FPL

L-2011-332
10 CFR 52.3

August 19, 2011

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
Response to NRC Request for Additional Information Letter No. 031 (eRAI 5430)
Standard Review Plan Section 12.03-12.04 Radiation Protection Design Features

Reference:

1. NRC Letter to FPL dated July 20, 2011, Request for Additional Information Letter No. 031 Related to SRP Section 12.03, Radiation Protection Design Features for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application

Florida Power & Light Company (FPL) provides, as an attachment to this letter, its response to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) 12.4.1.9.2-1, 12.4.1.9.2-2, 12.4.1.9.3-1 through 12.4.1.9.3-3, 12.4.1.9.5-1 and 12.4.1.9.5-2 provided in Reference 1. 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 August 19, 2011.

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/RFO

D097
NRO

Attachment 1: FPL Response to NRC RAI No. 12.4.1.9.2-1 (eRAI 5430)
Attachment 2: FPL Response to NRC RAI No. 12.4.1.9.2-2 (eRAI 5430)
Attachment 3: FPL Response to NRC RAI No. 12.4.1.9.3-1 (eRAI 5430)
Attachment 4: FPL Response to NRC RAI No. 12.4.1.9.3-2 (eRAI 5430)
Attachment 5: FPL Response to NRC RAI No. 12.4.1.9.3-3 (eRAI 5430)
Attachment 6: FPL Response to NRC RAI No. 12.4.1.9.5-1 (eRAI 5430)
Attachment 7: FPL Response to NRC RAI No. 12.4.1.9.5-2 (eRAI 5430)

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 3 & 4

NRC RAI Letter No. 031 Dated July 20, 2011

SRP Section: 12.03-12.04 – Radiation Protection Design Features

Question from Health Physics Branch (CHPB)

NRC RAI Number: 12.4.1.9.2-1 (eRAI 5430)

Subsection 12. 4.1.9.2 states, "Routine operational thermo-luminescent dosimeter (TLD) measurements at the Units 3 & 4 site show that dose rates are comparable to those observed during the preoperational surveillance program." Please provide specific data and references that support this statement, including TLD results, locations and measurement dates for both the pre-operational and operational surveillance programs. Referenced operational data should be evaluated to ensure that it is representative of Units 3 & 4 plant operating conditions that will be expected during the period of construction for Units 6 & 7.

FPL RESPONSE:

Florida's Department of Health and Rehabilitative Services measured dose rates at the Turkey Point site from 1970 to 1974. This dose rate data shows that in 1970 the mean dose rate at six TLDs ranged from 0.013 to 0.015 mrem/hr:

TLD	Aug.	Sep.	Oct.	Nov.	Dec.
T52	0.015	0.014	0.013	0.015	0.015
T56	0.016	0.015	0.015	0.015	0.018
T58	0.014	0.012	0.013	0.012	0.015
T64	0.015	0.013	0.014	0.014	0.016
T71	0.014	0.012	0.013	0.013	0.015
T57	0.015	0.013	0.014	0.015	0.016
Mean	0.014	0.013	0.013	0.014	0.015

These measurements also show that in 1971 the mean dose rate at 11 TLDs ranged from 0.016 to 0.019 mrem/hr:

TLD	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Mean
T52	0.017	0.017	0.019	0.021	0.019	0.018	0.018	0.018	0.018	0.020	0.018	0.020	0.019
T56	0.018	-	0.020	0.022	0.020	0.020	0.019	0.021	0.019	0.018	0.015	0.019	0.019
T58	0.022	0.017	0.021	0.020	0.020	0.018	0.019	0.018	0.019	0.020	0.018	0.021	0.019
T64	0.014	0.019	0.017	0.020	0.018	0.020	0.016	0.019	-	0.019	0.017	0.019	0.018
T71	0.015	0.017	0.016	0.018	0.016	0.017	0.015	0.017	0.016	0.018	0.017	0.018	0.018
T72	0.016	0.016	0.018	0.018	0.018	0.016	0.017	0.016	0.017	0.016	0.018	0.017	0.017
T57	0.017	0.017	0.019	0.020	0.019	0.019	0.018	0.018	0.018	0.020	0.014	0.017	0.018
T70	-	0.014	0.020	0.015	0.021	0.015	0.016	0.021	0.020	0.017	0.016	0.020	0.018
T78	-	0.017	0.018	0.018	0.017	0.017	0.016	0.017	0.017	0.017	0.016	0.017	0.017
T79	-	0.019	0.015	0.020	0.014	0.018	0.013	0.018	0.015	0.017	0.015	0.017	0.016
T51	-	-	-	-	-	-	-	0.020	0.020	0.018	0.013	0.018	0.018
Mean	0.017	0.017	0.018	0.019	0.018	0.018	0.017	0.018	0.018	0.018	0.016	0.018	

