Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

FPL

November 14, 2011

L-2011-467
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Re: St. Lucie Plant Unit 2
Docket No. 50-389
Renewed Facility Operating License No. NPF-16

Response to NRC Accident Dose Branch Request for Additional Information Regarding Extended Power Uprate License Amendment Request

References:

(1) R. L. Anderson (FPL) to U.S. Nuclear Regulatory Commission (L-2011-021), St. Lucie Unit 2, "License Amendment Request for Extended Power Uprate," February 25, 2011, Accession No. ML110730116.

(2) Email from T. Orf (NRC) to C. Wasik (FPL), "St. Lucie 2 EPU draft RAIs – Accident Dose branch (AADB)," August 31, 2011.

(3) R. L. Anderson (FPL) to U.S. Nuclear Regulatory Commission (L-2011-404), St. Lucie Unit 2, "Response to NRC Accident Dose Branch Request for Additional Information Regarding Extended Power Uprate License Amendment Request," October 5, 2011, Accession No. ML11290A065.

(4) R. L. Anderson (FPL) to U.S. Nuclear Regulatory Commission (L-2011-360), St. Lucie Unit 1, "Response to NRC Accident Dose Branch Request for Additional Information Regarding Extended Power Uprate License Amendment Request," September 2, 2011, Accession No. ML11251A159.

(5) R. L. Anderson (FPL) to U.S. Nuclear Regulatory Commission (L-2011-314), St. Lucie Unit 1, "Response to NRC Accident Dose Branch Request for Additional Information Regarding Extended Power Uprate License Amendment Request," August 12, 2011, Accession No. ML11341A283.

By letter L-2011-021 dated February 25, 2011 [Reference 1], Florida Power & Light Company (FPL) requested to amend Renewed Facility Operating License No. NPF-16 and revise the St. Lucie Unit 2 Technical Specifications (TS). The proposed amendment will increase the unit's licensed core thermal power level from 2700 megawatts thermal (MWt) to 3020 MWt and revise the Renewed Facility Operating License and TS to support operation at this increased core thermal power level. This represents an approximate increase of 11.85% and is therefore considered an extended power uprate (EPU).

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In an email from the NRC Project Manager dated August 31, 2011 [Reference 2], additional information related to accident dose was requested by the NRC staff in the Accident Dose Branch (AADB) to support their review of the EPU License Amendment Request (LAR). The request for additional information (RAI) identified twelve questions (AADB-1 through AADB-12). Reference 3 provided FPL's response to AADB-1 through AADB-11. Attachment 1 to this letter provides the FPL response to RAI AADB-12. In addition, Attachment 1 provides supplemental information to incorporate the revised atmospheric dispersion factors (χ/Q's) and dose calculation results based on the site meteorological data provided in FPL letter L-2011-314 [Reference 5].

As a result of the revised accident dose calculations, FPL is proposing to revise the TS to limit the radioactivity in the gas storage tanks to 165,000 curies noble gases. Attachment 2 contains a revision to the EPU proposed change to TS 3.11.2.6, Radioactive Effluents – Gas Storage Tanks. The EPU LAR originally proposed to limit the radioactivity in the gas storage tanks to 202,500 curies noble gases. Attachment 3 contains the marked-up and clean pages to support the proposed TS revision. A proposed revision to the St. Lucie Unit 1 Gas Storage Tanks TS was submitted by FPL letter L-2011-360 [Reference 4].

This submittal does not alter the significant hazards consideration or environmental assessment previously submitted by FPL letter L-2011-021 [Reference 1].

This submittal contains no new commitments and no revisions to existing commitments.

In accordance with 10 CFR 50.91(b)(1), a copy of this letter is being forwarded to the designated State of Florida official.

Should you have any questions regarding this submittal, please contact Mr. Christopher Wasik, St. Lucie Extended Power Uprate LAR Project Manager, at 772-467-7138.

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

Executed on 14-November-2011

Very truly yours,

Richard L. Anderson
Site Vice President
St. Lucie Plant

Attachments (3)

cc: Mr. William Passetti, Florida Department of Health

Response to NRC Accident Dose Branch Request for Additional Information

The following information is provided by Florida Power & Light (FPL) in response to the U.S. Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI). This information was requested to support the review of the Extended Power Uprate (EPU) License Amendment Request (LAR) for St. Lucie Unit 2 that was submitted to the NRC by FPL via letter L-2011-021, February 25, 2011, Accession No. ML110730116.

In an email dated August 31, 2011 from T. Orf (NRC) to C. Wasik (FPL), Subject: St. Lucie 2 EPU draft RAIs – Accident Dose branch (AADB), the NRC staff requested additional information regarding FPL's request to implement the EPU. The RAI consisted of twelve questions from the AADB. The responses to AADB-1 through AADB-11 were provided in FPL letter L-2011-404, dated October 5, 2011, Accession No. ML11290A065. The response to RAI AADB-12 is provided below.

AADB-12

The NRC staff is relying on the accuracy of the information presented in Table 2.9.2 for the review of the radiological inputs and assumptions for the EPU design basis accident analyses. The NRC staff notes that there are several instances in Table 2.9.2 where primary and secondary activity concentration is shown as mCi/gm instead of µCi/gm. The NRC staff review is proceeding based on the assumption that these instances represent typographical errors. Table 2.9.2-23 indicates two different times for the termination of SG tube leakage. The NRC staff review is proceeding based on the assumption that the time to terminate SG tube leakage for the EPU analysis is 12.4 hours. Please review and correct as necessary the information presented in Table 2.9.2 to ensure that it is accurate.

Response

EPU LAR Attachment 5, Table 2.9.2-23 is revised to correct the typographical errors and to clarify the time for termination of SG tube leakage. In addition, the following supplemental information is being provided to incorporate the revised atmospheric dispersion factors (χ/Q's) and dose calculation results based on the site meteorological data submitted by FPL letter L-2011-314, dated August 12, 2011, Accession No. ML11234A283.

LAR Attachment 5, Section 2.9.2, Radiological Consequences Analyses Using Alternative Source Terms (AST)

The control room unfiltered inleakage is changed from 425 cfm to 395 cfm for all events. This change affects all references to control room unfiltered inleakage of 425 cfm in Section 2.9.2.

Section 2.9.2.2.1.1 Common Input Parameters and Assumptions – Source Terms

FPL letter L-2011-404, dated October 5, 2011, Accession No. ML11290A065 provided the response to RAIs AADB-1 through AADB-11. As a result of the response to AADB-8, FPL is correcting an identified error in the statement of reference to the method of determining high burnup fuel gap release adjustment factor and is replacing the paragraph in EPU LAR Attachment 5, Section 2.9.2.2.1.1 in its entirety, after the four bullets providing the source term tables with the following paragraphs:

Consistent with the method of Reference 9 accepted in Reference 10, a high burnup adjustment factor for gap release of affected assemblies will be implemented. The St. Lucie Unit 2 EPU assumption is that two high burnup assemblies may exceed the Regulatory Guide (RG) 1.183 Footnote 11 combined burnup and kw/ft limits. Therefore, a high burnup adjustment/increase of 0.922% is applied to the release fractions for all non-LOCA events in which fuel damage causes the inventory of the fuel rod gaps to be released into the reactor coolant. The value of 0.922% is calculated in accordance with the methods outlined in Reference 9 and accepted in Reference 10 for St. Lucie Unit 1. With 217 fuel assemblies in the core, the maximum number of high burnup rods represents [2/217] x 100 = 0.922% of the core. Doubling the gap fractions of 0.922% of the core would yield a core-wide adjustment factor of:

High Burnup Adjustment Factor = (2)(0.00922) + (1-0.00922) = <u>1.00922</u>

This adjustment factor was applied to the gap release fractions in the RADTRAD-NAI release fraction timing files ("rft" file).

