UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of Docket # 50-293-LR

Entergy Corporation

Pilgrim Nuclear Power Station

License Renewal Application August 8, 2011

Pilgrim Watch Request for Leave to Supplement Pilgrim Watch Request for Hearing on a New Contention Regarding the Inadequacy of the Environmental Report, Post Fukushima filed June 1, 2011

Pilgrim Watch requests leave to file this supplement to the record. It includes new, significant and material information and is timely provided to inform the Board.[1]

The attached Appendix contains excerpts from NRC's Task Force Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from The Fukushima Dai-Ichi Accident, July 12, 2011.

We respectfully ask that this new, significant and material information relevant to Pilgrim Watch's Request for Hearing, provided by NRC technical experts and submitted to inform the Board in a timely manner, be included in the record.

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[1] Under NRC practice, parties have an "obligation to keep the Licensing Board . . .informed of relevant and material new information." *Sacramento Municipal Utility District* (Ranco Seco Nuclear Generating Station), CLI-93-5, 37 NRC 168, 170 (1993).

Respectfully submitted,

(Signed Electronically)

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August 8, 2011

APPENDIX – EXTRACTS FROM TASK FORCE REPORT

1. **Reactor design- Units 1-5 same as Pilgrim, BWR Mark 1** (pg., 8):

REACTORS AT THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT

Unit	Net MWe*	Reactor, Containment, and Cooling Systems**
1	460	BWR-3, Mark I, IC, HPCI
2	784	BWR-4, Mark I, RCIC, HPCI
3	784	BWR-4, Mark I, RCIC, HPCI
4	784	BWR-4, Mark I, RCIC, HPCI
5	784	BWR-4, Mark I, RCIC, HPCI
6	1,100	BWR-5, Mark II, RCIC, HPCS

* *MWe—megawatts electric*

** *IC—isolation condenser, HPCI—high-pressure coolant injection system, RCIC—reactor core isolation cooling system, HPCS—high-pressure core spray system*

2. **Accident Description: Hydrogen Explosions- Failure DTV [pg., 9]**:

"The current condition of the Unit 1, 2, and 3 reactors is relatively static, but those units have yet to achieve a stable, cold shutdown condition. Units 1, 2, 3, and 4 also experienced explosions further damaging the facilities and primary and secondary containment structures. The Unit 1, 2, and 3 explosions were caused by the buildup of hydrogen gas within primary containment produced during fuel damage in the reactor and subsequent movement of that hydrogen gas from the drywell into the secondary containment. The source of the explosive gases causing the Unit 4 explosion remains unclear. In addition, the operators were unable to monitor the condition of and restore normal cooling flow to the Unit 1, 2, 3, and 4 spent fuel pools."

3. Failure Venting

4.2.2 Containment Overpressure Protection – Task Force Evaluation [pgs., 40-41]

"Information available at the time of this report indicates that, during the days following the Fukushima Dai-ichi prolonged SBO event, primary containment (drywell) pressure in Units 1, 2, and 3 substantially exceeded the design pressure for the containments. The operators attempted to vent containment, but they were significantly challenged operating the wetwell (suppression pool) vents because of complications from the prolonged SBO. Units 1, 2, 3, and 4 use the Mark I containment design."

4. Fukushima's Vents

- "The process at Fukushima Dai-ichi Units 1, 2, 3, and 4 for venting the wetwell involves opening one ac-powered motor-operated valve to permit air pressure to open air-operated valves in the vent line, and then opening another ac-powered motor-operated valve in line with the air-operated valves, permitting containment pressure to impact a rupture disk designed to open if containment pressure is significantly above design pressure. If all of these actions are successful, the containment would vent directly to the plant stack, and containment integrity could be reestablished by closing either the in-line ac-powered motor-operated valve or the air-operated valves." [pg., 40]
- "In a prolonged SBO situation, these actions would not be possible from the control room because of the loss of ac power and the depletion of the batteries providing dc control power for the valves. It is unclear whether the operators were ever successful in venting the containment in Unit 1, 2, or 3. The operators' inability to vent the containments complicated their ability to cool the reactor core, challenged the containment function, and likely resulted in the leakage of hydrogen gas into the reactor building, precipitating significant explosions in Units 1, 3, and 4." [pgs., 40-41]