These measurements were made using Calcium Fluoride: Manganese (CaF:Mn) glass envelope TLDs. These TLDs include Potassium-40 in the substrate, leading to elevated readings due to "self-dosing." In 1974, the state of Florida started accounting for self-dosing, resulting in subsequent background readings in the range of 0.005 to 0.006 mrem/hr.

Results of recent TLD measurements are presented in the *2010 Annual Radiological Environmental Operating Report* (Reference 1). Table 1 of this report shows that in 2010 the dose rate at 22 TLD locations ranged from 0.0037 to 0.0073 mrem/hr, compared to a mean of 0.0055 mrem/hr at a control location. These readings are comparable to the range of 0.005 to 0.006 mrem/hr observed prior to operation. Furthermore, as indicated in Attachment A of the Environmental Report, the 22 TLD locations vary from 2 to 10 miles from the plant, but there are no observable trends between readings close to the plant and those far away, indicating the operating units are not a significant source of direct radiation.

This response is PLANT SPECIFIC.

References:

1. *2010 Annual Radiological Environmental Operating Report, Turkey Point Units 3 & 4* (NRC Accession No. ML11140A084 in ADAMS).

ASSOCIATED COLA REVISIONS:

None

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 031 Dated July 20, 2011

SRP Section: 12.03-12.04 – Radiation Protection Design Features

Question from Health Physics Branch (CHPB)

NRC RAI Number: 12.4.1.9.2-2 (eRAI 5430)

Subsection 12.4.1.9.2 states that construction workers receive no dose from the liquid effluent pathway because potable water is provided from an external source that is not affected by the liquid discharge from Unit 6 or any of the other existing units. However, the application does not describe potential exposures to Unit 7 construction workers while performing activities related to the installation of liquid effluent discharge lines. Once Unit 6 has commenced operations, activities to tie in the Unit 7 discharge lines may present a source of exposure from liquid effluents to Unit 7 construction workers. Please provide a justification of why this potential source of construction worker exposure was not identified, or provide an assessment of the construction worker exposure from these activities.

FPL RESPONSE:

During the construction of Unit 7, any work involving Unit 6 contaminated liquid waste effluent discharge piping connections will be performed within the existing work control programs of the operating Unit 6 by trained and monitored radiation workers. Hence, this activity is not considered to contribute to unmonitored construction worker doses. FSAR Subsection 12.4.1.9.2 will be revised in a future COLA revision to clarify this, as shown in the Associated COLA Revisions section below.

This response is PLANT SPECIFIC.

References:

None.

ASSOCIATED COLA REVISIONS:

The last sentence of FSAR Section 12.4.1.9.2 will be revised as follows in a future COLA revision:

Therefore, construction workers receive no **internal** dose from the liquid effluent pathway.

A paragraph will be added at the end of FSAR Section 12.4.1.9.2 as follows in a future COLA revision:

While Unit 6 is operating and Unit 7 is under construction, workers may be externally exposed to liquid effluents from Unit 6 while performing Unit 7 liquid waste effluent discharge piping connections. However, this work will be performed by trained and monitored radiation workers, not general site construction workers. Hence, this activity is not considered a contributor to general site construction worker doses.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 031 Dated July 20, 2011

SRP Section: 12.03-12.04 – Radiation Protection Design Features

Question from Health Physics Branch (CHPB)

NRC RAI Number: 12.4.1.9.3-1 (eRAI 5430)

Subsection 12.4.1.9.3 states, "The calculated dose rate of 0.009 mrem per year from a fully loaded ISFSI is negligible." Please provide the detailed methodology, measurements, parameters and/or bases used to calculate the dose rate from the ISFSI so that the staff can validate this conclusion. This information should include the exact location of the ISFSI in relation to the Units 6 and 7 construction workers and the quantity and radionuclide content of the fuel stored during the construction period.

