the parties shall provide, to the extent of their capability, concise and specific technical testimony addressing the reasonably expected growth in leakage rate over times ranging from at least four hours to three days.

Ab. (JAD) The only way that a leak could form in the stainless steel CS system piping is by pitting or corrosion of the heat affected zone as a result of microbiologically- influenced corrosion ("MIC"). Neither of these types of corrosion has been observed at Pilgrim. Once a leak starts, it will not grow rapidly and the leak rate will not be expected to noticeably increase over four days. The flow of water out of the leak source would be too low to cause erosion. There would be an almost unnoticeable increase in leak rate.

CONCLUSION

For the reasons discussed above and in the testimony filed herewith, a careful evaluation of the evidence demonstrates that the AMPs for buried piping at Pilgrim are adequate to manage the effects of aging in accordance with 10 C.F.R. Part 54, and that Pilgrim Watch's challenge to the LRA for the Pilgrim operating license filed by Entergy cannot be sustained.

Respectfully submitted,

/RA/

Susan L. Uttal
Kimberly A. Sexton
James E. Adler
Counsel for NRC Staff

Dated at Rockville, Maryland
this 6th day of March, 2008

March 6, 2008

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

REBUTTAL TESTIMONY AND RESPONSES TO BOARD QUESTIONS OF DR. JAMES A. DAVIS, TERENCE L. CHAN AND ANDREA T. KEIM CONCERNING PILGRIM WATCH CONTENTION 1

James A. Davis ("JAD"), Terence L. Chan ("TLC") and Andrea T. Keim ("ATK"), do hereby state as follows:

Q1. Please state your name.

A1a. (JAD) James A. Davis.

A1b. (TLC) Terence L. Chan.

A1c. (ATK) Andrea T. Keim.

Q2. Have you provided testimony previously in this matter?

A2. (JAD) (TLC) (ATK) Yes. This testimony is in addition to my previous testimony in this matter and is provided to specifically respond to issues raised in the prefiled testimony of the Pilgrim Watch witnesses and also to respond to the Licensing Board's questions in its Order dated February 21, 2008.[1]

Q3. Have you reviewed the testimony of the Pilgrim Watch witnesses?

A3. (JAD) (TLC) (ATK) Yes, I have reviewed the testimony of Mr. Gundersen and Dr. Ahlfeld.

1 Order and Notice (Regarding Hearing, Limited Appearance Session and Additional Questions for Parties (Feb. 21, 2008) (unpublished).

Q4. Pilgrim Watch asserts that the aggressiveness of the soil has not been properly evaluated.[2] Does Entergy have a procedure for testing the aggressiveness of soil?

A4. (JAD) Yes, Entergy Specification EN-DC-343 gives the procedure for testing the aggressiveness of soil.[3] In addition, in Entergy's Testimony, the witnesses state that there are three precautions taken to ensure that the piping is not buried in an aggressive soil environment. Entergy Testimony at A83. First, the piping is buried using select backfill. *Id.* Second, during construction, all rocks over 6 inches, shrubs, and trees are removed from the backfill. *Id.* Third, when Pilgrim was erected, a storm drain system was installed to prevent the buildup of water; and buried pipes are buried above the water table. *Id.*

Q5. Pilgrim Watch claims that Entergy's failure to address Flow Accelerated Corrosion ("FAC") in its License Renewal Application ("LRA") is a deficiency. PW Statement at 32-33. Is FAC an aging mechanism that is of concern for buried piping containing radioactive contaminated water?

A5. (JAD) No. Pilgrim Watch suggests that FAC would be a factor in the degradation of the buried pipes at Pilgrim in their testimony as follows:

> **7.2.3. Flow Accelerated Corrosion (FAC)**: FAC is a pipe wall thinning phenomena in which the thinning rate is accelerated by flow velocity. FAC includes wall thinning by electrochemical corrosion, erosion-corrosion and cavitation-corrosion. All three are affected by flow velocities. Although the main causes of FAC (turbulence intensity, material compositions, oxygen content and pH) have been identified, the behavior of FAC is not completely understood...."

PW Statement at 32-33.

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2 Pilgrim Watch Presents Statements of Position, Direct Testimony and Exhibits under 10 CFR 2.1207 at 56 (Jan. 29, 2008, modified Mar. 3, 2008) ("Pilgrim Watch Statement" or "PW Statement").

3 Testimony of Alan Cox, Brian Sullivan, Steve Woods, and William Spataro of Pilgrim Watch Contention 1, Regarding Adequacy of Aging Management Program for Buried Pipes and Tanks and Potential Need for Monitoring Wells to Supplement Program (Jan. 8, 2008) ("Entergy Testimony"), Exhibit 5 at 10-16 ("Entergy Ex.").

There are a number of incorrect statements in Pilgrim Watch's testimony regarding FAC, which shows a complete misunderstanding of this phenomenon. Flow accelerated corrosion has never been observed in service water piping or buried condensate storage piping. As Pilgrim Watch's footnote[4] indicates, FAC occurs in feed water piping constructed from carbon steel with no internal lining. NRC Bulletin No. 87-01, "Thinning of Pipe Walls in Nuclear Power Plants,"[5] was written to request information concerning licensees' programs for monitoring the thickness of pipe walls in high-energy single-phase and two-phase carbon steel piping systems. High energy piping systems are piping systems that operate at temperatures above 200°F or above 275 pound per square inch gage ("psig") or both. Neither the CS system piping nor the SSW system piping qualify as high-energy piping systems and are therefore not subject to FAC.

The Electric Power Research Institute has developed several computer codes to give guidance to operators of nuclear power plants on how to inspect for flow accelerated corrosion in feedwater piping. The programs are Checkmate and Checkworks. These programs determine where flow accelerated corrosion is most likely to occur and guidance is given on how to inspect for flow accelerated corrosion. Basically, the licensees place a grid on the outside of the pipes and make periodic ultrasonic thickness measurements in the high susceptibility locations. Licensees may select additional locations to monitor in addition to the locations predicted by Checkmate or Checkworks. In areas where flow accelerated corrosion is identified, the carbon steel piping is replaced with carbon steel that contains 2% chromium, a material like stainless steel or titanium that is resistant to flow accelerated corrosion. Contrary to Pilgrim Watch's statement, PW Statement at 33, the computer code RELAP cannot be used to predict where flow accelerated corrosion might occur.

Q6. Is "leak before break" applicable to buried piping?

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4 PW Statement at 33, n.45.

5 Staff Exhibit ("Staff Ex.") 21.

A6. (JAD) No. On page 19 of Pilgrim Watch's Statement of Position, the argument is made that

> Monitoring wells and a more robust inspection protocol are necessary to detect small leaks from the buried piping/tanks that, left alone, could become larger leaks. Whereas small leaks do not pose a serious challenge by themselves to the ability of the buried piping in the condensate system, for example, to get the required water volume from the condensate storage tank to the RCIC/HPCI systems, the **"leak before break"** concept suggests that the small leak could be indicative of deteriorating conditions that could lead to a pipe break. But "indicative" only works if one has the means to recognize the indication.

However, leak before break is not applicable to Pilgrim. It is a concept applied to high energy piping in PWRs. The leak before break concept concerns high energy pipe breaks, such as during postulated loss of coolant accidents ("LOCAs"), where a pipe will leak and the leak will be detected before a flaw reaches the fracture mechanics critical flaw size and the pipe ruptures. It is used to analyze the behavior of cast stainless elbows, for instance. Leak before break does not apply to the CS or SSW buried piping at the Pilgrim site. Leak before break also does not apply to buried stainless steel, carbon steel, or titanium piping.

Q7. Was any action taken by the NRC regarding the possibility that counterfeit pipes could have been used at nuclear power plants such as Pilgrim?

A7. (JAD) The NRC issued Generic Letter 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marked Products," in 1989 to advise holders of operating licenses and construction permits for nuclear power plants of ways to reduce the likelihood of the introduction of counterfeit or fraudulent products into their plants and to assure the quality of procured vendor products. Upon receipt of the generic letter, licensees were to take appropriate actions to avoid using counterfeit and fraudulently marked products using the methods identified in the generic letter.

Q8. Pilgrim Watch makes multiple statements about Entergy's supposed failure to use cathodic protection. Is there a requirement to use cathodic protection for buried pipelines?

A8. (JAD) No. There is no requirement to use cathodic protection for buried pipelines. There is no discussion of cathodic protection in 10 C.F.R. Part 50 or in the American Society of Mechanical Engineers ("ASME") Boiler and Pressure Vessel Code.

