

June 24, 2015

Mark A. Satorius, Executive Director for Operations  
United States Nuclear Regulatory Commission  
Washington, DC 20555-0001

**SUBJECT: 2.206 Petition on Current Licensing Basis for Flooding at Pilgrim**

Dear Mr. Satorius:

On behalf of the Union of Concerned Scientists (UCS) and the organizations listed below, I submit this petition pursuant to 10 CFR §2.206. We petition the Nuclear Regulatory Commission (NRC) to take enforcement action to require that the current licensing basis for the Pilgrim Nuclear Power Station (PNPS) in Plymouth, Massachusetts explicitly includes flooding caused by local intense precipitation/probable maximum precipitation events. (This could be done by issuing an order to the licensee of the plant.) Evaluations by the plant's owner indicate that the site could experience flood levels from these causes nearly ten feet higher than anticipated when the Atomic Energy Commission originally licensed it. The good news is that doors already installed at the site protect important equipment from being submerged and damaged. The bad news is that neither regulatory requirements nor enforceable commitments exist that ensure the continued reliability of these flood protection features. The petitioners seek to rectify this safety shortcoming by revising the current licensing basis to include flooding caused by heavy rainfall events.

**Pilgrim's Flood Hazard Re-Evaluation**

By letter dated March 12, 2015, the licensee for Pilgrim submitted a flood re-evaluation report<sup>1</sup> to the NRC to satisfy one of the agency's post-Fukushima mandates. Section 2.2.1 stated that the "minimum entrance level for areas housing SSCs [systems, structures and components] important to safety is 23 feet MSL [Mean Sea Level]."

Section 2.2 of the report stated "The PNPS design basis flood is the extreme design storm tide level of 13.5 feet MSL." Section 2.3.1.1 explained that "the extreme design storm tide level is based on a peak storm surge of 6.6 feet coincident with a high tide of 6.9 feet MSL." Section 2.3.1.1 further stated that "The extreme storm tide event is the only CLB [current licensing basis] flood hazard." Section 4.1.4 repeated this statement, noting that "The only flood hazard addressed in the CLB is an extreme storm tide level of 13.5 feet MSL resulting from either the peak storm surge from a nor'easter and an astronomical high tide, or from a maximum hurricane produced storm surge."

Thus, all flooding hazards other than the extreme storm tide event are outside the current licensing basis for Pilgrim.

---

<sup>1</sup> Online at <http://pbadupws.nrc.gov/docs/ML1507/ML15075A082.pdf>

### **Current Licensing Basis Background**

The NRC defined current licensing basis in 10 CFR 54:<sup>2</sup>

*Current licensing basis (CLB) is the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR 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. It also includes the plant-specific design-basis information defined in 10 CFR 50.2 as documented in the most recent final safety analysis report (FSAR) as required by 10 CFR 50.71 and the licensee's commitments remaining in effect that were made in docketed licensing correspondence such as licensee responses to NRC bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports.*

The current licensing basis consists of applicable regulatory requirements and the licensee's written commitments for complying with them.

Being outside the current licensing basis means there are no applicable regulatory requirements. As a direct result, there can be no associated compliance commitments.

Being within the current licensing basis invokes a wide array of associated regulatory requirements. For example, the quality assurance criteria in 10 CFR 50 Appendix B require that licensees find and fix problems with structures, systems, and components having safety functions credited within the current licensing basis. Problems with structures, systems and components outside the current licensing basis can be remedied, or not, at the licensee's discretion.

Similarly, the change control measures within 10 CFR 50.59 apply to proposed modifications to structures, systems and components having safety functions credited within the current licensing basis. When a proposed modification alters the boundary or conditions of an NRC regulatory decision, prior NRC approval is necessary. NRC review and approval is not needed for modifications to structures, systems and components outside the current licensing basis.

By definition and law, there are no regulatory requirements governing structures, systems, and components lacking safety functions within the current licensing basis.

