FPL

L-2015-112
10 CFR 52.3

April 7, 2015

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Re: Florida Power & Light Company
Proposed Turkey Point Units 6 and 7
Docket Nos. 52-040 and 52-041
Revised Response to NRC Request for Additional Information Letter No. 063 (eRAI 5695) Related to SRP Section 11.02 – Liquid Waste Management System

References:

1. NRC Letter to FPL dated May 21, 2012, Request for Additional Information Letter No. 063 Related to SRP Section 11.02, Liquid Waste Management System, for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application

2. FPL Letter L-2012-283 to NRC dated July 13, 2012, Response to NRC Request for Additional Information Letter No. 063 (eRAI 5695) Related to SRP Section 11.02 – Liquid Waste Management System

Florida Power & Light Company (FPL) provides, as an attachment to this letter, its revised response to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) 11.02-2 provided in Reference 1. This response was first provided to the NRC in Reference 2. The attachment identifies changes that will be made in a future revision of the Turkey Point Units 6 and 7 Combined License Application (if applicable).

If you have any questions, or need additional information, please contact me at 561-691-7490.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 7, 2015.

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/RFO

D097
NRO

Florida Power & Light Company

700 Universe Boulevard, Juno Beach, FL 33408

Attachment: FPL Revised Response to NRC RAI No. 11.02-2 (eRAI 5695)

cc:
PTN 6 & 7 Project Manager, AP1000 Projects Branch 1, USNRC DNRL/NRO
Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant Units 3 & 4

NRC RAI Letter No. 063 Dated May 21, 2012

SRP Section: 11.02 – Liquid Waste Management System

Question from Radiation Protection and Accident Consequence Branch (RPAC)

NRC RAI Number: EIS 11.02-2 (eRAI 5695)

FSAR Section 11.2.3.5 and PTN COL 11.2-2 refer to the hypothetical intrusion scenario being an off-normal operation for which a cost benefit analysis is not needed. The information in the FSAR is not sufficient for the NRC staff to confirm the validity of the assumption. Pursuant to 10 CFR 50 Appendix I, Section II.D, a cost benefit analysis would be appropriate, as a minimum indicating assumptions as to bounding values on dose and effluent fate. The licensee will not have control over the environment or the behavior of the public that might affect access to the effluent. Therefore, please provide additional information on bounding cost/benefit, in particular as to whether and/or why deviations of individual habits from the average are or are not reasonable under 10 CFR 50 Appendix I, Section III.A.2, i.e., accessing the Boulder Zone for extraction of liquids.

FPL RESPONSE:

In response to an NRC letter, eRAI 5695, to FPL dated May 21, 2012 (Reference 1), FPL submitted an initial response in FPL letter, L-2012-283, dated July 13, 2012 (Reference 2). Subsequent to that submittal, necessary additional clarifications to the initial response have been identified as a result of FPL's response to an NRC letter, eRAI 6985, to FPL dated February 20, 2013 (Reference 3), provided in FPL Letter, L-2014-002 to NRC dated January 15, 2014 (Reference 4). This submittal provides these additional clarifications, indicated by revision bars, in the response portion of this submittal. Subsequent changes to the FSAR are also provided in the Associated COLA Revisions section.

REVISIONS TO FPL LETTER L-2012-283

As described in FSAR Subsection 11.2.3.5, Units 6 & 7 will use a non-traditional disposal method for NRC licensed radioactive material in liquid effluents, i.e., deep well injection into the Boulder Zone (about 2900 feet below ground surface) versus the traditional liquid effluent disposal methods that involve the direct discharge into surface waters where the liquid effluent is diluted and dispersed in the receiving waters and is immediately available for member-of-the-public exposure.

Although deep well injection provides the means to isolate liquid radioactive waste, minimizing the risk of exposure, migration within and out of the injection zone was evaluated in FSAR Subsection 11.2.3.5 and Reference 4, as part of the liquid effluent pathway analysis portion of the performance assessment, to determine if the potential exists for increasing activity concentrations of long-lived radionuclides over the total assumed operation time period of 60 years for each unit. This evaluation focused on four long-lived radionuclides (tritium, cesium-134, cesium-137, and strontium-90) which are the most significant potential dose contributors.

Analysis of the potential for migration within the injection zone determined that the injectate plume is not expected to reach the hypothesized receptor location—2.2 miles from the injection point in the Boulder Zone, the distance to the nearest privately owned land parcel—until more than 10 years after initiation of injection. Maximum activity concentrations over the model duration (100 years) at the hypothesized receptor location were estimated for the four radionuclides under consideration, which indicated maximum concentrations would be less than the as-injected concentrations. These maximum concentrations were used to compute the annual doses described below. Additionally, the potential for vertical migration out of the injection zone toward drinking water sources in higher strata was evaluated, as presented in FSAR Subsection 11.2.3.5 and Reference 4. This analysis concluded that it is not anticipated, under normal operating conditions, that radioactivity injected into the Boulder Zone would reach either an underground source of drinking water or the surface environment—primarily due to confinement, slow movement, and radioactive decay.