Q9. Is the bathtub curve relevant to the buried piping at Pilgrim?

A9. (JAD) No. Statements made in Pilgrim Watch's Statement of Position are incorrect. For instance, Pilgrim Watch states: "Stainless steel and titanium are known as passive metals which form a "passive" oxide layer on their surface that makes it immune to general corrosion until the oxide layer is breached, which *will eventually happen*; then corrosion occurs on the bare metal underneath. The oxide layer can be breached by a variety of factors." Pilgrim Watch Statement at 26.

While the portion of the statement about stainless steel and titanium being passive metals is correct, the rest of the statement is incorrect. Stainless steel and titanium spontaneously repassivate if the oxide film is ruptured. The time required for spontaneous repassivation is measured in nanoseconds and significant corrosion does not occur. The spontaneous repassivation experiments I have conducted showed repassivation rates too fast to accurately record. Therefore, the stainless steel and titanium piping at Pilgrim would not show the bathtub curve behavior.

Furthermore, the purpose of the aging management program Buried Piping and Tanks Inspection Program ("BPTIP") is to prevent region C of the bathtub curve from occurring.

Q10. Is Pilgrim Watch accurate in quoting Dr. Davis as follows:

> Mr. Davis, the NRC Staff's expert, in NRC Staff Response to Entergy's Motion of Summary Disposition, June 28, 2007, explained why relying on industry experience may need to be qualified. Davis said, at 16 [Pilgrim Watch Exhibit 11] that, '…industry practice has shown that properly applied coatings will prevent corrosion *as long as* the soil is not extremely aggressive (as Entergy states is not the case at Pilgrim) or *unless there is damage during application of the coating and handling of the pipe*.' [Emphasis added]."?[6]

6 PW Statement at 72.

A10. (JAD) No. Pilgrim Watch took the quote out of context, entirely ignoring my discussion of the program at Pilgrim. In the answer to Q9 of my testimony, I stated that:

> The BPTI AMP calls for using preventative measures to mitigate corrosion and periodic inspections to determine if corrosion is occurring that could affect the pressure-retaining capacity of the buried steel piping and tanks. The preventive measures to mitigate corrosion involve the use of protective coatings combined with periodic inspections. Corrosion can occur as a result of exposure to an aggressive soil environment. The four relevant aging effects are general, pitting, crevice corrosion, and microbiologically-influenced corrosion ("MIC"). Inspections are to be conducted each time the piping is uncovered for maintenance. For example, the coating and external surface of two 40 foot sections of piping on the discharge loops were examined in 1999 when the two 40 foot sections were replaced. The coatings were found to be in good condition and no external corrosion was noted. Those coatings were then removed to inspect the outside surface of the piping which was also found to be in good condition.[7]

This means that aggressive soils will not cause corrosion of buried piping with properly applied coatings. Corrosion will only occur if the coating is damaged and the aggressive soil contacts the steel where the coating has been damaged. There is no evidence that the coating has been damaged in the buried piping at Pilgrim.

In addition, Entergy discussed its program for preventing damage to the buried piping in its testimony:

> PNPS coatings exceed industry standards in two major respects. PNPS has generally double wrapped its buried piping. As described earlier, Specification No. 6498-M-306 provided for double wrapping of buried pipe consisting of a permanent protective coal-tar coating, fiberglass wrapping, another layer of coal-tar, a layer of insulation, and a final layer of heavy Kraftpaper. The standard industry practice, as set forth in AWWA C-203, requires a single wrapping for buried piping under normal soil conditions. AWWA C-203 does provide for double wrapping of pipe but only for unusual or severe conditions, such as when pipes are submerged under water. The coal-tar enamel permanent coating and bonded double outerwrap used at PNPS is specifically designed for use on submerged lines, river crossings,

7 NRC Staff Testimony of Dr. James A. Davis Concerning Pilgrim Watch Contention 1 at A9 (Jan. 29, 2008) ("Davis Testimony").

> or similar installations involving aggressive environments, or where trench conditions are extraordinarily severe, conditions that do not apply at PNPS.
>
> **Second**, it has been the practice at PNPS to wrap titanium and stainless steel buried piping, although neither is susceptible to corrosion caused by soil conditions. This is not the standard practice for the industry, which typically buries titanium and stainless steel pipe with no protective coatings because of their inherent corrosion resistance.

Entergy Testimony at A57.

Entergy also discussed the precautions taken to ensure that the soil environment around the buried piping is not aggressive. That includes placing the piping "on a bed of sand or specially engineered fill before it is covered by another layer of fill." *Id.* at A83. The sand or fill is very porous so water can percolate through, and therefore moisture is not retained and there is a high resistivity to corrosion. *Id.* In addition, during construction of Pilgrim, the site was excavated and all rocks over six inches, shrubs, and trees were removed from the soil. *Id.* "These two precautions serve to reduce the corrosivity of the soil environment experienced by the buried piping at PNPS. Additionally, . . . the soil's pH of 6.2-6.82 and Cl- content of 210 - 420 ppm show that neither of these factors creates an aggressive soil environment." *Id.*

Entergy went on to say:

> (SPW) In addition to surrounding buried pipe with sand or special fill material, as already described, two other important precautions are taken to prevent high levels of soil moisture from occurring: (1) when PNPS was erected, a storm drain system was installed to prevent the buildup of water; and (2) buried pipes are buried above the water table.

Id. at A84.

The combination of these statements provided additional information about the special precautions that are taken at Pilgrim in handling the coated pipe, in addition to the fact that the pipes are inspected using a high voltage holiday detector just prior to back filling, and demonstrate that the coatings had not suffered any damage during handling and that they were not placed in an aggressive soil environment.

Q11. Did Entergy find that its buried piping and tanks program was inadequate and develop the BPTIP because of the contention filed by Pilgrim Watch, as suggested by Mr. Gundersen in § 12 of his testimony?[8]

A11. (JAD) No. When Entergy prepared their application for license renewal, Entergy was required to identify any potential aging effects for systems, structures, and components in scope for license renewal and then provide an aging management program to manage the effects of aging for the period of extended operation in accordance with 10 C.F.R. § 54.21(a)(3). Entergy identified loss of material due to general, pitting, crevice, and MIC as the relevant aging effects and proposed the BPTIP to manage the effects of aging for the period of extended operation. LRA at 3.3-22.

Q12. Is a baseline inspection required for buried piping as suggested by Mr. Gundersen in his testimony at §§ 12.4.1.1 and 12.4.1.3?

A12. (JAD) No. However, in effect, there is a baseline inspection conducted and described in Entergy Specification No. 6498-M-306 (3 of 4). Entergy Ex. 3 at 3. After the pipe is coated, it is visually inspected and then inspected for cracks, dents, and holidays using a high voltage holiday detector. After field joints are prepared and coated, the piping is reinspected using the high voltage holiday detector prior to being buried using select backfill to avoid damage to the coating. *Id.*

Q13. Mr. Gundersen states that if buried piping with a low inspection priority is excavated for other reasons, then the procedure should have workers inspect the coatings when the piping is uncovered. Gundersen Testimony at §§ 12.4.5.4 -12.5.4.5. Is this done?

A13. (JAD) Yes. The BPTIP requires that regardless of inspection priority, when a section of buried piping is uncovered, it will be inspected.

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8 Declaration of Arnold Gundersen Supporting Pilgrim Watch's Petition for Contention 1 at § 12 (Jan. 26, 2008) ("Gundersen Testimony").

Q14. Mr. Gundersen comments in his testimony that the BPTIP is silent on internal corrosion. Gundersen Testimony at § 12.4.6.3. Is this correct?

A14. (JAD) Yes. The BPTIP only applies to external corrosion of buried piping. There are other programs that deal with internal corrosion such as the Service Water Integrity Program (LRA at § B.1.28) for SSW and the Water Chemistry Control – BWR Program (LRA at § B.1.32.2) for CS system.

Q15. What requirements are there to initiate a condition report ("CR") and what happens after it is initiated?

A15. (JAD) 10 C.F.R. Part 50 Appendix B, XVI states:

> Measures will be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the cause of the condition, and corrective action taken shall be documented and reported to appropriate levels of management.

10 C.F.R. Part 50 Appendix B, XVII states:

> Sufficient records shall be maintained to furnish evidence of activities affecting quality. The records shall include at least the following: Operating logs and the results of reviews, inspections, tests, audits, monitoring of work performance, and materials analyses. The records will also include closely-related data such as qualifications of personnel, procedures, and equipment. Inspection and test records shall, as a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any deficiencies noted. Records shall be identifiable and retrievable. Consistent with applicable regulatory requirements, the applicant shall establish requirements concern record retention, such as duration, location, and assigned responsibility."