### **Pilgrim's Heavy Rainfall Flood Hazard**

Table 4-1 in Pilgrim's flood hazard re-evaluation report is replicated as Figure 1 in this petition. It shows that the extreme storm surge event was re-evaluated to have a maximum height of 15.8 MSL, providing more than 7 feet (about 50 percent) margin to the 23 feet MSL minimum entrance elevation for areas housing structures, systems and components important to safety.

Table 4-1 also shows that local intense precipitation events can result in flooding up to 23.5 feet MSL "at important locations on north and west sides of plant" and up to 25.2 feet MSL "at important locations on south side of plant." Such events have negative margin to the 23 feet MSL minimum entrance elevation.

---

<sup>2</sup> Online at <http://www.nrc.gov/reading-rm/doc-collections/cfr/part054/part054-0003.html>

Section 2.3.1.2 of the report states that the “water depths along the power block buildings are based on one hour precipitation rates having a probability of occurrence of  $1 \times 10^{-6}$  per year. The rainfall rates were developed from the National Weather Service HYDRO-35 report,<sup>3</sup> and the U.S. Army Corps of Engineers (USACE) Flood Hydrograph Package HEC-1 was used to develop the runoff flowrate. The duration of the PMP [probable maximum precipitation] event is one hour.” Thus, the heavy rainfall hazard (encompassing local intense precipitation and probable maximum precipitation events) is neither a common occurrence nor an overly speculative threat.

Section 5.0 of the report evaluates the potential consequences from the estimated flood heights. It concludes that flooding caused by local intense precipitation is the only mechanism challenging structures, systems and components important to safety.

Section 5.1.1 and Tables 3-1 and 4-3 indicate that the north side door to the Emergency Diesel Generator Building could be submerged to a depth of 0.6 feet. This outcome was judged acceptable based on a 1993 internal memo purporting that the doors would not fail even if flooded to a depth of 1.5 feet. That memo is not publicly available, so this claim cannot be independently evaluated. But because the NRC mandated that flooding hazards be re-evaluated, the implicit expectation is that measures relied upon to protect structures, systems and components from flooding damage would also be re-assessed.

The situation in the turbine building was described in Section 5.1.1.1. The report states that flood water could flow “to the Lower Switch Gear Room which houses SSCs important to safety.” The report identifies three doors (103, 105, and 311, see Figure 2 for their locations) within the turbine building that prevent flood waters from damaging key equipment.

The turbine building’s outer door (Door 102) is stated to be 20 feet wide by 21 feet high and designed for wind loading of approximately 0.17 pounds per square inch. The report states that the door could be flooded to a depth of 2.5 feet during a local intense precipitation event, putting a force of 0.325 pounds per square inch on the door. Despite being nearly double the force the door is designed to withstand, this condition was accepted in the re-evaluation report because only part of the door will be underwater. The report further reveals that a walkdown of the building showed Door 102 to be bowed inward for its bottom five feet. Because no fractures were observed, the bent door was assumed to be structurally adequate.

#### **Appropriateness of Heavy Rainfall Events within the Current Licensing Basis**

By letters dated October 19, 1989,<sup>4</sup> the NRC notified licensees of operating nuclear power reactors, including Pilgrim, of the following:

*This letter is to inform you that the NRC staff has adopted for future plants the latest probable maximum precipitation (PMP) criteria published by the National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS) to establish acceptable design configurations for safety-related nuclear power plant facilities. The staff has been using the PMP concept in plant flood design for well over 15 years. The criteria appear in Regulatory Guides, ANSI Standards, and Standard Review Plans (NUREG-0800) and were based primarily on*

---

<sup>3</sup> National Weather Service Office of Hydrology Technical Memoranda 35 (HYDRO-35), “Five- to 60-Minute Precipitation Frequency for the Eastern and Central United States,” June 1977. Online at [http://nws.noaa.gov/oh/hdsc/PF\\_documents/TechnicalMemo\\_HYDRO35.pdf](http://nws.noaa.gov/oh/hdsc/PF_documents/TechnicalMemo_HYDRO35.pdf)