Although FPL will use a non-traditional disposal method which will serve to isolate the liquid radioactive waste, as indicated in 10 CFR 50, Appendix I, Section II.D, a cost-benefit analysis is required to determine whether radwaste system augments can yield reductions in the 50-mile population doses at a cost of less than $1000 per person-rem. In estimating the potential 50-mile population dose, the maximally exposed individual (MEI) doses in the inadvertent intrusion scenario provided in FSAR Table 11.2-209 were selected because they bound those due to off-normal operation as shown in FSAR Table 11.2-208. FSAR Table 11.2-209 indicates that the annual doses to the MEI due to the ingestion of water and irrigated foods are 2.7 mrem to the total body and 3.8 mrem to the liver per unit, the organ receiving the maximum dose. While these doses are based on consumption rates for the MEI, it is conservatively assumed that the average member of the population also receives these doses.

Of the liquid radwaste system augments listed in RG 1.110, the one with the lowest annual cost (and thus the first potentially justifiable augment based on an averted dose consideration) is a 20-gpm cartridge filter at $11,140. To be justified for installation, this augment would need to avert at least 11.14 person-rem in a 50-mile population ($11,400 divided by $1000 per person-rem averted). Although 10 CFR 50, Appendix I indicates that the thyroid is the only organ to be considered in the cost-benefit analysis, it is conservatively assumed that the bounding organ dose provided in FSAR Table 11.2-209 applies to the thyroid. Dividing 11.14 person-rem by the MEI doses of 0.0027 rem to the total body and 0.0038 rem to the organ yields populations of 4125 and 2931 persons, respectively. Accordingly, the minimum 50-mile population justifying installation of the cartridge filter augment is 2931 persons. Consistent with the intruder exposure analysis, each member of this exposed population (cohort) would need to obtain all of their water from a well located 2.2 miles from Units 6 & 7. This cohort does not now exist, nor is it considered reasonable to assume it will exist in the future, as discussed below.

In addition to the conservative assumptions made in analyzing the cost-benefit analysis exposure scenario for a deep well injection disposal method versus the traditional surface water disposal method, the following considerations are provided to show that it is not reasonable or credible to assume that 2931 persons will ingest water (at the MEI rate of 510 liters per year for child, the age group receiving the maximum dose) and irrigated foods (e.g., at MEI child rate of 520 kg per year for fruits, vegetables, and grain) produced from the postulated well on privately-owned land:

i. **Regulatory Constraints** - For a population of at least 2931 persons ingesting drinking water and irrigated foods contaminated with the well water, the well would need to serve a non-transient population of that size and, consequently, would be classified as a "public water system" which would be subjected to regulatory restrictions. As defined in Florida Administrative Code 62-550.200, Definitions for Public Water Systems, a public water system is one that provides water to 25 or more people for at least 60 days each year or serves 15 or more service connections (Reference 5). These regulatory restrictions apply to both the construction and operation of the well. For example, prior to construction and issuance of a permit, the Florida Department of Environmental Protection (DEP) would examine the proposed new facility along with its ability to have the technical, managerial, and financial capacity to successfully operate and maintain a system and deliver clean drinking water to the public it serves. (Reference 6)

ii. **Boulder Zone Water Quality** - DEP is responsible for ensuring each newly constructed well is in compliance with drinking water rules before allowing it to begin operation. The Boulder Zone contains saltwater and has been permitted by the DEP as a zone to discharge treated sewage and other wastes disposed of through injection wells operated in South Florida. Therefore, significant treatment (such as reverse osmosis) and testing would be required for the postulated well to receive a permit. (Reference 6 and FSAR 11.2.3.5.2.3.1.3)

iii. **Land Use** - As described in FSAR Subsection 11.2.3.5.2.4.1, current land use near Turkey Point does not include large-scale farming or livestock raising that could potentially impact the population through the ingestion of food products. Additionally, future water use policy mandates that individual potable water supplies, including private wells, are to be considered interim water supply systems to be utilized only where no alternative public water supply is available and land use and water resources are suitable for an interim water supply.

In conclusion, no liquid radwaste treatment system augment is justified for installation based on an Appendix I averted dose cost-benefit evaluation of the hypothetical exposed cohort discussed above.

This response is PLANT SPECIFIC.