For the fuel handling accident (FHA), in which 100% of the rods in the dropped assembly are assumed to be damaged, high burnup is addressed by increasing the gap release fraction of the entire assembly by a factor of two.

Section 2.9.2.2.4 Atmospheric Dispersion Factors (χ/Q)

The revised meteorological data are based on data collected in years, 1997, 1998, 1999, 2002, and 2003. The data were screened based on discussions with the NRC staff to be acceptable for use in determining χ/Q's.

The references to ARCON96 and PAVAN are deleted.

Section 2.9.2.3.2 Analysis Parameters and Assumptions – <u>Release Inputs</u>

The following input parameters are changed as follows:

- Third paragraph – leakage to the reactor auxiliary building (RAB) is changed from assumed to start at 20.3 minutes to assumed to start at 22.3 minutes;
- Fourth paragraph – backleakage to the refueling water tank (RWT) is changed from assumed to start at 20.3 minutes to assumed to start at 22.3 minutes;
- Fifth paragraph –
    - The maximum iodine concentration at the beginning of the event is changed from 4.079 E-05 gm-atom/liter to 4.088 E-05 gm-atom/liter;
    - The maximum pH is changed from 4.862 to 4.864; and
    - The maximum RWT elemental iodine fraction is changed from 0.1699 to 0.1694.

The next to the last paragraph is revised to correct an editorial error. The last sentence incorrectly discussed the control room inleakge, as opposed to the purge release to the environment. The last sentence, "The release is modeled for 30 seconds at 425 cfm until isolation occurs," is replaced with, "The purge release to the environment is modeled for 30 seconds at 2500 cfm until purge isolation occurs."

Section 2.9.2.13 References

The following two new references are added:

9. L-2007-085, Letter from Florida Power & Light Company to the USNRC, Subject: St. Lucie Unit 1, Docket No. 50-335, Proposed License Amendment, Alternative Source Term and Conforming Amendment, July 16, 2007 (ML070000250), as supplemented by References 3 through 8.
10. Letter to Mr. J. A. Stall (Florida Power & Light Company) from Ms. Brenda L. Mozafari (NRC), St. Lucie Plant, Unit 1 – Issuance of Amendment Regarding Alternative Source Term (TAC No. MD6173), dated November 26, 2008 (ML082682060).

The following EPU LAR Attachment 5 Section 2.9.2 tables are being replaced as a result of the revised χ/Q values: (pages 5 through 37 of 37)

- Table 2.9.2-1 – Summary of EPU Radiological Analysis Results
- Table 2.9.2-7 – Onsite Atmospheric Dispersion Factors (χ/Q) for Analysis Events
- Table 2.9.2-9 – Offsite Atmospheric Dispersion Factors (χ/Q) for Analysis Events
- Table 2.9.2-10 – Control Room Ventilation System Parameters
- Table 2.9.2-12 – Loss-of-Coolant Accident (LOCA) – Inputs and Assumptions
- Table 2.9.2-13 – LOCA Time Dependent RWT pH
- Table 2.9.2-14 – LOCA Time Dependent RWT Total and Elemental Iodine Concentration
- Table 2.9.2-15 – LOCA Time Dependent RWT Liquid Temperature
- Table 2.9.2-16 – LOCA Time Dependent RWT Elemental Iodine Fraction
- Table 2.9.2-17 – LOCA Time Dependent RWT Partition Coefficient
- Table 2.9.2-18 – LOCA Release Rate from Sump to RWT Vapor Space
- Table 2.9.2-19 – Fuel Handling Accident (FHA) – Inputs and Assumptions
- Table 2.9.2-20 – Main Steam Line Break (MSLB) – Inputs and Assumptions
- Table 2.9.2-21 – MSLB Intact Steam Release Rate
- Table 2.9.2-22 – MSLB Steam Generator Tube Leakage
- Table 2.9.2-23 – Steam Generator Tube Rupture Accident – Inputs and Assumptions
- Table 2.9.2-28 – Locked Rotor Accident – Inputs and Assumptions
- Table 2.9.2-31 – CEA Ejection Accident – Inputs and Assumptions
- Table 2.9.2-34 – FWLB – Inputs and Assumptions
- Table 2.9.2-36 – FWLB Steam Generator Tube Leakage
- Table 2.9.2-37 – Letdown Line Rupture – Inputs and Assumptions

LAR Attachment 5 Section 2.9.3 Radiological Consequences of Gas Decay Tank Ruptures

As discussed in EPU LAR Attachment 5, Section 2.9.3.2.4, Source Term and Dose Models, Assumptions and Parameters, the gas decay tank rupture is a site analysis. As such, the calculations and results presented in FPL letter L-2011-360 dated September 2, 2011 (ML11251A159), for St. Lucie Unit 1, are applicable to St. Lucie Unit 2. No new tables are provided with this submittal.

Table 2.9.2-1
Summary of EPU Radiological Analysis Results

Case	Allowable Unfiltered Control Room Inleakage (cfm)	EAB Dose(1) (rem TEDE)	LPZ Dose(2) (rem TEDE)	Control Room Dose(2) (rem TEDE)	AOR Control Room Dose(5) (rem TEDE)
LOCA	395	1.26	2.74	4.64	4.46
MSLB – Outside of Containment (1.2% DNB)	395	0.27	0.76	4.36	4.69
MSLB – Outside of Containment (0.29% FCM)	395	0.30	0.81	4.45	4.77
MSLB – Inside of Containment (21% DNB)	395	0.41	0.88	4.46	4.96
MSLB – Inside of Containment (4.5% FCM)	395	0.64	1.23	4.45	4.92
SGTR Pre-accident Iodine Spike	395	0.38	0.37	4.13	2.57
Acceptance Criteria		**≤ 25(3)**	**≤ 25(3)**	**≤ 5(4)**	**≤ 5(4)**
SGTR Concurrent Iodine Spike	395	0.18	0.18	1.53	0.66
Locked Rotor (19.7% DNB)	395	0.37	0.92	4.35	2.81
FWLB(6)	395	0.015	0.019	0.63	0.82
Letdown Line Rupture(6)	395	0.32	0.31	2.77	2.57
Acceptance Criteria		**≤ 2.5 (3)**	**≤ 2.5 (3)**	**≤ 5(4)**	**≤ 5(4)**
FHA - Containment	395	0.60	0.58	1.28	0.81
FHA – Fuel Handling Building	395	0.60	0.58	3.01	1.63
CEA Ejection – Containment Release (9.5 % DNB, 0.5 % FCM)	395	0.29	0.57	2.86	2.78
CEA Ejection – Secondary Side Release (9.5 % DNB, 0.5 % FCM)	395	0.31	0.73	3.12	2.87
Acceptance Criteria		**≤ 6.3(3)**	**≤ 6.3(3)**	**≤ 5(4)**	**≤ 5(4)**

<u>NOTES</u>:
(1) Worst 2-hour dose
(2) Integrated 30-day dose
(3) RG 1.183, Table 6
(4) 10 CFR 50.67
(5) AOR control room dose from CLB AST results
(6) Acceptance criteria from References 1 and 2

Table 2.9.2-7
Onsite Atmospheric Dispersion Factors (χ/Q) for Analysis Events

This table summarizes the χ/Q values (sec/m^3) for the control room that apply to the various accident scenarios. For the intakes, values are presented for the unfavorable intake prior to control room isolation, the midpoint between the intakes during isolation, as well as values for the favorable intake following manual restoration of filtered control room make-up flow. These values are not corrected for control room occupancy factors but do include credit for dilution where allowed. Based on the layout of the site, the only cases that credited dilution are the releases from the plant vent stack. However, dilution is not credited during the time period when the control room intakes are isolated for these cases.