Pilgrim's 10 C.F.R. Part 50 Appendix B program is applicable to all aging management programs that will be required during the period of extended operation. This includes all safety-related and non-safety related systems, structures and components covered by an AMP during the period of extended operation.

Every CR is reviewed briefly by the NRC Resident Inspectors at Pilgrim. In addition, there is an inspection module for auditing the CR process by selecting a sample of the CRs and conducting an in depth review of the CRs.[9] This audit is carried out by the Regional Inspectors on the selected CRs.

10 C.F.R. § 72.75 contains the criteria for determining which events must be reported to the NRC staff. Not all CRs are required to be reported to the NRC.

Q16. Does Entergy's program have commitments associated with each plant?

A16. (JAD) Yes. The commitments for license renewal for Pilgrim are presented in Appendix B of the Safety Evaluation.

Q17. Are the AMPs for buried piping containing radioactive liquids adequate?

A17. (JAD) I have stated that the buried pipes at Pilgrim that could potentially contain radioactive liquid have either been replaced or have not experienced external or internal degradation. In addition, aging of buried piping at Pilgrim is effectively managed by the Buried Piping and Tanks Inspection Program for the external surfaces, by the Service Water Integrity Program for SSW piping, and by the Water Chemistry Control – BWR Program and One-Time Inspection Program for the CS piping. The external inspection is a visual inspection that looks for any evidence of damaged wrapping or coating defects, such as coating perforation, holidays, or other damage that is an indicator that there is possible corrosion damage to the external surface of the piping. As described in detail above, the combination of these AMPs provide reasonable assurance that the buried piping and tanks containing or potentially containing radioactive liquid at Pilgrim will maintain their intended functions for the period of extended operation. For these reasons, as I stated in the Staff's Prefiled Testimony, these AMPs are adequate as they are and no leak detection devices are required. Davis Testimony at A17.

9 NRC Inspection Manual, Inspection Procedure 35101, QA Program Implementation Inspection for Operational Programs (Staff Ex. 23).

Q18. Pilgrim Watch states that all buried pipes and tanks have the same four intended safety functions:

> (1) keeping the liquid inside the component and not to allow leakage into the ground, the principle function of any pipe; (2) service the system it feeds; (3) prevent radioactive contamination from entering the ground that could result in significant harm to the health and safety of the public; and (4) prevent future legacy sites.

PW Statement at 90. Further, "their primary intended function" is to "isolate[] the liquid from the environment." *Id.* at 99. Do you agree?

A18. (ATK) No. My initial testimony contains a discussion of the safety functions of the SSW system and the CS System at Pilgrim.[10] As I have previously stated, the SSW system is addressed in the Pilgrim Nuclear Power Station Final Safety Analysis Report ("FSAR") at chapter 10.7. Chan and Keim Testimony at A15. The CS system is addressed in chapter 11.9 of the FSAR. *Id.* at A7, A10.[11]

Q19. How are systems, structures, and components determined to be within the scope of license renewal?

A19. (ATK) The scoping criteria for license renewal is set forth in 10 C.F.R. § 54.4. As I stated in the Staff's response to the Board Questions, "That regulation describes the structures, systems or components that are in-scope for license renewal. If a structure, system or component fulfills a function listed in 10 C.F.R. §§ 54.4(a)(1),(2), or (3), then it is within scope [for] license renewal."[12]

Q20. Are Pilgrim Watch's references to recent research Dr. Gilbert Bellanger relevant to Pilgrim?

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10 NRC Staff Testimony of Terence L. Chan and Andrea T. Keim Concerning Pilgrim Watch Contention 1 at A7, A10, A15 (Jan. 29, 2008) ("Chan and Keim Testimony").

11 The CS system does not have a credited safety function in the FSAR. Chan and Keim Testimony at A7, A10.

12 Affidavit of Dr. James A. Davis and Andrea T. Keim in Response to Licensing Board Questions in Order (Board Questions for the NRC Staff and Applicant) at 3 (Feb. 11, 2008) ("Staff Affidavit") (Staff Ex. 24).

A20. (ATK) No, the research, found in the book [13] referenced by Pilgrim Watch, Pilgrim Watch Statement at 27, addresses highly concentrated tritium and tritium water and is not relevant to light water reactors such as Pilgrim. Dr. Bellanger specifically states that the testing and research medium used "is very reactive and its properties are completely different from the light water in nuclear power stations." Staff Ex. 22 at 35. He goes on to say that the behaviors and types of corrosion are completely different in the installations he is discussing and that no comparison is possible. *Id.*

Q21. Pilgrim Watch makes reference to a Brookhaven Report entitled "Risk Informed Assessment of Degraded Buried Piping Systems in Nuclear Power Plants"[14] in various locations of its testimony.[15] What is the purpose of that report?

A21. (TLC) The report documents the efforts of the NRC's Office of Regulatory Research to assess the effects of age-related degradation of buried piping at nuclear power plants. As stated in the Abstract of the report, "The evaluation of buried piping was conducted in order to develop analytical methods and degradation acceptance criteria (DAC) that can be used to assess the condition of degraded buried piping." Brookhaven Report at iii. Further, "The methodology and degradation acceptance criteria (DAC) developed in this report are intended to provide guidance to the NRC staff for making an assessment in a timely manner whether degraded conditions, identified at a plant site, potentially have an immediate significant effect on plant risk. *Id.* This knowledge is important in order to provide input that can help determine whether immediate repairs are warranted, or whether ... other actions can be determined in the normal course of evaluating the condition...." *Id.*

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13 G. Bellanger, *Corrosion Induced by Low Energy Radionuclides: Modeling of Tritium and Its Radiolytic and Decay Products Formed in Nuclear Installations*, Elsevier Publications, 2004 (excerpt). (Staff Ex.22).

14 Brookhaven National Laboratory, NUREG/CR6876 (June 2005) ("Brookhaven Report").

15 *See, e.g.,* PW Statement at 12, 17-18, 20, 25-28.

The report does not make any attempt to conclude what leakage is acceptable or not acceptable, nor does it address the capability of a system which contains the degraded buried piping to fulfill its safety function.

Q22. Is Pilgrim Watch accurate in quoting the Brookhaven report as follows?

> Buried piping systems at a nuclear power plant can degrade [and] Such deterioration could impair the operation of the system that contains the buried piping, and thus impact the overall safety of the NPP [Brookhaven Report at 97].

Pilgrim Watch Statement of Position at 18.

A22. (TLC) No. The Brookhaven report actually states:

> Buried piping systems at a nuclear power plant can degrade, as described in the previous sections. Such deterioration ***potentially*** could impair the operation of the system that contains the buried piping, and thus impact the overall ***risk*** of an NPP.

Brookhaven Report at 97. The use of the word "risk" rather than "safety" is significant in that a change in risk does not necessarily impact safety. The Brookhaven report is careful not to conclude that all degradation has the potential of impairing operation of a system.

Q23. Is the result of the Bernoulli principle, as described by Pilgrim Watch, capable of "rendering the system 'unable to perform the intended safety function'"? Gundersen Testimony at § 17.2; PW Statement at 18-19.

A23. (TLC) The Staff does not possess detailed knowledge about the systems' configuration and design features to provide a plant- or system-specific answer. However, the estimated velocity of the fluids within service water systems and condensate systems are such that the normal pressure within such piping readily overcomes the negative contribution of the Bernoulli principle and results in out-leakage of liquid from a breach in the pipe wall, rather than intrusion of debris.

Board Questions

By Order dated January 11, 2008, the Board directed the Staff and the Applicant to answer several questions. Order (Board Questions for the NRC Staff and Applicant) (Jan.11, 2008). The Staff's answers to the Board's questions are attached hereto as Staff Ex. 24.

In its Order of February 21, 2008, the Board asked additional questions. The Staff's answers follow.

Qa. In follow-up to the Board's questions of January 31, 2008, we direct the Licensee to address the following fundamental question regarding the Condensate Storage System ("CSS"): How large of a leak can the CSS withstand before its ability to satisfy its intended safety function is challenged, and how small of a leak is certain to be detected? The other parties may reply to this inquiry to the extent of their capability to do so.

Aa. (ATK) The Staff does not have detailed design information for this system. However, the Staff notes that the CS system does not have a credited safety function.