References:

1. NRC Letter to FPL dated May 21, 2012, Request for Additional Information Letter No. 063 Related to SRP Section 11.02 - Liquid Waste Management System for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application.

2. FPL Letter L-2012-283 to NRC dated July 13, 2012, Response to NRC Request for Additional Information Letter No. 063 (eRAI 5695) Related to SRP Section 11.02 - Liquid Waste Management System.

3. NRC Letter to FPL dated February 20, 2013, Request for Additional Information Letter No. 072 Related to SRP Section 11.02 - Liquid Waste Management System for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application.

4. FPL Letter L-2014-002 to NRC dated January 15, 2014, Response to NRC Request for Additional Information Letter No. 072 (eRAI 6985) SRP Section 11.02 - Liquid Waste Management Systems.

5. Florida Administrative Code 62-550.200, Definitions for Public Water Systems.

6. Florida Department of Environmental Protection, *Florida's Strategy to Improve Public Water Supply, Source and Drinking Water Program, Division of Water Resource Management, Florida Department of Environmental Protection August 2014,* available at http://www.dep.state.fl.us/water/drinkingwater/docs/2014TriennialReportGovernor.pdf, September 2014. Accessed March 31, 2015.

ASSOCIATED COLA REVISIONS:

The Associated COLA Revisions submitted under FPL Letter L-2012-283 are being revised as shown below.

FSAR Table 1.8-202, COL Item Tabulation, will be revised in a future COLA revision as follows:

11.2-2	**Cost Benefit Analysis of Population Doses**	**11.2.5.2**	**11.2.3.5.2.5.2 11.2.5.2**	**A**

The last paragraph of FSAR Subsection 11.2.3.5.2.5.1, Beyond Property Area – Off-Normal Operation, will be revised in a future COLA revision as follows:

Table 11.2-208 summarizes the resultant doses **to the MEI** (for conservatism, a child was considered as the member of the public). The total body dose is lower than the 10 CFR Part 50, Appendix I, annual design objective of 6 mrem for two units. The organ dose (dose to child's liver as maximum organ) is lower than the 10 CFR Part 50, Appendix I, annual design objective of 20 mrem for two units. As can beseen, tritium is the dominant dose contributor. **Cost-benefit analysis of population doses is presented in Subsection 11.2.3.5.2.5.2.**

The following will be added at the end of FSAR Subsection 11.2.3.5.2.5.2, Beyond Property Area – Inadvertent Intrusion, in a future COLA revision:

Although FPL will use a non-traditional disposal method which will serve to isolate the liquid radioactive waste, as indicated in 10 CFR 50, Appendix I, Section II.D, a cost-benefit analysis is required to determine whether radwaste system augments can yield reductions in the 50-mile population doses at a cost of less than $1000 per person-rem. In estimating the potential 50-mile population dose, the maximally exposed individual (MEI) doses in the inadvertent intrusion scenario provided in Table 11.2-209 were selected because they bound those due to off-normal operation as shown in Table 11.2-208. Table 11.2-209 indicates that the annual doses to the MEI due to the ingestion of water and irrigated foods are 2.7 mrem to the total body and 3.8 mrem to the liver per unit, the organ receiving the maximum dose. While these doses are based on consumption rates for the MEI, it is conservatively assumed that the average member of the population also receives these doses.

Of the liquid radwaste system augments listed in RG 1.110, the one with the lowest annual cost (and thus the first potentially justifiable augment based on an averted dose consideration) is a 20-gpm cartridge filter at $11,140. To be justified for installation, this augment would need to avert at least 11.14 person-rem in a 50-mile population ($11,400 divided by $1000 per person-rem averted). Although 10 CFR 50, Appendix I indicates that the thyroid is the only organ to be considered in the cost-benefit analysis, it is conservatively assumed that the bounding organ dose provided in Table 11.2-209 applies to the thyroid. Dividing 11.14 person-rem by the MEI doses of 0.0027 rem to the

total body and 0.0038 rem to the organ yields populations of 4125 and 2931 persons, respectively. Accordingly, the minimum 50-mile population justifying installation of the cartridge filter augment is 2931 persons. Consistent with the intruder exposure analysis, each member of this exposed population (cohort) would need to obtain all of their water from a well located 2.2 miles from Units 6 & 7. Due to regulatory constraints and the quality of water in the Boulder Zone, the postulated inadvertent intrusion scenario is not considered reasonable given that the cohort population would need to ingest water and irrigated foods produced from the postulated well on privately-owned land.

FSAR Subsection 11.2.5.2 will be revised in a future COLA revision as follows:

This COL item is addressed in Subsection 11.2.3.5.**2.5.2**.

ASSOCIATED ENCLOSURES:

None