A comparison of EPU χ/Q values to the pre-EPU χ/Q values from Reference 1 is presented in the shaded row below each release-receptor pair (positive values indicate that EPU χ/Q values are higher).

* Indicates credit for dilution taken for this case.

The atmospheric dispersion factors corresponding to ADVs were determined to be more limiting than those from the MSSVs for all time periods. Therefore, the more limiting ADV values have been used throughout the analyses for all secondary releases. No distinction is made between automatic steam relief from the MSSVs and controlled releases from the ADVs for radiological purposes.

Table 2.9.2-7
Onsite Atmospheric Dispersion Factors (χ/Q) for Analysis Events

Release Receptor Pair	Release Point	Receptor Point	0-2 hr χ/Q	2-8 hr χ/Q	8-24 hr χ/Q	1-4 days χ/Q	4-30 days χ/Q
A*	Stack/Plant Vent	N CR intake	2.39E-03				
			1.70%				
B*	Stack/Plant Vent	S CR intake	6.70E-04	4.58E-04	2.02E-04	1.40E-04	1.13E-04
			3.40%	7.01%	1.51%	16.67%	23.50%
C	Stack/Plant Vent	Midpoint between CR intakes	3.96E-03				
			-0.25%				
D	RWT	N CR intake	1.37E-03				
			-0.72%				
E	RWT	S CR intake	1.04E-03	8.49E-04	3.64E-04	2.73E-04	2.32E-04
			2.97%	-1.74%	-2.15%	-6.51%	5.45%

Table 2.9.2-7 (continued) Onsite Atmospheric Dispersion Factors (χ/Q) for Analysis Events							
Release Receptor Pair	**Release Point**	**Receptor Point**	**0-2 hr χ/Q**	**2-8 hr χ/Q**	**8-24 hr χ/Q**	**1-4 days χ/Q**	**4-30 days χ/Q**
F	RWT	Midpoint between CR intakes	1.34E-03				
			0.75%				
G	FHB Closest Point	N CR intake	4.92E-03				
			1.23%				
H	FHB Closest Point	S CR intake	1.87E-03	1.36E-03	5.88E-04	4.00E-04	3.06E-04
			0.54%	-0.73%	-4.23%	2.56%	0.33%
I	FHB Closest Point	Midpoint between CR intakes	3.29E-03				
			0.61%				
J	Louver 2L-7B	N CR intake	4.80E-03				
			-1.03%				
K	Louver 2L-7A	S CR intake	4.32E-03	3.72E-03	1.64E-03	1.34E-03	1.07E-03
			-1.59%	-0.53%	1.86%	-10.07%	-5.94%
L	Louver 2L-7A	Midpoint between CR intakes	5.06E-03				
			0.40%				
M#	Closest ADV	N CR intake	6.71E-03				
			0.30%				
N#	Closest ADV	S CR intake	1.89E-03	1.53E-03	6.02E-04	4.55E-04	3.89E-04
			0.53%	4.79%	0.67%	7.57%	21.94%
O#	Closest ADV	Midpoint between CR intakes	3.13E-03				
			0.64%				

Table 2.9.2-7 (continued) Onsite Atmospheric Dispersion Factors (χ/Q) for Analysis Events							
Release Receptor Pair	**Release Point**	**Receptor Point**	**0-2 hr χ/Q**	**2-8 hr χ/Q**	**8-24 hr χ/Q**	**1-4 days χ/Q**	**4-30 days χ/Q**
P	Closest Feedwater Line Point	N CR intake	7.29E-03				
			-0.14%				
Q	Closest Feedwater Line Point	S CR intake	1.95E-03	1.57E-03	6.56E-04	4.75E-04	3.99E-04
			0.52%	4.67%	1.39%	9.95%	23.91%
R	Closest Feedwater Line Point	Midpoint between CR intakes	3.33E-03				
			0.30%				
S	Containment Maintenance Hatch	N CR intake	1.90E-03				
			1.60%				
T	Containment Maintenance Hatch	S CR intake	8.28E-04	6.57E-04	2.92E-04	1.93E-04	1.76E-04
			1.35%	8.06%	2.82%	12.87%	36.43%
U	Containment Maintenance Hatch	Midpoint between CR intakes	1.27E-03				
			2.42%				
V	Steam Jet Air Ejector [1]	N CR intake	3.02E-03				
			22.27%				

NOTES:

(1) Based on recent meteorological and plant configuration data, the χ/Q for the steam jet air ejector release point was determined to be higher than the χ/Q for the condenser release point that was provided in Reference 1.

Table 2.9.2-9
Offsite Atmospheric Dispersion Factors (χ/Q) for Analysis Events

Time Period	EAB χ/Q (sec/m^3)	LPZ χ/Q (sec/m^3)
0-2 hours	1.05E-04	1.01E-04
0-8 hours	5.98E-05	5.74E-05
8-24 hours	4.52E-05	4.32E-05
1-4 days	2.46E-05	2.33E-05
4-30 days	1.02E-05	9.62E-06

The above table summarizes the maximum χ/Q values for the EAB and LPZ. Note that the 0-2 hour EAB χ/Q value was used for the entire event.

Table 2.9.2-10
Control Room Ventilation System Parameters

Parameter	EPU Value	Pre-EPU Value
Control Room Volume	97,215 ft^3	Same
Normal Operation		
Filtered Makeup Flow Rate	0 cfm	Same
Filtered Recirculation Flow Rate	0 cfm	Same
Unfiltered Makeup Flow Rate	1000 cfm	Same
Limiting Unfiltered Inleakage	395 cfm	435 cfm
Emergency Operation		
Isolation Mode:		
Filtered Makeup Flow Rate	0 cfm	Same
Filtered Recirculation Flow Rate	1760 cfm(1)	2000 cfm
Unfiltered Makeup Flow Rate	0 cfm	Same
Limiting Unfiltered Inleakage	395 cfm	435 cfm
Filtered Makeup Mode:		
Filtered Makeup Flow Rate	504 cfm(1)	450 cfm
Filtered Recirculation Flow Rate	1256 cfm(1)	1550 cfm
Unfiltered Makeup Flow Rate	0 cfm	Same
Limiting Unfiltered Inleakage	395 cfm	435 cfm
Filter Efficiencies:		
Particulates	99%	99%
Elemental iodine	95%	99%
Organic iodine	95%	99%

(1) Control room emergency ventilation flow rates conservatively consider over/under frequency/voltage of the emergency diesel generators, as well as tolerance in the control room ventilation flow rate test acceptance criteria.

