

Attachment Q

Declaration of David Lochbaum

I, David A. Lochbaum, declare as follows:

Personal Education and Experience

1. I received a Bachelor of Science degree in Nuclear Engineering from The University of Tennessee in June 1979.
2. Between June 1979 and December 1979, I was a Junior Engineer at Georgia Power Company's Edwin I. Hatch Nuclear Plant. I was the radwaste system engineer and also qualified and worked as a reactor engineer.
3. From January 1980 to June 1981, I was a Reactor Engineer and Shift Technical Advisor at Tennessee Valley Authority's Browns Ferry Nuclear Plant.
4. Between June and October 1981, I was an instructor at General Electric's BWR/6 Training Center. I went on assignment in the Independent Safety Engineering Group at the Grand Gulf Nuclear Station.
5. Between October 1981 and August 1983, I was a Reactor Engineer and Shift Technical Advisor at Tennessee Valley Authority's Browns Ferry Nuclear Plant.
6. Between August 1983 and February 1987, I was a Senior Engineer with Enercon Services on assignment in the reactor engineering section at the Grand Gulf Nuclear Station.
7. Between March and August 1987, I was a System Engineer with General Technical Services (subsidiary of General Physics Corporation) on assignment in the Browns Ferry Nuclear Plant Restart Project.
8. Between November 1987 and September 1996, I was a Senior Consultant with Enercon Services on assignments at the Grand Gulf (BWR Technical Specification Improvement

Program licensing effort), Hope Creek (reactor engineering), Susquehanna (power uprate project), Salem (Unit 2 restart project), and Connecticut Yankee (station blackout topical report) nuclear plants.

9. Between October 1996 and February 2009, I was the Director of the Nuclear Safety Project for the Union of Concerned Scientists Responsible for directing UCS's nuclear safety program, for monitoring developments in the nuclear industry, for serving as the organization's spokesperson on nuclear safety issues, for initiating action to correct safety concerns, for authoring reports and briefs on safety issues, and for presenting findings to the Nuclear Regulatory Commission, the US Congress, and state and local officials.
10. Between March 2009 and March 2010, I was a Reactor Technology Instructor for the U.S. Nuclear Regulatory Commission at the Technical Training Center.
11. From March 2010 to date, I have been the Director of the Nuclear Safety Project for the Union of Concerned Scientists.

Flood Protection During Period of Extended Operation

12. The original operating licenses for Turkey Point Units 3 and 4 were renewed by the NRC with expiration dates of July 19, 2032, and April 10, 2033, respectively. (NRC 2016).
13. General Design Criterion (GDC) 2 in Appendix A to 10 CFR Part 50 requires that structures, systems, and components important to safety be designed to withstand effects of earthquakes, tornadoes, hurricanes, and floods without losing capacity to perform their safety functions.
14. GDC 2 is explicitly contained within the current licensing basis for Turkey Point Units 3 and 4 in Section 1.3.1 of the Updated Final Safety Analysis Report (UFSAR). (FPL 2016a)

15. Appendix 5G to the Turkey Point UFSAR describes the protection provided at the site against external flooding. The flood protection measures include:
- a. A 4 ft. high concrete wall was provided at the seaward extremity (east side) of the intake structure deck. The wall provides flood protection to +20 feet above MLW [Mean Low Water].
 - b. The intake cooling water pump motor bases were raised from +20 feet MLW to +22.5 feet MLW, and are therefore protected by their elevation.
 - c. External flood protection has been provided to +20 ft. above MLW to the north, south, and west of the facility by a continuous barrier consisting of building exterior walls, flood walls, a flood embankment, and stop logs for the door openings
 - d. External flood protection has been provided to +22 ft. above MLW to the east of the facility by a continuous barrier consisting of building exterior walls and stop logs for the door openings. (FPL 2016b)
16. The license renewal rule, specifically 10 CFR 54.21(a)(1), requires applicants to “identify and list those structures and components subject to an aging management review.”
17. Section 2.4.2.17, Plant Structures, of the application for subsequent license renewal describes the structures and components in the yard subject to aging management reviews under 10 CFR 54.21(a)(1). Table 2.4.2.17, Yard Structures Components Subject to Aging Management Review, explicitly includes flood protection features such as masonry block walls, drains and drain plugs, and stop logs. The stated function to be performed by these structures and components is identified as being that of “Flood barrier.” (FPL 2018c).