<sup>4</sup> NRC Generic Letter 89-22. Online at <http://www.nrc.gov/reading-rm/doc-collections/gen-comm/gen-letters/1989/g189022.html>

*procedures established in the 1940s and 1950s by the U.S. Army Corps of Engineers and National Weather Service (NWS).*

The NRC-endorsed criteria published by the NOAA's NWS were used by Pilgrim's licensee during its individual plant examination of external events<sup>5</sup> and more recently in its flood hazard re-evaluation. This petition seeks to apply state-of-the-art safety precautions adopted by the NRC more than two decades ago for nuclear power reactors in the United States to the Pilgrim nuclear reactor in Massachusetts recently relicensed by the NRC to operate for two more decades.

As Figure 1 in this petition (Table 4-1 from Pilgrim's flood hazard re-evaluation report) clearly indicates, the heavy rainfall events constitute a significantly greater flooding hazard at Pilgrim than that posed by an extreme storm surge. Heavy rainfall events could result in flooding levels above the entrance elevations to areas housing structures, systems and components important to safety whereas the maximum extreme storm surge flooding levels are several feet below that elevation. Consequently, administrative measures protecting against damage from extreme storm surges do not also protect against damage from heavy rainfall events.

### **No Undue Burden on the Licensee**

Although not required to do so under 10 CFR 2.206 or NRC Management Directive 8.11, the petitioners considered whether granting this petition and including heavy rainfall events within the current licensing basis for Pilgrim would place an undue burden on the licensee. We concluded that the licensee might have to undertake some additional measures, but these efforts cannot be considered an undue burden for several reasons.

First, the licensee has already evaluated heavy rainfall events using methodology accepted decades ago by the NRC. Thus, no new analysis or re-analysis would be necessary.

Second, the licensee's completed evaluation has already identified the locations where heavy rainfall events pose flooding challenges and has already identified the existing components (i.e., doors) that protect equipment important to safety from damage. Thus, no new equipment needs to be installed and no existing equipment needs to be modified or replaced.

Third, the licensee would only encounter burden, due or undue, relative to heavy rainfall events being within the current licensing basis if it voluntarily changed the existing configuration. For example:

1. Suppose that the licensee wanted to route cabling or piping into the building housing the emergency diesel generators or into the turbine building through an opening cut through the building's wall at an elevation of 19 feet MSL. Because the old current licensing basis only included an extreme storm surge flood level of 13.5 feet MSL (15.8 feet MSL in the re-evaluation), the design change package for this new building penetration would entail no flood protection features. But if the current licensing basis included heavy rainfall events, it would require the design change package to address impacting flood protection margins or result in the cabling/piping being rerouted.
2. Suppose the licensee wanted to permanently remove Door 311 (see Figure 2 for its location) from its hinges in the turbine building because it was impeding personnel movements within the turbine building. Again, because the only flooding hazard under the former current licensing basis came from extreme storm surges that did not exceed the entrance elevation (23 feet MSL) of the

---

<sup>5</sup> Pilgrim Nuclear Power Station Individual Plant Examination for External Events (GL 88-20), July 1994. Available from the NRC's Public Document Room under Accession No. 9407060097.

turbine building, removing Door 311 would not undermine flooding protection measures. But if the current licensing basis included heavy rainfall events, this would either prevent Door 311's removal or condition it on providing some readily available alternative means of protecting important equipment from flooding damage.

The extra effort illustrated by these examples does not constitute undue burden. It is effort necessary to protect a significant business asset of the company and a significant region of the country.

### **Undue Burden on the Public**

Pilgrim's existing current licensing basis excludes heavy rainfall events despite evaluations using NRC-accepted methods that show such events to be the dominant flood hazard at Pilgrim.

The good news is that the licensee's evaluation of heavy rainfall events indicates that doors already exist at Pilgrim to protect important equipment from damage by submergence during heavy rainfall events.