Table 2.9.2-12
Loss-of-Coolant Accident (LOCA) – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Release Inputs:		
Core Power Level	3030 MWt (~3020 + 0.3%)	2754 MWt (2700 + 2%)
Core Average Fuel Burnup	49,000 MWD/MTU	45,000 MWD/MTU
Fuel Enrichment	1.5 – 5.0 w/o	3.0 – 4.5 w/o
Initial RCS Equilibrium Activity	1.0 μCi/gm DE I-131 and 518.9 μCi/gm DE Xe-133 (Table 2.9.2-2)	1.0 μCi/gm DE I-131 and 100/E-bar gross activity
Core Fission Product Inventory	Table 2.9.2-4	Different based on power, burnup and enrichment
Containment Leakage Rate 0 to 24 hours after 24 hours	 0.5% (by volume)/day 0.25% (by volume)/day	 Same Same
LOCA release phase timing and duration	RG 1.183, Table 4	Same
Core Inventory Release Fractions (gap release and early in-vessel damage phases)	RG 1.183, Sections 3.1 and 3.2	Same
<u>ECCS Systems Leakage</u> Time of Recirculation	 22.3 minutes	 20 minutes
Sump Volume (minimum)	57,683 ft^3	55,739 ft^3
ECCS Leakage to RAB (2 times allowed value)	1.08 gph	1.28 gph
Flashing Fraction	Calculated – 5.7% Used for dose determination – 10%	Calculated – 3.4% Used for dose determination – 10%
Chemical form of the iodine in the sump water	0% aerosol, 97% elemental iodine, and 3.0% organic iodine	Same
Release ECCS Area Filtration Efficiency	Elemental iodine – 95% Organic iodine – 95% Particulates – 99% (100% of the particulates are retained in the ECCS fluid)	Same Same Same

Table 2.9.2-12 (continued)
Loss-of-Coolant Accident (LOCA) – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
RWT Back-leakage Sump Volume (at time of recirculation)	57,683 ft^3	58,894 ft^3
ECCS Leakage to RWT (2 times allowed value)	2 gpm	Same
Flashing Fraction (elemental iodine assumed to be released into tank space based upon partition factor)	0 % based on temperature of fluid reaching RWT	Same
RWT liquid/vapor Elemental Iodine partition factor	Table 2.9.2-17	Different based on RWT/sump conditions
Elemental Iodine fraction in RWT	Table 2.9.2-16	Different based on RWT/sump conditions
Initial RWT Liquid Inventory (minimum)	65,350 gallons	52,345 gallons
Release from Sump to RWT Vapor Space	Table 2.9.2-18	Different based on RWT/sump conditions
Release from RWT Vapor Space to Environment	0.98 cfm	Not explicitly used as model input; the vent flow concept was incorporated into effective sump to atmosphere iodine flow determination used in pre-EPU model.
Containment or Hydrogen Purge Release	2500 cfm for 30 sec (H_2 purge)	Same

Table 2.9.2-12 (continued)
Loss-of-Coolant Accident (LOCA) – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Removal Inputs:		
Containment Particulates/Aerosol Natural Deposition (only credited in unsprayed regions)	0.1/hour	Same
Containment Elemental Iodine Natural/Wall Deposition	2.89/hour	Same
Containment Spray Region Volume	2,125,000 ft^3	Same
Containment Unsprayed Region Volume	375,000 ft^3	Same
Flow rate between sprayed and unsprayed containment volumes	12,500 cfm	Same
Spray Removal Rates: Elemental Iodine Time to reach DF of 200 Particulate Iodine Time to reach DF of 50	 20/hour 3.07 hours 6.52/hour 2.643 hours	 Same 3.06 hours 6.40/hour 2.65 hours
Spray Initiation Time Spray Termination Time	80 seconds (0.0222 hours) 8 hours	60 seconds (0.0167 hours) Same
Control Room Ventilation System Time of automatic control room isolation Time of manual control room air intake opening	(See Table 2.9.2-10) 30 seconds 1.5 hrs	 Same Same
Secondary Containment Filter Efficiency	Particulates – 99% Elemental iodine – 95% Organic iodine – 95%	Same Same Same
Secondary Containment Drawdown Time	310 seconds	Same
Secondary Containment Bypass Fraction	9.6%	Same
Containment or Hydrogen Purge Filtration	0 %	Same

Table 2.9.2-12 (continued)
Loss-of-Coolant Accident (LOCA) – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Transport Inputs:		
Containment Release Secondary Containment release prior to drawdown	Nearest Containment penetration to CR ventilation intake	Same
Containment Release Secondary Containment release after drawdown	Plant stack	Same
Containment Release Secondary Containment Bypass Leakage	Nearest Containment penetration to CR ventilation intake	Same
ECCS Leakage	ECCS exhaust louver	Same
RWT Backleakage	RWT	Same
Containment or Hydrogen Purge	Plant Stack	Same
Personnel Dose Conversion Inputs:		
Atmospheric Dispersion Factors Offsite Onsite	 Table 2.9.2-9 Table 2.9.2-7	 Different based on meteorological data Different based on meteorological data
Breathing Rates	RG 1.183 Sections 4.1.3 and 4.2.6	Same
Control Room Occupancy Factor	RG 1.183 Section 4.2.6	Same

Table 2.9.2-13
LOCA Time Dependent RWT pH

Time (hours)	RWT pH
0.00	4.500
0.37	4.500
0.50	4.500
1.0	4.500
5.0	4.504
10.0	4.508
15.0	4.511
25.0	4.519
50.0	4.538
75.0	4.556
100.0	4.573
125.0	4.589
150.0	4.605
200.0	4.635
250.0	4.663
300.0	4.690
350.0	4.714
400.0	4.738
450.0	4.760
500.0	4.781
550.0	4.802
600.0	4.821
650.0	4.839
700.0	4.857
720.0	4.864

Table 2.9.2-14
LOCA Time Dependent RWT Total and Elemental Iodine Concentration

Time (hours)	RWT Total Iodine Concentration* [I]aq (gm-atom/liter)	RWT Elemental Iodine Concentration [I_2]aq (gm-atom/liter)
0	0	0.000E+00
0.37	0.000E+00	0.000E+00
0.50	1.692E-08	3.224E-12
1.0	8.276E-08	7.682E-11
5.0	6.052E-07	3.972E-09
10.0	1.248E-06	1.623E-08
15.0	1.879E-06	3.544E-08
25.0	3.107E-06	9.046E-08
50.0	5.998E-06	2.907E-07
75.0	8.655E-06	5.358E-07
100.0	1.111E-05	7.948E-07
125.0	1.337E-05	1.052E-06
150.0	1.548E-05	1.299E-06
200.0	1.926E-05	1.749E-06
250.0	2.257E-05	2.132E-06
300.0	2.549E-05	2.450E-06
350.0	2.808E-05	2.710E-06
400.0	3.040E-05	2.918E-06
450.0	3.248E-05	3.083E-06
500.0	3.436E-05	3.211E-06
550.0	3.607E-05	3.307E-06
600.0	3.764E-05	3.377E-06
650.0	3.907E-05	3.426E-06
700.0	4.038E-05	3.455E-06
720.0	4.088E-05	3.462E-06

* Includes radioactive and stable iodine isotopes

Table 2.9.2-15
LOCA Time Dependent RWT Liquid Temperature

Time (hr)	Temperature (°F)
0	104.5
0.37	104.5
0.50	104.5
1.0	104.5
5.0	104.5
10.0	104.5
15.0	104.5
25.0	104.5
50.0	104.5
75.0	104.5
100.0	104.5
125.0	104.5
150.0	104.5
200.0	104.5
250.0	104.5
300.0	104.5
350.0	104.5
400.0	104.5
450.0	104.5
500.0	104.5
550.0	104.5
600.0	104.5
650.0	104.5
700.0	104.5
720.0	104.5