18. The flood hazard re-evaluation report submitted by Florida Power & Light to the NRC in response to a post-Fukushima order described the probable maximum hurricane as the design base external flood event. Page 20 of the report stated that the analyses for proposed Turkey Point Units 6 and 7 “considered a 100-year sea level rise due to climate change.” Page 59 reported “the long-term sea level rise trend at Miami Beach, Florida, as estimated on data from 1931 to 1981, is 0.78 foot per century.” Pages 39 and 40 stated “that global sea level rise is occurring” and that the “20-year second-order nonlinear trend seal-level rise of 0.39 feet” was assumption in the analyses for Turkey Point Units 3 and 4 “for the remaining license life (20 years, out to 2033).” (Enercon 2013)
19. Page 8 of the NRC’s assessment of FPL’s re-evaluation of the flood hazard showed that the agency explicitly relied on the projected 0.39 feet sea level rise to 2033. (Minarik 2015)
20. Robert Kopp concluded that “it’s likely (greater than two chances in three) that seal-level rise will exceed 1 foot in south Florida by 2060.” (Kopp 2018)
21. By letter dated June 29, 2017, FPL submitted the summary of the flooding focused evaluation conducted for Turkey Point Units 3 and 4. Table 4, Current Flood Wall APM [Available Physical Margin], lists the available physical margin for the flood walls protecting the east, north, south, and west sides of Turkey Point Units 3 and 4 as being 1.5, 0.1, 0.2 and 0.6 feet respectively. The sentence appearing just above this table states: “Note, this does not include the 20-year sea level increase, which was calculated to be 0.39 feet.” (Summer 2017)
22. If the 0.39-foot sea level rise calculated for FPL out to 2033 is subtracted from the available physical margins in Table 4 of the Flooding Focused Evaluation Summary, the

available physical margins for the flood walls protecting the east, north, south, and west sides of Turkey Point Units 3 and 4 become 1.11, (0.29), (0.19) and 0.21 feet respectively, with values in parentheses representing negative margins.

23. If the sea level rise out to 2033 exceeds 0,39 feet, the available physical margins decrease and negative margins increase.
24. FPL submitted an Individual Plant Examination (IPE) to the NRC in response to Generic Letter 88-20. Section 3.8 of the IPE described the hurricane analysis. Section 3.8.5 described the results of the analysis: “At the 19 feet (NGVVD) storm surge level, the plant’s flood walls are overtopped, with subsequent damage to critical plant equipment (i.e., 4.16 kV switchgear). ... All other components [e.g., precipitation, etc.] of this hurricane were bounded by the storm surge.” (FPL 1991)
25. By letter dated December 20, 2016, FPL submitted to the NRC the Mitigating Strategies Assessment for Turkey Point Units 3 and 4. Table 2.2-3, Probable Maximum Storm Surge (Including 20 Year Sea Rise) Parameters, provided information about the inputs and outcomes from the flood hazard re-evaluation. Item 5, Concurrent Site Conditions, stated that the Probable Maximum Storm Surge assumed “High velocity winds” and “High intense rainfall” concurrent with the storm surge. Note 1 to the table specified that the Probable Maximum Storm Surge is based on a postulated Probable Maximum Hurricane, which includes high winds and intense rainfall, but that no outdoor actions are required during that period. (Summer 2016)
26. Page 55 of the flood hazard re-evaluation report for Turkey Point Units 3 and 4 stated that the “sustained wind speeds during the PMSS [Probable Maximum Storm Surge] event are in excess of approximately 157 miles per hour.”

27. Appendix 5E to the Turkey Point UFSAR provided the Missile Protection Criteria. Its initial sentence stated: “Hypothetical missiles that could be generated either from various components of the unit or by hurricanes and tornadoes are considered in the design. Section 5E-2, External Missiles, described missiles considered in the design to be a 4-foot by 8-foot corrugated metal siding weighing 100 pounds propelled at 224 miles per hour, a 12-inch by 4-inch by 4-inch bolted wood decking section weighing 450 pounds propelled at 200 miles per hour, and a passenger car weighing 4,000 pounds propelled at 50 miles per hour. Appendix 5E described how components are protected from wind-generated missiles either by being housed within robust structures designed to withstand such impacts or through redundancy where loss of a single component due to impact will not prevent the required function from being performed. (FPL 2016b)
28. Neither the UFSAR nor the flood hazard re-evaluations explain how the flood barriers (i.e., flood walls and stoplogs) are invulnerable to wind-generated missiles. Nor could any document be found that showed the loss or impairment of a flood barrier due to impact(s) from wind-generated missile(s) would not result in the intended function being performed successfully.
29. FPL Emergency Plan Implementing Procedure 0-EPIP-20106, Natural Emergencies, described the actions to be taken to supplement permanently installed flood protection features at Turkey Point. The actions include deploying portable electric generators and portable dewatering pumps along with fuel supplies and hoses to areas such as the Unit 3 and 4 component cooling water pump rooms, Unit 3 and 4 residual heat removal room sumps, Auxiliary Building sump, Unit 3 Emergency Diesel Generator room floor drain,

and Unit 3 and 4 switchgear rooms. Other actions include placing sandbags around exterior doors and installing stoplogs. (FPL 2002)