Qb. With regard to corrosion-induced small leaks that might grow rapidly into large enough leaks to challenge the ability of the CS system to satisfy its intended safety function, the parties shall provide, to the extent of their capability, concise and specific technical testimony addressing the reasonably expected growth in leakage rate over times ranging from at least four hours to three days.

Ab. (JAD) The only way that a leak could form in the stainless steel CS system piping is by pitting or corrosion of the heat affected zone as a result of microbiologically-influenced corrosion ("MIC"). Neither of these types of corrosion has been observed at Pilgrim. Once a leak starts, it will not grow rapidly and the leak rate will not be expected to noticeably increase over four days. The flow of water out of the leak source would be too low to cause erosion. There would be an almost unnoticeable increase in leak rate.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

PREFILED REBUTTAL TESTIMONY OF DR. JAMES A. DAVIS

I, James A. Davis, do declare under penalty of perjury that my statements in the foregoing testimony are true and correct to the best of my knowledge and belief.

/Original Signed By/

James A. Davis

Executed at Shippingport, Pennsylvania
this 5th day of March, 2008.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
Entergy Nuclear Generation Co. and	)	
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	)	
	)	ASLBP No. 06-848-02-LR
(Pilgrim Nuclear Power Station)	)	

PREFILED REBUTTAL TESTIMONY OF TERENCE L. CHAN
CONCERNING CONTENTION 1

I, Terence L. Chan, do declare under penalty of perjury that my statements in the foregoing testimony are true and correct to the best of my knowledge and belief.

/Original Signed By/

_____
Terence L. Chan

Executed at Rockville, Maryland
This 3rd day of March, 2008.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

PREFILED REBUTTAL TESTIMONY OF ANDREA T. KEIM

I, Andrea T. Keim, do declare under penalty of perjury that my statements in the foregoing testimony are true and correct to the best of my knowledge and belief.

/Original Signed By/

Andrea T. Keim

Executed at Rockville, Maryland
this 6th day of March, 2008.

March 6, 2008

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF EXHIBIT LIST

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NRC STAFF

REBUTTAL STATEMENT OF POSITION

EXHIBIT 21

SSINS No.: 6820
OMB No.: 3150-0011
NRCB 87-01

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

July 9, 1987

NRC BULLETIN NO. 87-01: THINNING OF PIPE WALLS IN NUCLEAR POWER PLANTS

Addressees:

All licensees for nuclear power plants holding an operating license or a construction permit.

Purpose:

The purpose of this bulletin is to request that licensees submit information concerning their programs for monitoring the thickness of pipe walls in high-energy single-phase and two-phase carbon steel piping systems.

Description of Circumstances:

On December 9, 1986, Unit 2 at the Surry Power Station experienced a catastrophic failure of a main feedwater pipe, which resulted in fatal injuries to four workers. This event was reported in IE Information Notice (TN) 86-1069 "Feedwater Line Break," on December 16, 1986; IN 86-106, Supplement I., on February 13, 1987; and TN 86-106, Supplement 2, on March 18, 1987. The licensee submitted Licensee Event Report (LER) 86-020-00 on January 8, 1987; Revision 1, LER 86-020-01, on January 14, 1987; and Revision 2, LER 86-020-02, on March 31, 1987. A comprehensive report entitled "Surry Unit 2 Reactor Trip and Feedwater Pipe Failure Report," was attached to the updated LER, Revisions 1 and 2. The findings of NRC's Augmented Inspection Team were issued on February 10, 1987, in IE Inspection Report Nos. 50-280/86-42 and 50-281/86-42.

Investigation of the accident and examination of data by the licensee, NRC, and others led to the conclusion that failure of the piping was caused by erosion/corrosion of the carbon steel pipe wall. Although erosion/corrosion pipe failures have occurred in other carbon steel systems, particularly in small diameter piping in two-phase systems and in water systems containing suspended solids, there have been few previously reported failures in large diameter systems containing high-purity water. Consistent with general industry practice, the licensee did not have in place an inspection program for examining the thickness of the walls of feedwater and condensate piping.

Main feedwater systems, as well as other power conversion systems, are important to safe operation. Failures of active components in these systems, for example, valves or pumps, or of passive components such as piping, can result in undesirable challenges to plant safety systems required for safe shutdown and accident mitigation. Failure of high-energy piping, such as feedwater

system piping, can result in complex challenges to operating staff and the plant because of potential systems interactions of high-energy steam and water with other systems, such as electrical distribution, fire protection, and security systems. All licensees have either explicitly or implicitly committed to maintain the functional capability of high-energy piping systems that are a part of the licensing basis for the facility. An important part of this commitment is that piping will be maintained within allowable thickness values.

Actions Requested:

Within 60 days from the receipt of this bulletin, licensees are requested to provide the following information concerning their programs for monitoring the wall thickness of pipes in condensate, feedwater, steam, and connected high-energy piping systems, including all safety-related and non-safety-related piping systems fabricated of carbon steel:

1. Identify the codes or standards to which the piping was designed and fabricated.

2. Describe the scope and extent of your programs for ensuring that pipe wall thicknesses are not reduced below the minimum allowable thickness. Include in the description the criteria that you have established for:

   a. selecting points at which to make thickness measurements
   b. determining how frequently to make thickness measurements
   c. selecting the methods used to make thickness measurements
   d. making replacement/repair decisions

3. For liquid-phase systems, state specifically whether the following factors have been considered in establishing your criteria for selecting points at which to monitor piping thickness (Item 2a):

   a. piping material (e.g., chromium content)
   b. piping configuration (e.g., fittings less than 10 pipe diameters part
   c. pH of water in the system (e.g., pm less than 10)
   d. system temperature (e.g., between 190 and 500 F)
   e. fluid bulk velocity (greater than 10 ft/s)
   f. oxygen content in the system (e.g., oxygen content less than 50 ppb)

4. Chronologically list and summarize the results of all inspections that have been performed, which were specifically conducted for the purpose of identifying pipe wall thinning, whether or not pipe wall thinning was discovered, and any other inspections where pipe wall thinning was discovered even though that was not the purpose of that inspection.

   a. Briefly describe the inspection program and indicate whether it was specifically intended to measure wall thickness or whether wall thickness measurements were an incidental determination.

   b. Describe what piping was examined and how (e.g., describe the inspection, instrument(s), test method, reference thickness, locations examined, means for locating measurement point(s) in subsequent inspections).

c. Report thickness measurement results and note those that were identified as unacceptable and why.

d. Describe actions already taken or planned for piping that has been found to have a nonconforming wall thickness. If you have performed a failure analysis, include the results of that analysis. Indicate whether the actions involve repair or replacement, including any change of materials.

5. Describe any plans either for revising the present or for developing new or additional programs for monitoring pipe wall thickness.

The written report shall be submitted to the appropriate Regional Administrator under oath or affirmation under provisions of Section 182a, Atomic Energy Act of 1954, as amended. In addition, the original of the cover letter and a copy of the report shall be transmitted to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555 for reproduction and distribution.

This request for information was approved by the Office of Management and Budget under blanket clearance number 3150-0011. Comments on burden and duplication may be directed to the Office of Management and Budget, Reports Management, Room 3208, New Executive Office Building, Washington, D.C. 20503.

NRC intends to summarize the information collected under this bulletin and study it to help determine if additional actions are required by the staff and/or industry. The information will be analyzed and placed in the PDR.

If you have any questions about this matter, please contact the Regional Administrator of the appropriate NRC regional office or the technical contacts listed below.

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: Paul Wu, NRR
(301) 492-8987

Conrad McCracken, NRR
(301) 492-7042

Attachment: List of Recently Issued Bulletins

NRC STAFF

REBUTTAL STATEMENT OF POSITION

EXHIBIT 22

CORROSION INDUCED BY LOW-ENERGY RADIONUCLIDES

Modeling of Tritium and Its Radiolytic and Decay Products Formed in Nuclear Installations

Gilbert Bellanger

Selongey, France

2004

ELSEVIER

Amsterdam • Boston • Heidelberg • London • New York • Oxford
Paris • San Diego • San Francisco • Singapore • Sidney • Tokyo

Chapter 4

STRATEGY FOR CONTROLLING CORROSION

First of all, the following question can be asked: why carry out corrosion tests?