The bad news is that because heavy rainfall events are outside the currently licensing basis, there are neither regulatory requirements nor reliable commitments that ensure these doors remain in place. Absent a regulatory footprint, no credit can be given to informal, uncontrolled measures in protecting against the identified flood hazard.

As a result, the public faces an undue burden — the licensee could intentionally and legally remove one or more of these doors next week. In that case, the public would not be adequately protected from harm should a heavy rainfall event occur.

### **Due, Perhaps Overdue, Remedy**

The petitioners ask the NRC to take enforcement action that results in heavy rainfall events being included in the current licensing basis for the Pilgrim Nuclear Power Station. Granting this petition puts no undue burden on the plant's owner and removes an undue burden from the public.

We, the petitioners, would like to exercise our option under Management Directive 8.11 to address the NRC staff before the Petition Review Board (PRB) meets to consider our request. We believe we have clearly articulated the enforcement action we are requesting as well as its justification, but seek the pre-PRB meeting to highlight key issues as well as answer any clarifying questions the NRC staff may have for us.

Sincerely,



David A. Lochbaum  
Director, Nuclear Safety Project  
Union of Concerned Scientists  
PO Box 15316  
Chattanooga, TN 37415  
423-468-9272, office  
423-488-8318, mobile  
[dlochbaum@ucsusa.org](mailto:dlochbaum@ucsusa.org)

Co-Petitioners (arranged alphabetically):

David Agnew  
18 Marthas Lane  
Harwich, MA 02645

Paul Gunter  
Beyond Nuclear  
6930 Carroll Avenue Suite 400  
Takoma Park, MD 20912  
301-270-2209  
[www.beyondnuclear.org](http://www.beyondnuclear.org)

Sandra Gavutis,  
Executive Director  
C-10 Foundation,  
44 Merrimac Street,  
Newburyport, Ma. 01950

Diane Turco  
Co-Founder  
Cape Downwinders  
PO Box 303  
South Harwich, MA 02661

Pine duBois  
Executive Director  
Jones River Watershed Association  
Jones River Landing  
55 Landing Rd.  
Kingston, MA 02364  
781-585-2322  
[www.jonesriver.org](http://www.jonesriver.org)

Timothy L. Judson  
Executive Director  
Nuclear Information & Resource Service  
6930 Carroll Avenue, Suite 340  
Takoma Park, MD 20912  
301-270-6477  
[www.nirs.org](http://www.nirs.org)

Mary Lampert  
Pilgrim Watch, director  
148 Washington Street  
Duxbury MA 02332  
Tel. 781-934-0389