FPL RESPONSE:

The *Radiological Impacts of Normal Operation* and the *Turkey Point ISFSI Dose Rate Evaluation* calculations contain the requested information and are available for inspection in the FPL online reference portal.

Sections 3.13 and 5.4 of *Radiological Impacts of Normal Operation* indicate that Turkey Point Units 6 and 7 are at least 3000 ft from the ISFSI and that the dose rate at this distance from a fully loaded ISFSI is approximately 0.009 mrem/yr. Attachment D of the calculation provides further details on the determination of the distance and the dose rate.

Section 1.0 of *Turkey Point ISFSI Dose Rate Evaluation* indicates that the Monte Carlo N-Particle Transport Code, Version 5 (MCNP5) computer program is used to calculate dose rates, assuming the ISFSI is fully loaded with 52 horizontal storage modules, each containing design basis PWR fuel. Sections 6.0 and 7.0 of the calculation provide further information on the methodology and the MCNP5 model.

This response is PLANT SPECIFIC.

References:

None.

ASSOCIATED COLA REVISIONS:

None.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 031 Dated July 20, 2011

SRP Section: 12.03-12.04 – Radiation Protection Design Features

Question from Health Physics Branch (CHPB)

NRC RAI Number: 12.4.1.9.3-2 (eRAI 5430)

Subsection 12. 4.1.9.3 describes the methodology used to calculate the Unit 7 construction worker doses as a result of the airborne effluents from the operation of Unit 6. However, this subsection does not identify the calculated Unit 7 construction worker dose or the radionuclide source term used for the calculation. Please provide the calculated construction worker dose and the assumed Unit 6 gaseous effluent source term so that the staff can verify and validate the result.

FPL RESPONSE:

The *Radiological Impacts of Normal Operation* calculation contains the requested information and is available for inspection in the FPL online reference portal.

This response is PLANT SPECIFIC.

References:

None.

ASSOCIATED COLA REVISIONS:

None.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 031 Dated July 20, 2011

SRP Section: 12.03-12.04 – Radiation Protection Design Features

Question from Health Physics Branch (CHPB)

NRC RAI Number: 12.4.1.9.3-3 (eRAI 5430)

Subsection 12.4.1.9.3 states that "Gaseous effluent doses from Units 3 & 4 were estimated from the annual effluent reports for those units." However, the applicant did not provide the calculated gaseous effluent dose from Units 3 & 4, nor did it reference the specific annual effluent reports that support the applicant's construction worker exposure analysis. Please provide the calculated construction worker dose from Units 3 & 4 gaseous effluents, along with the data used to perform the calculation. The data should reference the applicable annual reports and include the assumed effluent source terms, locations where exposure results were calculated, and assumed χ/Q. In addition, these data should be evaluated to ensure that they are representative of Units 3 & 4 plant operating conditions that will be expected during the period of construction for Units 6 & 7.

FPL RESPONSE:

The *Radiological Impacts of Normal Operation* calculation contains the requested information and is available for inspection in the FPL online reference portal.

This response is PLANT SPECIFIC.

References:

None.

ASSOCIATED COLA REVISIONS:

None.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 031 Dated July 20, 2011

SRP Section: 12.03-12.04 – Radiation Protection Design Features

Question from Health Physics Branch (CHPB)

NRC RAI Number: 12.4.1.9.5-1 (eRAI 5430)

In subsection 12.4.1.9.5, the applicant states that collective construction worker doses were conservatively estimated using "the estimated maximum dose rate for the gaseous pathway". Please provide additional details including source term, location, and meteorological χ/Q values for the staff to validate this calculation.