Table 2.9.2-16
LOCA Time Dependent RWT Elemental Iodine Fraction

Time (hr)	Elemental Iodine Fraction
0	0.000E+00
0.37	0.000E+00
0.50	3.811E-04
1.0	1.856E-03
5.0	1.313E-02
10.0	2.601E-02
15.0	3.773E-02
25.0	5.822E-02
50.0	9.694E-02
75.0	1.238E-01
100.0	1.431E-01
125.0	1.573E-01
150.0	1.679E-01
200.0	1.816E-01
250.0	1.889E-01
300.0	1.923E-01
350.0	1.930E-01
400.0	1.920E-01
450.0	1.899E-01
500.0	1.869E-01
550.0	1.834E-01
600.0	1.795E-01
650.0	1.754E-01
700.0	1.711E-01
720.0	1.694E-01

Table 2.9.2-17
LOCA Time Dependent RWT Partition Coefficient

Time (hr)	Elemental Iodine Partition Coefficient
0	41.88
0.37	41.88
0.50	41.88
1.0	41.88
5.0	41.88
10.0	41.88
15.0	41.88
25.0	41.88
50.0	41.88
75.0	41.88
100.0	41.88
125.0	41.88
150.0	41.88
200.0	41.88
250.0	41.88
300.0	41.88
350.0	41.88
400.0	41.88
450.0	41.88
500.0	41.88
550.0	41.88
600.0	41.88
650.0	41.88
700.0	41.88
720.0	41.88

Table 2.9.2-18
LOCA Release Rate from Sump to RWT Vapor Space

Time (hours)	Adjusted Iodine Release Rate (cfm)
0.0	0.0
0.37	5.485E-07
10.0	5.524E-06
25.0	3.235E-05
75.0	1.104E-04
125.0	2.026E-04
200.0	3.278E-04
300.0	4.659E-04
450.0	5.694E-04
600.0	6.223E-04

Table 2.9.2-19
Fuel Handling Accident (FHA) – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Core Power Level Before Shutdown	3030 MWt (~3020 + 0.3%)	2754 MWt (2700 + 2%)
Core Average Fuel Burnup	49,000 MWD/MTU	45,000 MWD/MTU
Discharged Fuel Assembly Burnup	45,000 – 62,000 MWD/MTU	Same
Fuel Enrichment	1.5 – 5.0 w/o	3.0 – 4.5 w/o
Maximum Radial Peaking Factor	1.65	1.7
Number of Fuel Assemblies in the Core	217	Same
Number of Fuel Assemblies Damaged	1	Same
Delay Before Spent Fuel Movement	72 hours	Same
FHA Source Term for a Single Assembly	Table 2.9.2-5	Different based on power, burnup and enrichment
High Burnup Fuel Adjustment Factor	2.0	Same
Water Level Above Damaged Fuel Assembly	23 feet minimum	Same
Iodine Decontamination Factors	Elemental iodine – 285 Organic iodine – 1	Same Same
Noble Gas Decontamination Factor	1	Same
Chemical Form of Iodine In Pool	Elemental iodine – 99.85% Organic iodine – 0.15%	Same Same
Chemical Form of Iodine Above Pool	Elemental iodine – 57% Organic iodine – 43%	Same Same
Atmospheric Dispersion Factors Offsite Onsite	 Table 2.9.2-9 Table 2.9.2-7	 Different based on meteorological data Different based on meteorological data
Control Room Ventilation System Time of Control Room Ventilation Isolation Time of Control Room Filtered Makeup Flow Control Room Unfiltered Inleakage	(See Table 2.9.2-10) 30 seconds 1.5 hours 395 cfm	 Same Same 500 cfm
Breathing Rates	RG 1.183 Sections 4.1.3 and 4.2.6	Same
Control Room Occupancy Factor	RG 1.183 Section 4.2.6	Same

Table 2.9.2-20
Main Steam Line Break (MSLB) – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Core Power Level	3030 MWt (~3020 + 0.3%)	2754 MWt (2700 + 2%)
Core Average Fuel Burnup	49,000 MWD/MTU	45,000 MWD/MTU
Fuel Enrichment	1.5 – 5.0 w/o	3.0 – 4.5 w/o
Maximum Radial Peaking Factor	1.65	1.7
% DNB for MSLB Outside of Containment	1.2%	1.8%
% DNB for MSLB Inside of Containment	21%	29%
% Fuel Centerline Melt for MSLB Outside of Containment	0.29%	0.43%
% Fuel Centerline Melt for MSLB Inside of Containment	4.5%	6.1%
Core Fission Product Inventory	Table 2.9.2-4	Different based on power, burnup and enrichment
Initial RCS Equilibrium Activity	1.0 μCi/gm DE I-131 and 518.9 μCi/gm DE Xe-133 (Table 2.9.2-2)	1.0 μCi/gm DE I-131 and 100/E-bar gross activity
Initial Secondary Side Equilibrium Iodine Activity	0.1 μCi/gm DE I-131 (Table 2.9.2-3)	Same
Release Fraction from DNB Fuel Failures	RG 1.183, Section 3.2	Same
Release Fraction from Centerline Melt Fuel Failures	RG 1.183, Section 3.2, and Section 1 of Appendix H	Same
High Burnup Fuel Adjustment Factor	1.00922	None
Steam Generator Tube Leakage	0.25 gpm per SG (Table 2.9.2-22)	0.25 gpm per SG
Steam Release from Intact SGs	Table 2.9.2-21	Different based on different thermodynamic conditions
Intact SG Tube Uncovery Following Reactor Trip Time to tube recovery Flashing Fraction	 1 hour 6%	 1 hour 5%
Steam Generator Secondary Side Partition Coefficient	Unaffected SG - 100 Faulted SG - None	Same
Time to Terminate Steam Release	12.4 hours	10.32 hours
Time to Terminate SG Tube Leakage	12.4 hours	12 hours
Containment Volume Containment Leakage Rate 0 to 24 hours after 24 hours	2.50E+06 ft^3 0.5% (by volume)/day 0.25% (by volume)/day	Same Same Same

Table 2.9.2-20 (continued)
Main Steam Line Break (MSLB) – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Secondary Containment Filter Efficiency	Particulates – 99% Elemental iodine – 95% Organic iodine – 95%	Same Same Same
Secondary Containment Drawdown Time	310 seconds	Same
Secondary Containment Bypass Fraction	9.6%	Same
RCS Mass	420,090 lbm Minimum mass used for fuel failure dose contribution to maximize SG tube leakage activity.	423,700 lbm
SG Secondary Side Mass	Minimum – 121,970.5 lbm (per SG) Maximum – 219,009 lbm (per SG) Maximum mass used for faulted SG to maximize secondary side dose contribution. Minimum mass used for intact SG to maximize steam release nuclide concentration resulting from primary-to-secondary leakage.	Minimum – 105,000 lbm (per SG) Maximum – 260,000 lbm (per SG)
Chemical Form of Iodine Released from SGs	Particulates – 0% Elemental iodine – 97% Organic iodine – 3%	Same Same Same
Atmospheric Dispersion Factors Offsite Onsite	 Table 2.9.2-9 Table 2.9.2-7	 Different based on meteorological data Different based on meteorological data
Control Room Ventilation System Time of Control Room Ventilation Isolation Time of Control Room Filtered Makeup Flow Control Room Unfiltered Inleakage	(See Table 2.9.2-10) 30 seconds 1.5 hours 395 cfm	 Same Same 435 cfm
Breathing Rates	RG 1.183 Sections 4.1.3 and 4.2.6	Same
Control Room Occupancy Factor	RG 1.183 Section 4.2.6	Same
Containment Natural Deposition Coefficients	Aerosols – 0.1 hr^{-1} Elemental Iodine – 2.89 hr^{-1} Organic Iodine – None	Same Same Same

Table 2.9.2-21
MSLB Intact Steam Release Rate

Time (hours)*	Intact SG Steam Release Rate (lbm /min)
0.0	9087.1
0.5	5124.4
2.0	2690.3
8.0	2611.7
9.0	2478.3
10.0	2393.3
11.0	2301.7
12.0	2213.3
12.4	0.0

* Flow rates are applied until the next time point.