5. Lessons Learned Regarding Vents (pg., 40)

- "Ensuring that BWR Mark I and Mark II containments have reliable hardened venting capability would significantly enhance the capability of those BWRs to mitigate serious beyond-design-basis accidents."
- "A reliable venting system could be designed to be independent of ac power and to operate with limited operator actions from the control room. Alternatively, a reliable venting capability could be provided through a passive containment venting design, such as rupture disks with ac-independent isolation valves to reestablish containment following rupture of the disk. The Task Force concludes that the addition or confirmation of a reliable hardened wetwell vent in BWR facilities with Mark I and Mark II containment designs would have a significantly safety benefit."

- "During the longer term review, the staff needs to reevaluate the design of other containment structures for operating reactors to reaffirm the past conclusion that hardened vents are not necessary to mitigate certain beyond-design-basis accident scenarios."

8. **Task Force Recommendation 5** [pg., 41]

- "The Task Force recommends requiring reliable hardened vent designs in BWR facilities with Mark I and Mark II containments."
- "5.1 Order licensees to include a reliable hardened vent in BWR Mark I and Mark II containments. This order should include performance objectives for the design of hardened vents to ensure reliable operation and ease of use (both opening and closing) during a prolonged SBO."

9. **Mitigating Explosions:** 4.2.3 Combustible Gas Control Task Force Evaluation [pg.,42]

- "Information available at the time of this report indicates that, during the days following the Fukushima prolonged SBO event, Units 1, 3, and 4 experienced explosions, causing significant damage to the reactor buildings for those units."
- "It is believed that the explosions in Units 1 and 3 resulted from hydrogen gas that was liberated inside the drywell during high-temperature zirconium fuel cladding reactions with water and that hydrogen gas migrated to the reactor building."
- "The migration route of the hydrogen gas from the primary containment to reactor building has not yet been determined definitively; however, the failure to prevent, through containment venting, the primary containment pressure from significantly exceeding the design pressure likely contributed to the transport of hydrogen gas. It is believed that the explosion in the Unit 4 reactor building also resulted from hydrogen gas, but the source of the gas in Unit 4 is not yet clear. Unit 2 may also have experienced a hydrogen explosion in its suppression pool inside containment. However, the mechanism for suppression pool failure remains unclear."

10. **Inerting with Nitrogen- effectiveness limited [pg., 42]**

- "The method of combustible gas control in BWR Mark I and Mark II containments (i.e., containment inerting with nitrogen) will prevent hydrogen fires or explosions as long as containment remains isolated, but it will not eliminate the hydrogen resulting from an accident damaging the core." [pg., 42]
- "This means that in a BWR Mark I or Mark II containment, the hydrogen must be kept in containment by controlling containment pressure without venting (i.e., through heat removal from the containment when possible) or by venting to a safe location." [pg., 42]

- “Implementation of Task Force Recommendation 4,(The Task Force recommends that the NRC strengthen SBO mitigation capability at all operating and new reactors for design-basis and beyond-design-basis external events, pg.**.** 37) associated with prolonged SBO, would reduce the likelihood of core damage and hydrogen production.” [pg., 42]

11. Venting- serves dual function: overpressure protection & reliable venting of hydrogen

“In addition, implementation of Recommendation 5 to enhance the containment venting capabilities for Mark I and Mark II containments, while primarily intended for overpressure protection, would also provide for the reliable venting of hydrogen to the atmosphere. These two steps would greatly reduce the likelihood of hydrogen explosions from a severe accident.” [pg.,42]