Before answering this question, we must recognize that there are very few laboratories in the world that use highly concentrated tritium and tritiated water. Our laboratory is the only one in France. It is not a question of tritiated water traces present in light water, but the reverse. We do not work with light water as is the case in PWR or other nuclear reactors. No steel or super stainless alloy has been previously tested in this highly concentrated tritiated aqueous medium by anyone in France. By its nature, this medium is very reactive and its properties are completely different from the light water in nuclear power stations, which although it can be activated, contains much lower concentrations of radiolytic hydrogen peroxide, among other species, than in our closed storage units. In addition, we are not confronted with microbial corrosion as in the secondary circuits of PWR power stations. No living species could withstand the tritiated water concentrations we have. The behaviors and the types of corrosion of stainless steels or superalloys are thus completely different in our installations and no comparison is possible. After this digression, in answering the question, our corrosion tests, which are specific to tritium, must make it possible:

- to study the initiation and evolution of corrosion phenomena in the presence of tritium, concentrated tritiated water and radiolytic species,
- to select materials best adapted to the envisaged use in concentrated tritiated media,
- to know and understand their behavior in the various tritiated media,
- to monitor their corrosion resistance in a well-specified tritiated medium.

Finally, to reach the overall goal, the operator of a tritium gas and tritiated water nuclear processing installation, must, to ensure its correct operation and safety, apply a material and equipment maintenance and monitoring policy as well as an on-going survey of new materials for replacing corroded components. If he does not apply this policy and is satisfied with a simple monitored storage system, his installation will soon become obsolete with respect to those of other potential competitors in the tritium market for nuclear fusion. To avoid this, he must implement resources for monitoring and follow-up of the most highly stressed and defective components as well as for specialized examinations that can be directly applied to his installations. Various inspection methods have been extensively used to meet these requirements. These make possible: (1) analysis of tritiated water and tritium for its radiolytic species and impurities. This knowledge makes it possible to determine

NRC STAFF

REBUTTAL STATEMENT OF POSITION

EXHIBIT 23

INSPECTION PROCEDURE 35101

QA PROGRAM IMPLEMENTATION INSPECTION FOR OPERATIONAL PROGRAMS

PROGRAM APPLICABILITY: 2504

35100-01 INSPECTION OBJECTIVES

Verify that the Licensee has a quality assurance (QA) program that is in conformance with the Quality Assurance Program Description (QAPD) in the areas of: (1) organizational structure, functional relationships, and training (2) onsite design (or design change) controls, (3) quality requirements, (4) document control, (5) work and quality inspection, (6) control of material, (7) control of special processes, (8) corrective action, (9) test control and control of test equipment, (10) quality records, (11) audits, and (12) process for reporting changes to the QA program description.

35100-02 BACKGROUND

NUREG 0800, Standard Review Plan, Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants," provides extensive guidance concerning all phases of this procedure. Quality requirements related to safety-related activities are defined in 10 CFR Part 50, Appendix B and as described in the safety analysis report. Quality requirements are also described in ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Operations."

It is the responsibility of the licensee to establish and execute a QA program for the operational programs. The licensee is required to establish adequate procedures for any activity important to safety, or risk significant, before the start of that activity. These documents may be developed by the Licensee or delegated to others. This aggregate collection of documents is referred to as the "QAPD." This inspection procedure requires the inspector to determine if the licensee has established (written, reviewed, and approved) effective QA instructions, procedures, plans, and schedules in a timely manner which are in conformance with the QAPD.

This inspection procedure is concerned with the adequacy and implementation of quality-related procedures which have been established by the licensee. The intent of items 03.01 through 03.12 in Section 03 of this procedure is to provide the inspector with a "checklist" of inspection requirements to aid in determining whether adequate QA instructions and procedures have been established in the QA program manual. This inspection procedure is expected to be initiated as early as practical consistent with realizing valid results for licensee QA programs.

35100-03 INSPECTION REQUIREMENTS AND GUIDANCE

03.01 Assessment of Organizational Structure, Functional Relationships and Training.

a. Verify the organizational structure described in the QAPD to ensure it conforms to the description of the QA program as stated in the safety analysis report.

Specific Guidance. Review the QA organizational structure described in the QAPD against the criteria established in the safety analysis report.

b. Verify qualifications, responsibilities and duties of QA personnel, including independence from personnel having cost or scheduling responsibilities.

Specific Guidance.

1. Review both the licensee/contractor organizational charts and descriptions of duties and responsibilities to ensure that the "independence and freedom of action" requirements are met. Qualifications, responsibilities, and duties of QA personnel are to be defined sufficiently to ensure adequately qualified personnel with appropriate responsibilities.

2. Interview a sample of five QA personnel (as available) to determine whether they have an adequate understanding of the program. The interview should focus on qualifications, duties, and responsibilities.

c. Verify the indoctrination/training and retraining program for QA personnel.

Specific Guidance.

1. Review a sample of the four QA training program documents to ensure they provide the guidance required to implement the program.

2. Review a sample of five training attendance documents to verify QA personnel have received and maintain qualification standards as described in the program.

03.02 Assessment of Onsite Design (or Design Change) Controls.

Verify whether controls listed below have been established to ensure that design activities are carried out in a planned, controlled, and orderly manner, and to ensure that design changes are subject to design control measures commensurate with those applied to the original design.

a. Organization(s) or person(s) responsible for performing design work are identified.

b. Design (or design change) request forms (or equivalent) have provisions for documenting completion of required reviews, evaluations, and approvals prior to change implementation.

c. Methods exist to ensure that applicable design inputs are identified and their selection reviewed and approved.

d. Design activities are prescribed and accomplished in accordance with procedures of a type sufficient to ensure that applicable design inputs are correctly translated into specifications, drawings, procedures, or instructions.

e. Procedures requiring design analysis, such as physics, stress, thermal, hydraulic, and accident analyses, are performed in a planned, controlled, and correct manner.

f. Procedures exist that identify the external interfaces between the onsite design organizations, including those responsible for design specifications, changes, technical direction, and approvals.

g. Procedures exist to ensure that design changes have an adequate design verification performed or are checked by applicable methods.

h. Procedures delineate responsibility for identifying post modification testing requirements.

I. Administrative controls exist to ensure design changes have been incorporated into appropriate plant procedures, operator or technician training programs and plant drawings.

j. Administrative controls require design documentation records to provide evidence that the design (or design change) review process was performed and that the records were stored.

Specific Guidance.

1. Review applicable section(s) of the QAPD and any associated lower tier procedures for a description of the design controls listed above.

2. Review a sample of five design change packages to verify conformance with the controls established above.

03.03 Assessment of Quality Requirements. Verify that the following quality requirements are specified in the program:

a. Quality requirements, including appropriate material specifications, test reports, acceptance criteria, and required documentation, are specified in design and procurement documents.

b. Deviations from previously established requirements, including design changes, are adequately controlled and reviewed.

c. Quality documentation, including material certifications, test reports, receiving inspections, evaluations, and auditing results are generated and maintained to indicate that quality requirements have been met.

d. Procedures provide for identification and control of structures, systems and components (SSCs) covered by the facility's QA program; i.e., all safety-related, fire protection, and other items important to safety are subject to the QA program.

e. Procedures provide for the assignment of stop-process and stop-work authority to an onsite individual.

Specific Guidance.

1. Review applicable section(s) of the QAPD and any associated lower tier procedures for a description of the controls listed above.

2. Review a sample of five design and procurement documents and verify the requirements listed above in steps 03.03.a and b.

3. Review a sample of two each for the following and verify that quality requirements have been met as stated in step 03.03.c.

   (a) Material certifications.

   (b) Test reports.

   (c) Receiving inspections.

   (d) Evaluations.

   (e) Auditing results.

4. Review a sample of five procedures and verify the requirements listed above in steps 03.03.d and e.

5. Review established stop-process and stop-work procedures for any activity which does not conform to applicable quality requirements whenever construction activities are in progress at the site. The procedures may specify that this authority may be delegated and/or go through other organizational components, provided that the stop-process or stop-work authority is not abrogated, delayed, or diminished by this delegation or routing.

03.04 Assessment of Document Control. Verify the following for program documents:

a. Documents relating to quality are adequately controlled.

b. Quality related documents are reviewed by qualified personnel for adequacy.

c. Provisions to ensure appropriate identification/listing and control of aggregate collection of quality assurance (including quality control) instructions and procedures known as the QA manual, including future revisions.

d. Provisions exist to ensure periodic review of the adequacy of the document control procedures.

e. Provisions exist to ensure that plant configurations are accurately reflected in as-built drawings.

f. Provisions exist to ensure that any drawings, procedures, or equipment databases accurately reflect changes to plant configuration.

g. "Adequately controlled," as defined in the program, includes the turnover/retention of contractor and consultant quality records associated with safety-related materials, components, and systems.

Specific Guidance. Review a sample 10 program documents to verify that requirements were met in the areas specified in steps 03.04.a through g.