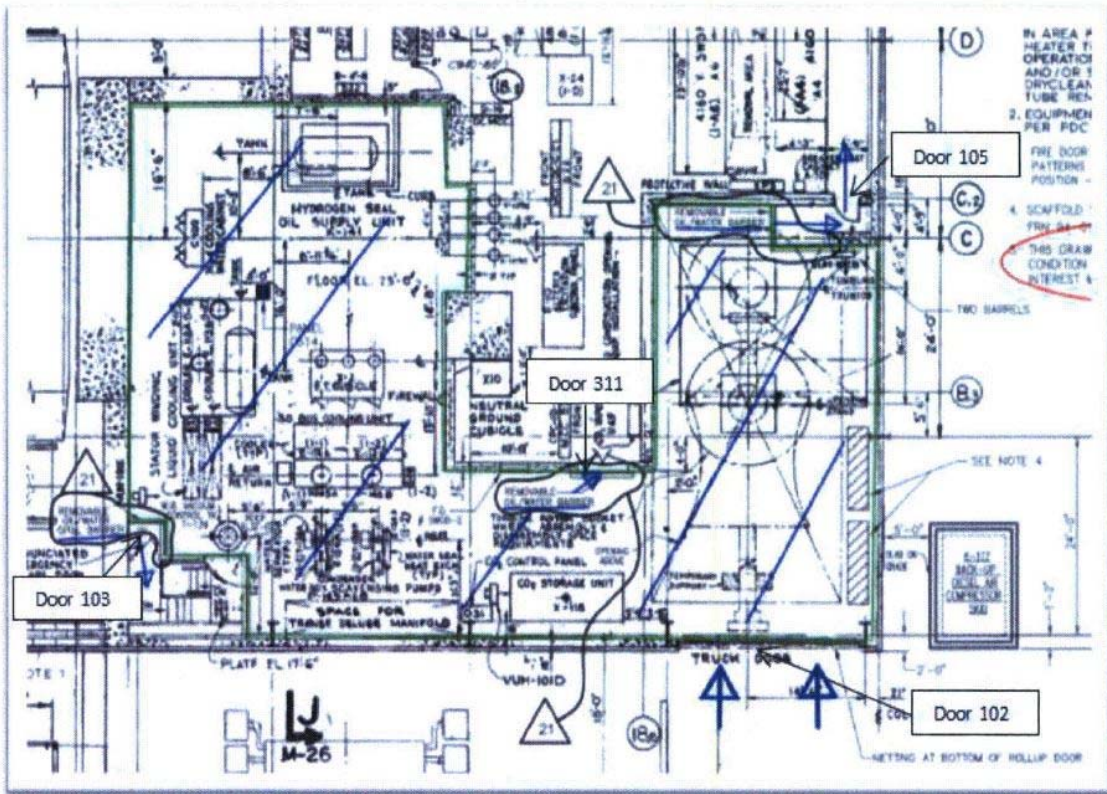
Figure 1: Table 4-1 from Pilgrim’s Flood Hazard Re-Evaluation Report



Pilgrim Nuclear Power Station  
Flood Hazard Re-Evaluation Report

**Table 4-1: Flood Elevation Comparison**

Mechanism	CLB Flood Height	Re-Evaluated Flood Height	Difference
Local Intense Precipitation	22.5 feet MSL along north side of plant buildings	23.3 to 23.5 feet MSL (at important locations on north and west sides of plant)	+0.8 to +1.0 feet MSL
	24.5 feet MSL along south side of plant buildings	25.2 feet MSL (at important locations on south side of plant)	+0.7 feet MSL
	Roof ponding of approx. 0.5 feet based on all roof drains being 100% effective. [Note: PMP was evaluated as part of the IPEEE.]	Not Applicable	Not Applicable
PMF in Rivers and Streams	Not Evaluated	Screened	Not Applicable
Dam Breaches and Failures	Not Evaluated	Screened	Not Applicable
Storm Surge	13.5 feet MSL	15.8 feet MSL [max. water surface elevation (i.e., still water plus wave setup)] [Note: Station grade is at 20 feet MSL.]	+2.3 feet
Seiche	Not Evaluated	Screened	Not Applicable
Tsunami	Not Evaluated	Screened	Not Applicable
Ice Induced Flooding	Not Evaluated	Screened	Not Applicable
Channel Migration or Diversion	Not Evaluated	Screened	Not Applicable
Combined Effect	Not Evaluated	22.1 feet MSL (near Reactor Building in site yard between buildings and shore revetment) 19.8 feet MSL (upstream face of Intake Structure) [Note: Station grade is at 20 feet MSL.]	Not Applicable
Note: "Not Evaluated" indicates that this flood mechanism was not defined or addressed in CLB documents. As a result, no comparison can be made to re-evaluated results.			



Notes:

1. Should water from the LIP seep through Door 102, potential flooding within Turbine Building areas is shown by the blue highlighting. It is anticipated that flood water would be contained within the walls and doors outlined in green highlighting.

Figure 2. This drawing looks downward at the southwest corner of the turbine building at Pilgrim. It is Figure 5-2 from Pilgrim's flood hazard re-evaluation report. It shows the location of external door 102 as well as internal doors 103, 105, and 311 that are credited in protecting important components from being submerged.