Table 2.9.2-22
MSLB Steam Generator Tube Leakage

Time (hours)*	Intact SG Tube Leakage (lbm /min)	Faulted SG Tube Leakage (lbm /min)
0	1.58	2.00
0.50	1.67	2.00
1.00	1.75	2.00
1.50	1.83	2.00
2.00	1.86	2.00
4.00	1.90	2.00
6.00	1.94	2.00
9.00	1.97	2.00
11.00	2.00	2.00
12.40	0.00	0.00

* Flow rates are applied until the next time point.

Table 2.9.2-23
Steam Generator Tube Rupture Accident – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Core Power Level	3030 MWt (~3020 + 0.3%)	2754 MWt (2700 + 2%)
Initial RCS Equilibrium Activity	1.0 μCi/gm DE I-131 and 518.9 μCi/gm DE Xe-133 (Table 2.9.2-2)	1.0 μCi/gm DE I-131 and 100/E-bar gross activity
Initial Secondary Side Equilibrium Iodine Activity	0.1 μCi/gm DE I-131 (Table 2.9.2-3)	0.1 μCi/gm DE I-131
Maximum Pre-Accident Spike Iodine Concentration	60 μCi/gm DE I-131	Same
Maximum Equilibrium Iodine Concentration	1.0 μCi/gm DE I-131	Same
Iodine Spike Appearance Rate	335 times	Same
Duration of Accident-Initiated Spike	8 hours	Same
Break Flow and Steam Releases	Table 2.9.2-24	Different based on different thermodynamic conditions and isolation time
Break Flow Flashing Fraction	Prior to Reactor Trip – 15.5% Following Reactor Trip – 7.5%	Prior to Reactor Trip - 17% Following Reactor Trip – 5%
Time to Terminate Break Flow	45 minutes	30 minutes
Steam Generator Tube Leakage Rate	0.25 gpm per SG	Same
Time to Re-cover Unaffected SG Tubes	1 hour	Same
Steam Generator Secondary Side Partition Coefficients	Flashed tube flow – none Non-flashed tube flow – 100	Same Same
Time to Terminate Steam Release	12.4 hours	10.32 hours
Time to Terminate SG Tube Leakage	12.4 hours	12 hours
RCS Mass	Pre-accident Iodine Spike: 420,090 lbm Concurrent Iodine Spike: 386,354 lbm	Pre-accident Iodine spike – 423,700 lbm Concurrent Iodine spike – 452,000 lbm

Table 2.9.2-23 (continued)
Steam Generator Tube Rupture Accident – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
SG Secondary Side Mass	Minimum -121,970.5 lbm (per SG) Maximum – 219,009 lbm (per SG) Maximum mass used for faulted SG to maximize secondary side dose contribution. Minimum mass used for all SG's for primary to secondary leakage nuclide transport, to maximize steam release nuclide concentration	Minimum – 105,000 lbm (per SG) Maximum – 260,000 lbm (per SG)
Atmospheric Dispersion Factors Offsite Onsite	 Table 2.9.2-9 Table 2.9.2-7	 Different based on meteorological data Different based on meteorological data
Control Room Ventilation System Time of Control Room Ventilation System Isolation Time of Control Room Filtered Makeup Flow Control Room Unfiltered Inleakage	(See Table 2.9.2-10) 314 seconds (Hot Leg Break Rx trip + 30 Sec) 1.5 hours 395 cfm	 409.2 seconds 1.5 hours 500 cfm
Breathing Rates Offsite Control Room	 RG 1.183, Section 4.1.3 RG 1.183, Section 4.2.6	 Same Same
Control Room Occupancy Factor	RG 1.183 Section 4.2.6	Same

Table 2.9.2-28
Locked Rotor Accident – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Core Power Level	3030 MWt (~3020+0.3%)	2754 MWt (2700 + 2%)
Core Average Fuel Burnup	49,000 MWD/MTU	45,000 MWD/MTU
Fuel Enrichment	1.5 – 5.0 w/o	3.0 – 4.5w/o
Maximum Radial Peaking Factor	1.65	1.7
Percent of Fuel Rods in DNB	19.7%	13.7%
High Burnup Fuel Adjustment Factor	1.00922	None
Core Fission Product Inventory	Table 2.9.2-4	Different based on power, burnup and enrichment
Initial RCS Equilibrium Activity	1.0 μCi/gm DE I-131 and 518.9 μCi/gm DE Xe-133 (Table 2.9.2-2)	1.0 μCi/gm DE I-131 and 100/E-bar gross activity
Initial Secondary Side Equilibrium Iodine Activity	0.1 μCi/gm DE I-131 (Table 2.9.2-3)	0.1 μCi/gm DE I-131
Release Fraction from Breached Fuel	RG 1.183, Section 3.2	Same
Steam Generator Tube Leakage	0.5 gpm (Table 2.9.2-30)	0.5 gpm
Secondary Side Mass Releases to Environment	Table 2.9.2-29	Different based on different thermodynamic conditions
SG Tube Uncovery Following Reactor Trip Time to tube recovery Flashing Fraction	 1 hour 6 %	 Same 5 %
Steam Generator Secondary Side Partition Coefficient	Flashed tube flow – none Non-flashed tube flow – 100	Same Same
Time to Terminate Steam Release	12.4 hours	10.32 hours
Time to Terminate SG Tube Leakage	12.4 hours	12 hours
RCS Mass	Minimum - 420,090 lbm Minimum mass used for fuel failure dose contribution to maximize SG tube leakage activity.	Minimum - 423,700 lbm

Table 2.9.2-28 (continued)
Locked Rotor Accident – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
SG Secondary Side Mass	Minimum – 121,970.5 lbm (per SG) Maximum – 219,009 lbm (per SG) Maximum mass not used since this event has no faulted SG. Minimum mass used for all SG's to maximize steam release nuclide concentration resulting from primary-to-secondary leakage.	Minimum – 105,000 lbm (per SG) Maximum – 260,000 lbm (per SG)
Atmospheric Dispersion Factors Offsite Onsite	 Table 2.9.2-9 Table 2.9.2-7	 Different based on meteorological data Different based on meteorological data
Control Room Ventilation System Time of Control Room Ventilation Isolation Time of Control Room Filtered Makeup Flow Control Room Unfiltered Inleakage	(See Table 2.9.2-10) 30 seconds 1.5 hours 395 cfm	 Same Same 500 cfm
Breathing Rates Offsite Onsite	 RG 1.183 Section 4.1.3 RG 1.183 Section 4.2.6	 Same Same
Control Room Occupancy Factor	RG 1.183 Section 4.2.6	Same