03.05 Assessment of Work and Quality Inspection. Verify the following:

a. Work and inspection procedures important to safety, including those of vendors and suppliers, have been established.

b. Procedures cover significant related activities such as process monitoring surveillances, inspection hold points, test programs, and the control of special equipment.

c. Procedures are complete, reviewed, approved, controlled, and maintained.

d. Those performing QA activities have available to them the most recent and approved specifications, procedures, and instructions pertinent to activities audited, monitored, or inspected by them.

Specific Guidance. Review a sample of five procedures to verify that the work and quality inspection requirements listed in steps 03.05.a through d. have been met.

03.06 Assessment of the Control of Material program requirements. Verify Control of Material procedures to assure that they are sufficiently complete, appropriate, and adequate to ensure that only material meeting applicable requirements is used and that this information is adequately documented and retained. (Material issue control procedures are included in this category, and applicable requirements are specified in the facility safety analysis report).

Verify that program procedures for Control of Material policies and guidelines are provided in the following areas :

a. Procurement, Receipt, Storage, and Handling of Equipment and Materials.

NOTE: IP 35746, "Procurement Control and Receipt, Storage and Handling of Equipment and Materials," provides a more extensive review of this area.

1. Documented evidence that quality requirements were met prior to use or installation of material or equipment.

2. Provisions exist for Identification and traceability of material and equipment, including status of inspection or tests performed, as required.

3. Handling, shipping, and storage procedures are established.

4. Procedures provide for identification and control of nonconforming material and components to preclude inadvertent use, including periodic inspections/ surveillances to verify adequate control.

5. Administrative controls for those preparing, reviewing, changing, and approving procurement documents.

6. Administrative controls for procurement of safety and non-safety related items.

7. Administrative controls for bidders/suppliers.

Specific Guidance. Review a sample of five procurement related documents to verify that the requirements listed in steps 03.06.a.1 through 7 have been met.

b. Quality Certification (Appendix B to 10 CFR 50, Criterion VII) - When quality documentation in the form of certification is used at the site in lieu of original records establishing quality of materials or components important to safety, the following procedural guidelines should be verified:

1. The certification shall specifically identify the purchased material or equipment, such as by citing the purchase order number.

2. The certification shall identify the specific procurement requirements met by the purchased material or equipment, such as by citing codes, standards, and other specifications. This may be accomplished by including a list of the specific requirements or by providing, on site, a copy of the purchase order and procurement specifications or drawings, together with a suitable conformance statement. The procurement requirements identified should include any approved changes, waivers, or deviations applicable to the subject material or equipment.

3. The certification shall identify any procurement requirements which have not been met, together with an explanation and the means used to resolve the non-conformances.

4. The certification shall be attested to by a person who is responsible for this QA function and whose function and position are described in the purchaser's or supplier's QA program. (The architect-engineer or construction management organization usually has this information for major suppliers.)

5. The certification system, including the procedures to be followed in filling out a certificate and the administrative procedures for review and approval of the certificates, shall be described in the purchaser's or supplier's QA program.

6. Means should be provided by the licensee to verify the validity of certificates, and to determine the effectiveness of the certification system when desired, such as during the performance of audits.

Typical certifications are manufacturer's certifications that a product (usually consumables, such as weld rod and fly ash), if tested, would exhibit the product characteristics shown on the certification document. Typical certifications are acceptable only if they can demonstrate that the product was manufactured under a process control system which provides for product control and process records which can establish that the product was manufactured within the characteristic limits identified on the typical certification

Specific Guidance. Review a sample of five quality certification related documents to verify that the requirements listed in steps 03.06.b.1 through 6 have been met.

03.07 Assessment of Control of Special Processes. Verify the following to assure that adequate measures are in place for Control of Special Processes:

a. Procedures are provided to ensure suitably controlled work and inspection/surveillance conditions.

b. Procedures are provided for the control of special processes.

c. Special processes are performed by qualified personnel using qualified procedures in accordance with applicable requirements.

d. Procedures are provided for control and approval of special processes such as welding, nondestructive examinations, (NDE), heat treatment, electroplating, etc.

Specific Guidance. Review a sample of five special process related documents to verify that the requirements listed in steps 03.07.a through d. have been met.

03.08 Assessment of Corrective Action Program Requirements. Verify the following for the corrective action process.

a. Verify procedures are established for identification and correction of conditions adverse to quality.

b. Verify procedures are established to preclude repetition of activities adverse to quality.

c. Verify provisions are established for escalating to higher management those corrective actions that are not adequate/timely.

d. Verify a management system is established for overview of trends in conditions adverse to quality.

Specific Guidance. Review a sample of five corrective action related documents to verify that the requirements listed in steps 03.08.a through d. have been met.

03.09 Assessment of Test Control and Control of Test Equipment.

NOTE: IP 35750, "QA Program -Test and Measurement Equipment, Tests and Experiments, and Surveillance Tests," provides a more extensive review of this area.

a. Verify procedures are established to ensure that acceptance criteria are specified, test requirements (including prerequisites) have been met, evaluation of results are documented, and deficiencies have been detected and reported to the appropriate level of management.

b. Verify procedures are established to ensure adequate control, calibration, and adjustment of measuring and test equipment.

c. Verify that an adequate method exists for establishing traceability of an inspected/ tested work activity to the instrument used for acceptance purposes.

Specific Guidance. Review a sample of six documents related to test control and control of test equipment to verify that the requirements listed in steps 03.09.a through c. have been met.

The review should include, but not necessarily be limited to, specified calibration intervals, accuracy within specified limits, accuracy and traceability of equipment by marking (e.g., serial numbers) for identification, adequate means to readily establish calibration status of equipment (e.g., tags or labels), and disposition of previously inspected material when test equipment is discovered to be outside of the specified limits.

03.10 Assessment of Quality Records.

a. Verify procedures are established to ensure the following:

1. Evidence of activities affecting quality are documented by qualified personnel.

2. Specified documentation for procured items has been received at the site and has been reviewed.

3. Review of quality records by qualified personnel, including records of appropriate subsequent corrective action if needed.

4. Records are stored in a manner which precludes deterioration.

Specific Guidance. Review applicable section(s) of the QAPD and any associated lower tier procedures for a description of the requirements for quality records stated in step 03.10.a.

b. Verify that requirements and provisions to maintain the following types of records have been established.

1. Pre-operational and startup tests

2. Normal reactor operation including operating logs, recorder charts, and computer printouts.

3. Principal maintenance activities

4. Design changes and modifications including safety evaluations associated with 10 CFR 50.59 type changes.

5. Reportable occurrences

6. Surveillance test results

7. Baseline data and inservice inspections

8. On and offsite safety committee (Group) meeting minutes

9. Procurement documents

10. Receipt inspection and testing

11. QA audit reports

12. Personnel training records

13. Safety related (non Technical Specification) Calibration results

14. Personnel qualification records

15. Special reactor tests

16. Defects and noncompliance (10 CFR 21, 10 CFR 50.55e, as applicable)

17. Fire protection/prevention activities

18. Engineering drawings

Specific Guidance. Review the QAPD and any related lower tier QA procedures to verify requirements and provisions were established to maintain the types of records listed above in step 03.10.b.1 through 18.

c. Verify that record storage controls described in the QA Program provide for the following.

1. Description of the record storage facility or facilities for the records identified in (03.10.b) above.

2. Designation of a custodian(s) in charge of storage facilities identified in (03.10.b) above.

3. Description of the filing system(s) to be used to allow for the retrieval of records identified above.

4. A method for verifying that records received are in agreement with the transmittal document or a pre-established records checklist, as applicable.

5. Provisions for governing access to files and for maintaining an accountability of records removed from the storage facility.

6. Establishment of methods for correcting or filing supplemental information and disposing of superseded records. Required review and approval should be specified.

Specific Guidance. Review the QAPD and any related lower tier QA procedures to verify requirements and provisions were established to address the record storage controls listed in step 03.10.c.

d. Verify that responsibilities have been assigned to ensure the following:

1. Record storage controls identified under (03.10.c) above will be implemented.

2. Transfer and retention of construction phase records.

3. Retention periods of records listed under 03.10.b.

4. Authorizing disposal of records no longer required has been specified.

Specific Guidance. Review the QAPD and any related lower tier QA procedures to verify that the responsibilities in step 3.10.d. have been assigned.

e. Verify that quality records are legible, adequate, retrievable, adequately protected and refer to markings, identification tags, or other means of identifying materials and components important to safety within a reasonable time after conclusion of the applicable quality affecting activities.