FPL RESPONSE:

The *Radiological Impacts of Normal Operation* calculation contains the requested information and is available for inspection in the FPL online reference portal.

This response is PLANT SPECIFIC.

References:

None.

ASSOCIATED COLA REVISIONS:

None.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 031 Dated July 20, 2011

SRP Section: 12.03-12.04 – Radiation Protection Design Features

Question from Health Physics Branch (CHPB)

NRC RAI Number: 12.4.1.9.5-2 (eRAI 5430)

In describing the collective doses to Unit 7 workers, subsection 12.4.1.9.5 states that a peak loading of 2600 construction workers will receive an annual dose of 17 person-rem, or roughly 6.54 mrem/yr (6.7 mrem/yr as stated in Table 12.4-201) per construction worker. Subsection 12.4.1.9.5 states that the direct dose from Units 3 & 4 in the Units 6 & 7 construction area is assumed to be 1 mrem/yr from each unit. Provide a breakdown in the FSAR of where the balance of the 4.7 mrem/yr to the Unit 7 workers comes from. Include in this breakdown the estimated dose rates from gaseous effluents from Units 3 & 4 and from Unit 6 (see parts B.2 and B.3 above), as well as any estimated direct dose rate to Unit 7 workers from the operation of Unit 6.

FPL RESPONSE:

The *Radiological Impacts of Normal Operation* calculation contains the requested information and is available for inspection in the FPL online reference portal.

Table 12.4-201 will be renumbered as 12.4-202 and a new Table 12.4-201 will be inserted to provide a breakdown of construction worker dose by source and pathway. The changes to the text and tables are shown in the Associated COLA Revisions section below. Please note that the dose values cited in the question are from COLA Revision 1 and that these values were changed in Revision 2.

This response is PLANT SPECIFIC.

References:

None.

ASSOCIATED COLA REVISIONS:

The last paragraph of FSAR Section 12.4.1.9.3 will be revised as follows in a future COLA revision:

> GASPAR II doses calculated at 0.13 mile were adjusted based on construction worker residence time on the site or 2080 hours/8760 hours = 0.24. Results are presented in **Table 12.4-201** ~~the following subsections~~.

The last paragraph of FSAR Section 12.4.1.9.5 will be revised as follows in a future COLA revision:

Table 12.4-2042 compares the estimated doses to a Units 6 & 7 construction worker with the public dose criteria of 10 CFR 20.1301. This comparison demonstrates compliance with 10 CFR 20.1301 criteria and supports conclusion that those who will construct Units 6 & 7 would not need to be classified as radiation workers nor would they require monitoring.

Table 12.4.201 will be added at the end of FSAR Section 12.4 as follows in a future COLA revision:

PTN SUP 12.4-1

Table 12.4-201
Construction Worker Dose Summary
During Unit 7 Construction

Source	Pathway	Annual Dose (mrem TEDE)
Units 3 & 4	Direct Radiation[(a)]	0.47
	Gaseous Effluent[(b)]	0.0023
Unit 6	Gaseous Effluent[(c)]	5.5
Total		6.0

(a) Direct radiation dose for Units 3 & 4 is determined as follows:
(1 mrem/yr-unit)(2 units)(2080 hr/yr)/(8760 hr/yr) = 0.47 mrem.

(b) Gaseous effluent doses for Units 3 & 4 are the maximum values from the annual effluent reports for 2004 to 2008, adjusted for annual occupancy of 2080 hr/yr.

(c) Gaseous effluent doses for Unit 6 are calculated using GASPAR II as 5.2 mrem for total body and 7.9 mrem for thyroid, adjusted for annual occupancy of 2080 hr/yr. The TEDE value of 5.5 rem is estimated by multiplying the thyroid dose by a weighting factor of 0.03 and adding the product to the total body dose.

Table 12.4-201 will be renumbered as Table 12.4-202 at the end of FSAR Section 12.4 as follows in a future COLA revision:

Table 12.4-2042
Comparison of Units 6 & 7 Construction Worker Estimated Radiation Doses to 10 CFR 20.1301 Public Dose Criteria

ASSOCIATED ENCLOSURES:

None.