Table 2.9.2-31
CEA Ejection Accident – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Core Power Level	3030 MWt (~3020 + 0.3%)	2754 MWt (2700 + 2%)
Core Average Fuel Burnup	49,000 MWD/MTU	45,000 MWD/MTU
Fuel Enrichment	1.5 – 5.0 w/o	3.0 – 4.5 w/o
Maximum Radial Peaking Factor	1.65	1.7
Percent of Fuel Rods in DNB	9.5%	Same
Percent of Fuel Rods with Centerline Melt	0.5%	Same
Core Fission Product Inventory	Table 2.9.2-4	Different based on power, burnup and enrichment
Initial RCS Equilibrium Activity	1.0 μCi/gm DE I-131 and 518.9 μCi/gm DE Xe-133 (Table 2.9.2-2)	1.0 μCi/gm DE I-131 and 100/E-bar gross activity
Initial Secondary Side Equilibrium Iodine Activity	0.1 μCi/gm DE I-131 (Table 2.9.2-3)	0.1 μCi/gm DE I-131
Release Fraction from DNB Fuel Failures	Section 1 of Appendix H to RG 1.183	Same
Release Fraction from Centerline Melt Fuel Failures	Section 1 of Appendix H to RG 1.183	Same
High Burnup Fuel Adjustment Factor	1.00922 2 fuel assemblies	None None
Steam Generator Tube Leakage	0.5 gpm (Table 2.9.2-33)	0.5 gpm
Secondary Side Mass Releases to Environment	Table 2.9.2-32	Different based on different thermodynamic conditions
SG Tube Uncovery Following Reactor Trip Time to tube recovery Flashing Fraction	 1 hour 6 %	 Same 5 %
Steam Generator Secondary Side Partition Coefficient	Flashed tube flow – none Non-flashed tube flow – 100	Same Same
Time to Terminate Steam Release	12.4 hours	10.32 hours
Time to Terminate SG Tube Leakage	12.4 hours	12 hours

Table 2.9.2-31 (continued)
CEA Ejection Accident – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
RCS Mass	Minimum - 420,090 lbm Minimum mass used for fuel failure dose contribution to maximum SG tube leakage activity.	Minimum – 423,700 lbm
SG Secondary Side Mass	Minimum – 121,970.5 lbm (per SG) Maximum – 219,009 lbm (per SG) Maximum mass not used since this event has no faulted SG. Minimum mass used for all SG's to maximize steam release nuclide concentration resulting from primary-to-secondary leakage.	Minimum – 105,000 lbm (per SG) Maximum – 260,000 lbm (per SG)
Chemical Form of Iodine Released to Containment	Particulates – 95% Elemental iodine – 4.85% Organic iodine – 0.15%	Same Same Same
Chemical Form of Iodine Released from SGs	Particulates – 0% Elemental iodine – 97% Organic iodine – 3%	Same Same Same
Atmospheric Dispersion Factors Offsite Onsite	 Table 2.9.2-9 Table 2.9.2-7	 Different based on meteorological data Different based on meteorological data
Control Room Ventilation System Time of Control Room Ventilation System Isolation Time of Control Room Filtered Makeup Flow Control Room Unfiltered Inleakage	(See Table 2.9.2-10) 30 seconds 1.5 hours 395 cfm	 Same Same 500 cfm
Breathing Rates	RG 1.183 Sections 4.1.3 and 4.2.6	Same
Control Room Occupancy Factor	RG 1.183 Section 4.2.6	Same

Table 2.9.2-31 (continued)
CEA Ejection Accident – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Containment Volume Containment Leakage Rate 0 to 24 hours after 24 hours	$2.500E+06\ ft^3$ 0.5% (by volume)/day 0.25% (by volume)/day	Same Same Same
Secondary Containment Filter Efficiency	Particulates – 99% Elemental iodine – 95% Organic iodine – 95%	Same Same Same
Secondary Containment Drawdown Time	310 seconds	Same
Secondary Containment Bypass Fraction	9.6%	Same
Containment Natural Deposition Coefficients	Aerosols – $0.1\ hr^{-1}$ Elemental Iodine – $2.89\ hr^{-1}$ Organic Iodine – None	Same Same Same

Table 2.9.2-34
FWLB - Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Core Power Level	3030 MWt (3020 + 0.3%)	2754 MWt (2700 + 2%)
Initial RCS Equilibrium Activity	1.0 μCi/gm DE I-131 and 518.9 μCi/gm DE Xe-133 (Table 2.9.2-2)	1.0 μCi/gm DE I-131 and 100/E-bar gross activity
Initial Secondary Side Equilibrium Iodine Activity	0.1 μCi/gm DE I-131 (Table 2.9.2-3)	0.1 μCi/gm DE I-131
Steam Generator Tube Leakage	0.25 gpm per SG (Table 2.9.2-36)	0.25 gpm per SG
Time to Terminate Steam Release	12.4 hours	10.32 hours
Time to Terminate SG Tube Leakage	12.4 hours	12 hours
Steam Release from the Intact SG	Table 2.9.2-35	Different based on different thermodynamic conditions
Intact SG Tube Uncovery Following Reactor Trip Time to tube recovery Flashing Fraction	 1 hour 6%	 1 hour 5%
Steam Generator Secondary Side Partition Coefficient	Unaffected SG - 100 Faulted SG - None	Same
SG Secondary Side Mass	Minimum – 121,970.5 lbm Maximum - 219,009 lbm Maximum mass used for faulted SG to maximize secondary side dose contribution. Minimum mass used for intact SG to maximize steam release nuclide concentration resulting from primary-to-secondary leakage..	Minimum – 105,000 lbm Maximum - 260,000 lbm
Atmospheric Dispersion Factors Offsite Onsite	 Table 2.9.2-9 Table 2.9.2-7	 Different based on meteorological data Different based on meteorological data
Control Room Ventilation System Time of Control Room Ventilation Isolation Time of Control Room Filtered Makeup Flow Control Room Unfiltered Inleakage	(See Table 2.9.2-10) 30 seconds 1.5 hours 395 cfm	 Same Same 500 cfm

Table 2.9.2-34 (continued)
FWLB - Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Breathing Rates:		
Offsite	RG 1.183 Section 4.1.3	Same
Onsite	RG 1.183 Section 4.2.6	Same
Control Room Occupancy Factor	RG 1.183 Section 4.2.6	Same

Table 2.9.2-36
FWLB Steam Generator Tube Leakage

Time (hours)*	Intact SG Tube Leakage (lbm /min)	Faulted SG Tube Leakage (lbm /min)
0	1.58	2.00
0.50	1.67	2.00
1.00	1.75	2.00
1.50	1.83	2.00
2.00	1.86	2.00
4.00	1.90	2.00
6.00	1.94	2.00
9.00	1.97	2.00
11.00	2.00	2.00
12.40	0.00	0.00

* Flow rates are applied until the next time point.