Specific Guidance. Review a sample of each of the records listed in step 3.10.b. (as available) and verify the items listed above, as applicable, in step 3.10.e.

03.11 Assessment of Audits. Verify the following:

a. The scope of the audit program has been procedurally defined and that it is consistent with safety analysis report commitments.

b. That an overall plan exists by which management ensures that the audit program addresses all aspects of quality-affecting activities.

c. That responsibilities have been assigned in writing for the overall management of the audit program including:

1. Determining the adequacy of the qualifications of audit personnel, including those of contractors. .

2. Determining the need for special training of audit personnel and/or inclusion of special expertise.

3. Determining the independence of audit personnel.

4. Assuring corrective actions are taken for deficiencies identified during audits.

5. Determining when reaudits are required.

6. Issuance of audit reports to management.

7. Periodic review of the audit program to determine its status and adequacy.

8. Preparation of the long range audit plans or schedules.

d. That methods or administrative channels have been defined for taking corrective actions when deficiencies are identified during audits. Verify that the audited organization is required to respond in writing to audit findings.

e. That distribution requirements for audit reports and corrective action responses have been defined.

f. Verify that checklists or procedures are required to be used in the performance of audits.

Specific Guidance.

1. Review the QAPD to verify the scope of the program is defined as stated in step 03.11.a.

2. Review the current long range audit schedule or plan in effect and verify that areas to be audited and audit frequencies identified are consistent with the QAPD commitments.

3. Review the most recent completed audit report(s) and determine the following:

(a) An audit checklist or procedure was prepared, used and covered the areas designated in the audit schedule.

(b) Auditors were independent of any direct responsibility for the activities which they audited.

(c) Deficiencies identified during the audit have been resolved or they are currently being carried as an "open item."

(d) The audited organization has responded in writing to the audit findings.

(e) Distribution of audit reports and response was consistent with program requirements.

03.12 Assessment of Process for Reporting Changes to the QA Program Description. Verify that a process is in place to notify the NRC of proposed changes to the QA program description.

Specific Guidance. Review the procedural process in place to verify that notification of QA program description change(s), if any, was made in accordance with 10 CFR 50.54(a)(3) and/or 10 CFR 50.54(a)(4).

35100.52-04 RESOURCE ESTIMATE

This procedure supports the QA review of COL operational programs per the guidance contained in Section 17.5 of NUREG 0800. The resource estimate for this inspection procedure is approximately 340 hours of direct inspection effort.

35100.52-05 REFERENCES

NUREG 0800, Standard Review Plan, Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants"

ASME NQA-1 1994, "Quality Assurance Requirements for Nuclear Facility Operations"

END

Attachment 1: Revision History

Attachment 1

Revision History Sheet
IP 35101

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Ascension #
N/A	10/03/07 CN 07-030	1. Initial issue to support inspections of operational programs described in IMC 2504, NON-ITAAC INSPECTIONS 2. Incorporates SRP 17.5 guidance 3. A review for incorporation of generic requirements has been conducted. None identified. 3. Combines information contained in IPs 35001, 35060, 35061, 35740, 35741, 35742, 35744, and 35748.	N	N/A	ML063400034

NRC STAFF

REBUTTAL STATEMENT OF POSITION

EXHIBIT 24

February 11, 2008

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

AFFIDAVIT OF DR. JAMES A. DAVIS AND ANDREA T. KEIM
IN RESPONSE TO LICENSING BOARD QUESTIONS IN
ORDER (BOARD QUESTIONS FOR THE NRC STAFF AND APPLICANT)

James A. Davis ("JAD") and Andrea T. Keim ("ATK"), do hereby state as follows:

1. (JAD) I am employed by the U.S. Nuclear Regulatory Commission ("NRC") as a Senior Materials Engineer in the Office of Nuclear Reactor Regulation ("NRR"), Division of License Renewal. I am filing this affidavit to respond to the Licensing Board's questions asked of the NRC Staff ("Staff") in the Order (Board Questions for the NRC Staff and Applicant), issued on January 31, 2008.

2. (ATK) I am employed by the NRC as a Materials Engineer in the Division of Component Integrity, NRR. I am filing this affidavit to respond to the Licensing Board's questions asked of the Staff in the Order (Board Questions for the NRC Staff and Applicant), issued on January 31, 2008.

3. (JAD, ATK) The Board ordered the Staff and the Applicant (Entergy) to answer one multi-part question relating to the condensate storage ("CS") system and one question relating to the salt service water ("SSW") system, and provide "thorough technical support . . . , including appropriate affidavits." Our answers to the questions are provided below.

4. (JAD, ATK) Question 1 is a three-part question that relates to the CS system.

> a. What is the minimum leakage rate that is certain to be detectable by the testing of the condensate storage tank (CST) water level every four hours, and conversely, what is the maximum leakage rate that would be detected by that testing? Provide a detailed statement of the basis of and sources for your answer.

Staff Response. This question is best answered by Entergy because the Staff does not have access to the detailed procedure for monitoring the CST water level and does not know the set point. However, given those limitations, the Staff is able to make some calculations regarding water level and leakage rate. For example, the CST holds 275,000 gallons of water at the 30-foot height. A 10% drop in water level would be easily detected. This would occur if 27,500 gallons leaked out in four hours, or 115 gallons per minute. If a one-foot drop in height were the limit, that would represent a 9,167 gallon drop or 38 gallons per minute. (Testimony of Alan Cox, *et al.,* on Pilgrim Watch Contention 1, Regarding Adequacy of Aging Management Program for Buried Pipes and Tanks and Potential Need for Monitoring Wells to Supplement Program (January 8, 2008) ("Entergy Testimony") at 49, answer A110).

Each CST has 75,000 gallons of reserve dedicated to the high pressure coolant injection ("HPCI") and reactor core isolation core ("RCIC") systems for a total of 150,000 gallons. The loss of 150,000 gallons in four hours would require a leak rate of 625 gallons per minute. The maximum amount of leakage would be the loss of all CST coolant or 550,000 gallons of coolant. The leakage rate for the loss of 550,000 gallons in four hours would be 2,292 gallons per minute. (Entergy Testimony at 16, A28).

> b. What is the minimum leakage rate that is certain to be detected by the quarterly testing of the water flow from the RCIC pump and the HPIC pump, and, conversely, what is the maximum leakage rate that would not be detected by that testing? Provide a detailed statement of the basis of and sources for your answer.

Staff Response. This question is best answered by Entergy because the Staff does not have access to the detailed procedure for the quarterly testing of the water flow from the RCIC and HPCI pumps. However, the water flow tests are conducted by establishing a flow path with suction from the CST and discharge back to the CST. Therefore, any leakage should be detected by a drop in the CST level. (*See* Entergy Testimony at 52, A120). So the Staff's response to this question is similar to the response to question 1a.

> c. What is the smallest leakage rate that could reasonably be expected to challenge the ability of the CSS system piping at issue to fail to satisfy its intended function(s) as relevant for license renewal? Provide a detailed statement of the basis of the sources for your answer.

Staff Response. The CS system, which consists of two large storage tanks and associated pipes and valves, has two functions that bring it within the scope of license renewal under 10 C.F.R. § 54.4. (Pilgrim License Renewal Application ("LRA") § 2.3.4.1 at 2.3-116 and 117; NUREG-1891, Safety Evaluation Report Related to the License Renewal of Pilgrim Nuclear Power Station ("SER") 2.3.4.1, 2-116-117 (November 2007)). That regulation describes the structures, systems or components that are in-scope for license renewal. If a structure, system or component fulfills a function listed in 10 C.F.R. §§ 54.4(a)(1), (a)(2), or (a)(3), then it is within scope of license renewal (ref. 10 C.F.R. 54.4(b)). In other words, it is within the scope of license renewal because it performs any of the functions listed in 10 C.F.R. Part 54.4(a).