30. Page 15 of the flood hazard re-evaluation report (Enercon 2013) described the rainfall rate associated with the design bases probably maximum hurricane to be based on the 100-year, 30-minute precipitation event which results in onsite flooding of 3.8 inches. This volume is managed using three dewatering pumps: a 4,900 gallon per minute (gpm) pump for the turbine building area, and a 250-gpm pump for each of the Unit 3 and 4 component cooling water areas.
31. Failure of permanently installed flood barrier(s) that results in more onsite flooding than anticipated by the 3.8-inch depth from the design bases hurricane event could overwhelm the supplemental flood protection measures that are deployed in advance of a hurricane.
32. The license renewal rule, specifically 10 CFR 54.30(a) states that if the reviews required by § 54.21 (a) or (cc) show that there is not reasonable assurance during the current license term that licensed activities will be conducted in accordance with the CLB [current licensing bases], then the licensee shall take measures under its current license, as appropriate, to ensure that the intended function of those systems, structures, or components will be maintained in accordance with the CLB throughout the term of its current license.” Protection against external flooding as required by GDC 2 and described in the CLB via UFSAR Appendices 5E and 5G during the current license term lacks such reasonable assurance because:
 - a. The flood hazard re-evaluation showed little to no margin available for design basis external flooding events assuming a 0.39 feet sea level rise out to 2033. If the sea level rise exceeds that assumption, design flood protection will be

compromised with the result that multiple safety components needed to prevent damage of irradiated fuel becoming disabled, increasing the potential for fuel damage.

- b. Wind-generated missiles are explicitly included within the current licensing basis, but no record has been found showing that flood barriers can withstand wind-generated missiles or that Turkey Point Units 3 and 4 can survive a design bases flood event with one or more flood barriers lost or damaged by a wind-generated missile.

Flood Protection During Period After Subsequent License Renewal

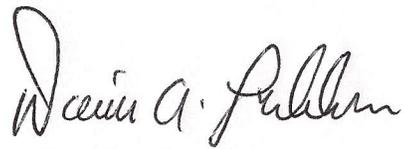
- 33. FPL applied to the NRC for a 20-year extension to the operating licenses for Turkey Point Units 3 and 4. The operating licenses currently expire on July 19, 2013, and April 10, 2033, respectively for Units 3 and 4. (FPL 2018b)
- 34. The flood hazard re-evaluation report (Enercon 2013), associated documents (Summer 2017 and Summer 2016), and NRC assessment (Minarik 2014) assume a 0.39 feet sea level rise out to 2033.
- 35. The environmental report (FPL 2018a) submitted with the application for subsequent license renewal mentioned sea level rise only twice: (1) on page 3.181 in a discussion about the impact of sea level rise on the habitat of the Cape Sable Thoroughwort, and (2) on page 3-210 in a discussion of the potential impact of sea level rise on the Black Skimmer population.
- 36. The application for subsequent license renewal (FPL 2018b and FPL 2018c) contain no mention of sea level rise.

37. The NRC staff's assessment of the flooding focused evaluation (Vega 2018), issued months after the application for subsequent license renewal was submitted, reported that the flood hazard re-evaluation (Enercon 2013) assumed a 0.39-foot sea level rise out to 2033 and the flooding focused evaluation (Summer 2017) assumed zero sea level rise out to 2033.
38. No document could be found in ADAMS, the NRC's online record repository, for the design bases external flood hazard and associated protections beyond 2033.
39. If the sea level rises more than the 0.39-feet assumed by 2033 in the flood hazard re-evaluation or more than the zero feet assumed in the flooding focused evaluation, protection against design bases external floods during the period after subsequent license renewal would be inadequate.
40. Section 2.4.2.17 of the application for subsequent license renewal (FPL 2018c) described the aging management measures intended to ensure that the flood barriers remain capable of performing their flood protection functions. It makes little sense to ensure the flood barriers remain solid enough to protect against flooding if assurance that the flood barriers are tall enough is lacking.
41. The license renewal rule, specifically 10 CFR 54.29, states that a renewed license may be issued if the Commission finds that "there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB" [current licensing basis]. Because the flooding evaluations and assessments only went out to 2033, the expiration of the current operating licenses, and there is no evaluation or assessment concluding that reactor operation beyond 2033 will remain

bound by those analyses, reasonable assurance needed to issue subsequent license renewals cannot be found.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge.

Dated: July 28, 2018

A handwritten signature in cursive script, appearing to read "David A. Lochbaum".

David A. Lochbaum

Sources

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