The first function, listed under 10 C.F.R. § 54.4(a)(1), is to provide a pressure boundary for the flowpath to the RCIC and HPCI pumps via the safety-related piping and valves that interface with the RCIC and HPCI. LRA § 2.3.4.1. The second function, listed under 10 C.F.R. § 54.4(a)(3), is to "provide a source of water to the HPCI and RCIC systems, which are credited in the 10 C.F.R. part 50, Appendix R analysis for safe shutdown for fire protection (10 C.F.R. § 50.48)." *Id.*

Regarding 10 C.F.R. § 54.4(a)(1), the CS system has no credited safety function in the Licensee's Accident Safety Analyses under scenarios covered in § 54.4(a)(1). Although the CSTs are the preferred source of water to the HPCI and RCIC pumps, they could be completely unavailable (*i.e.*, totally drained due to leakage), yet the safety function would still be achieved by using water from the Torus to supply water to the HPCI and RCIC pumps – the CS system is automatically isolated to prevent CS system faults from affecting HPCI/RCIC performance. Therefore, no CS system leak rate can challenge HPCI/RCIC performance for purposes of 10 C.F.R. § 54.4(a)(1). (*See* Entergy Testimony at 16, A28; NRC Staff Testimony of Terence L. Chan and Andrea T. Keim Concerning Pilgrim Watch Contention 1 (Jan. 29, 2008) at 4, A8 and 5-6, A10; NRC Staff Exhibit 10).

Regarding the 10 C.F.R. § 54.4(a)(3) function, 10 C.F.R. Part 50, Appendix R, requires, in effect, that the CS system would be needed to supply water to the reactor coolant system during a cooldown that could last up to 72 hours. The answer is better provided by Entergy because the Staff does not have the detailed analysis; but it would take a very large leak in the buried piping in order to compromise this requirement. If it is assumed that 150,000 gallons of CST water are required for this fire protection safe shutdown scenario, then CS function would only be challenged if more than 400,000 gallons of water leak out through the buried piping. It must further be assumed that no one notices the missing 400,000 gallons, either through flooding of plant equipment via the HPCI vault, significant water pooling between the CS Tanks and the building, or from unexpected CST low level alarms annunciating in the Main Control Room. If this leakage were to occur during the first 24 hours, that would indicate a leak rate of about 277 gallons per minute.

In sum, there is no CS system leak rate that would challenge HPCI/RCIC performance for purposes of § 54.4(a)(1), and only a very large leak would compromise the performance for purposes of § 54.4(a)(3).

5. (JAD, ATK) Question 2 relates to the SSW system.

> With regard to the salt service water (SSW) system – Explain how any leak in the SSW buried pipes that carry radioactive water from the plant to the canal that dumps into the bay could challenge the ability of the SSW system to satisfy its intended function(s)? For example, is there any correlation between any potential leak in those pipes and any potential plugs in them that might prevent them from discharging water from the SSW, thereby impeding the ability to remove heat from the [reactor building closed cooling water] RBCCW [system]? Provide a detailed statement of the basis of and sources for your answer.

Staff Response. The SSW system has two intended safety functions, which are to provide a heat sink for the reactor building closed cooling water ("RBCCW") system under transient and accident conditions, and is credited in the safe shutdown analysis for fire protection. (Entergy Testimony at 17, A30). By the time the cooling water is in the buried discharge piping, it has completed its intended safety function of providing cooling water for the RBCCW. Therefore, if a leak develops in the discharge piping, it will not affect the intended safety function.

There is no correlation between any potential leak in the buried discharge piping and any potential plugs in them that might prevent them from discharging water from the SSW. The SSW system is designed so that no active component failure nor any single passive component failure, or any other system, can prevent it from achieving its safety objective. There are two loops of discharge piping, so if one were inoperable, the second loop could be used to return the cooling water back to the bay. Each loop can transfer the full heat capacity required for its intended safety objective. (Entergy Testimony at 17, A30, A31; NRC Staff Exhibit 17). Therefore, the system would retain the ability to remove heat from the RBCCW.

The Staff does not believe that there is any credible mechanism for the discharge piping to become plugged. The discharge piping is constructed using carbon steel which is ductile and would deform before it would rupture. In addition, the pressure from the water inside the pipe would keep it from collapsing. But, even if it did become plugged, the second loop is still available to return the water to the bay.

I declare, under penalty of perjury, that the above statements made by me are true and correct to the best of my knowledge and belief.

/Original Signed By/

James A. Davis, PhD.

/Original Signed By/

Andrea T. Keim

Executed at Rockville, Maryland
this 11th day of February, 2008.

NRC STAFF

REBUTTAL STATEMENT OF POSITION

EXHIBIT 25

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-454; 50-455
License Nos:	NPF-37; NPF-66
Report No:	05000454/2007009 and 05000455/2007009
Licensee:	Exelon Generation Company, LLC
Facility:	Byron Station, Units 1 and 2
Location:	Byron, IL 61010
Dates:	October 23, 2007 through February 14, 2008
Inspectors:	M. Holmberg, Team Lead T. Bilik, Reactor Inspector V. Meghani, Reactor Inspector C. Moore, Operator Licensing Examiner J. McGhee, Reactor Engineer L. Kozak, Senior Reactor Analyst
Approved by:	D. Hills, Chief Engineering Branch 1 Division of Reactor Safety

REPORT DETAILS

Background and Overview

The essential service water (SX) system rejects heat to the SX cooling tower, both on a normal and on an emergency basis. The tower and SX basin constitute the ultimate heat sink (UHS) for the SX system and consist of a common eight cell mechanical draft cooling tower with safety-related make up. There is an "A" train side of the tower and a "B" train side of the tower, and each side has one common return from the associated train from each Unit. The discharges from each SX loop in each Unit are separate but merge into two separate and redundant return lines for SX system return to the cooling tower basin. Near the tower, the buried 48 inch diameter common return line splits into four buried 24 inch diameter lines which return water to individual cells within the cooling tower. The buried portions of this 24 inch diameter SX pipe reach the above-ground elevations within an enclosed chamber (referred hereinafter as a vault). These vaults are constructed of concrete and removable steel plates which serve to protect SX piping components from tornado generated missiles. Within each of the eight vaults, the portion of 24 inch diameter SX riser pipe runs vertically up through the concrete floor and terminates at a flange which supports a discharge isolation valve. Although, the SX riser vaults are enclosed, rainwater can enter through the roof/door interface and wind driven spray from the SX cooling tower outfall can enter through sheet metal panels forming the backwalls of the riser vaults. The floor of each riser vault is sloped to allow water to flow into drain holes (typically two) at the corner of the vault floor. Water intrusion into these vaults has contacted the uncoated carbon steel riser pipe providing a semi-continuous wetted environment, which caused significant external corrosion and wastage around the pipe perimeter just above the concrete floor elevation (Attachment 3, Pictures No. 1 through No. 5). The corroded portion of each riser pipe extended vertically four to six inches in height between the concrete floor and the support flange for its associated motor operated discharge isolation valve. The nominal pipe wall was originally 0.375 inch thick for these eight degraded pipes which are described as 0A through 0H SX riser pipes within this report.

The circumstances surrounding the essential service water riser pipe degradation was evaluated against the criteria in Management Directive 8.3, "NRC Incident Investigation Program," and Inspection Manual Chapter 0309 "Reactive Inspection Decision Basis for Reactors." Deterministic Criteria g and h of Management Directive 8.3 were met for this event. A conditional core damage probability (CCDP) estimate for a reactor transient was performed to represent the dual Unit plant shutdown. The essential service water system was determined to be available because the leak on the 0C SX riser was well within the capacity of the essential service water makeup system and as a result there was no actual loss of essential service water function. The CCDP estimate using the NRC's Simplified Plant Analysis Risk model, Revision 3.31, was 2.6E-6. This estimate is within the range of a special inspection. This risk calculation did not consider the potential impact of the degradation of the essential service water system due to corrosion and pipe wall thinning. A quantitative risk estimate could not be estimated for this condition, but the excessive pipe wall thinning could contribute to an increase in the loss of SX initiating event frequency. Because the loss of SX event is generally a high consequence event and the pipe degradation was common across all SX risers, the qualitative risk insights also supported a special inspection. Therefore, based on the probabilistic risk and deterministic criteria specified in Management Directive 8.3 and Inspection Procedure 71153, "Event Followup," a Special Inspection was initiated in accordance with Inspection Procedure 93812, "Special Inspection." The special inspection focus areas included the nine charter items related to the degraded SX riser piping (Attachment 4 – Special Inspection Team Charter).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR OPERATIONS, INC.	)	Docket No. 50-293-LR
	)	
(Pilgrim Nuclear Power Station)	)	ASLBP No. 06-848-02-LR
	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF RESPONSE TO INITIAL PRESENTATIONS ON CONTENTION 1, REBUTTAL TESTIMONY AND RESPONSE TO BOARD QUESTIONS" in the above-captioned proceeding have been served on the following by electronic mail and by deposit in the U.S. Nuclear Regulatory Commission's internal mail system, as indicated by an asterisk (*), or by electronic mail and by deposit in the U.S. Mail system this 6th day of March, 2008.

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/RA/

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