Table 2.9.2-37
Letdown Line Rupture – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Core Power Level	3030 MWt (~3020 + 0.3%)	2754 MWt (2700 + 2%)
Initial RCS Equilibrium Activity	1.0 μCi/gm DE I-131 and 518.9 μCi/gm DE Xe-133 (Table 2.9.2-2)	1.0 μCi/gm DE I-131 and 100/E-bar gross activity
Initial Secondary Side Equilibrium Iodine Activity	0.1 μCi/gm DE I-131 (Table 2.9.2-3)	0.1 μCi/gm DE I-131
Iodine Spike Appearance Rate	500 times	Same
Duration of Accident-Initiated Spike	8 hours	Same
Intact SG Tube Uncovery Following Reactor Trip Time to tube recovery Flashing Fraction	 1 hour 6%	 1 hour 5%
Steam Generator Tube Leakage Rate	0.5 gpm (Table 2.9.2-41)	0.5 gpm
Time to Terminate Steam Release	12.4 hours	10.32 hours
Time to Terminate SG Tube Leakage	12.4 hours	12 hours
Secondary Side Mass Releases to Environment	Table 2.9.2-40	Different based on different thermodynamic conditions
Broken Line Flashing Fraction	25.9%	Same
Time to Terminate Break Flow	1800 seconds	1920 seconds
Broken Line Flow Rate	Table 2.9.2-42	Different based on different thermodynamic conditions
RCS Mass	386,354 lbm	452,000 lbm
SG Secondary Side Mass	Minimum – 121,970.5 lbm (per SG) Maximum – 219,009 lbm (per SG) Maximum mass not used since this event has no faulted SG Minimum mass used for all SG's to maximize steam release nuclide concentration resulting from primary-to-secondary leakage.	Minimum – 210,000 lbm (Total)

Table 2.9.2-37 (continued)
Letdown Line Rupture – Inputs and Assumptions

Input/Assumption	EPU Value	Pre-EPU Value
Atmospheric Dispersion Factors		
Offsite	Table 2.9.2-9	Different based on meteorological data
Onsite	Table 2.9.2-7	Different based on meteorological data
Control Room Ventilation System	(See Table 2.9.2-10)	
Time of Control Room Ventilation System Isolation	30 seconds	Same
Time of Control Room Filtered Makeup Flow	1.5 hours	1.5 hours
Control Room Unfiltered Inleakage	395 cfm	500 cfm
Breathing Rates		
Offsite	RG 1.183, Section 4.1.3	Same
Control Room	RG 1.183, Section 4.2.6	Same
Control Room Occupancy Factor	RG 1.183 Section 4.2.6	Same

Technical Specifications Section 3.11.2.6
Radioactive Effluents – Gas Storage Tanks
Revision To Proposed Change Submitted By FPL Letter L-2011-021
Regarding Extended Power Uprate License Amendment Request

Description of the Change

EPU LAR Attachment 1, Section 3.1, Renewed Facility Operating License and Technical Specifications Changes, Item 25, TS 3/4.11.2.6, RADIOACTIVE EFFLUENTS – GAS STORAGE TANKS, proposed that LIMITING CONDITION FOR OPERATION (LCO) 3.11.2.6 be changed from "less than or equal to 285,000 curies noble gases" to "less than or equal to 202,500 curies noble gases."

By email from the NRC Project Manager dated August 31, 2011, additional information related to accident dose was requested by the NRC staff in the Accident Dose Branch (AADB) to support their review of the EPU LAR. The request for additional information (RAI) identified twelve questions. The response to eleven of the twelve AADB RAIs was submitted to the NRC by FPL letter L-2011-404, dated October 5, 2011 (Accession No. ML11290A065). FPL letter L-2011-404 referenced FPL letter L-2011-314, dated August 12, 2011 (Accession No. ML11234A283), which contained revised atmospheric dispersion factors (χ/Q's) that were based on updated site meteorological data provided on a compact disc (CD) that was enclosed with the letter.

The revised χ/Q's were inputs to a revision to dose analysis calculations. As a result of the revised calculations, the quantity of radioactivity contained in each gas storage tank is being reduced to less than or equal to 165,000 curies of noble gas.

- LCO 3.11.2.6 is changed from "...less than or equal to 285,000 curies noble gases..." to"...less than or equal to 165,000 curies noble gases..."

  Note that the change described is from the current TS value for curies noble gases, not the EPU LAR proposed value of 202,500 curies noble gases. The marked-up TS page in Attachment 3 contains this proposed change and the change proposed by the original EPU LAR.

- The remaining changes proposed for TS 3/4.11.2.6 remain valid.

Basis for the Change

The gas storage tank inventory source term required to generate an exclusion area boundary (EAB) dose of 0.1 rem total effective dose equivalent (TEDE) is the basis for a proposed TS limit of 165,000 curies noble gas (considered as Dose Equivalent Xe-133). The limit of 0.1 rem is consistent with Branch Technical Position 11-5, Postulated Radioactive Releases Due to a Waste Gas System Leak or Failure, of NUREG-0800, Standard Review Plan Chapter 11, Radioactive Waste Management.

FPL letter L-2011-314, dated August 12, 2011 (ML11234A283), submitted revised atmospheric dispersion factors (χ/Q's) for the St. Lucie plant site based on updated site meteorological data provided on a compact disc (CD) that was enclosed with the letter. The revised χ/Q's were utilized in accident dose calculation to determine the dose at the EAB. To ensure that the dose at the EAB does not exceed 0.1 rem TEDE, the radioactivity in each of the gas storage tanks has been reduced from the current TS value of "285,000 curies noble gases (considered as Xe-133)" to a limit of "165,000 curies noble gases (considered as Xe-133)." The revised radioactivity limit being proposed is also reduced from the EPU LAR proposed limit of "202,500 curies noble gases (considered as Xe-133)."

No Significant Hazards Consideration

This change reduces the quantity of radioactivity in each gas storage tank to ensure that the EAB dose is less than or equal to 0.1 rem TEDE. The change was the result of revised accident dose analysis calculation results which used the χ/Q values that were determined from updated meteorological data. The change is conservative as it presents a reduction in the radioactivity in the tanks. As such, the conclusions of EPU LAR Attachment 1, Section 5.2, No Significant Hazards Consideration, Item G. Reactor Coolant System Specific Activity, remain valid. Accordingly, the proposed change 1) does not involve a significant increase in the propbability or consequences of an accident previously evaluated, 2) does not create the possibility of a new or different kind of accident from any previously evaluated, and 3) does not result in a significant reduction in a margin of safety.

Environmental Evaluation

This change is conservative in that it reduces the radioactivity in the gas storage tanks. This change presents a reduction in the proposed TS radioactivity limit change provided in the EPU LAR, Attachment 1, Section 3.1, Renewed Facility Operating License and Technical Specifications Changes, Item 25, TS 3/4.11.2.6, RADIOACTIVE EFFLUENTS – GAS STORAGE TANKS. The environmental considerations evaluation contained in the EPU LAR remain valid. Accordingly, the proposed license amendment is eligible for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 50.22(b), no environmental impact statement or environmental assessment is needed in connection with the approval of the proposed license amendment.

ATTACHMENT 3

Marked Up and Clean Pages for Technical Specification 3/4.11.2.6 Revision To Proposed Change Submitted By FPL Letter L-2011-021 Regarding Extended Power Uprate License Amendment Request

This coversheet plus two pages.

RADIOACTIVE EFFLUENTS

GAS STORAGE TANKS

LIMITING CONDITION FOR OPERATION

3.11.2.6 The quantity of radioactivity contained in each gas storage tank shall be limited to less than or equal to ~~285,000~~ curies noble gases (considered as Xe-133).

~~202,500~~

165,000

APPLICABILITY: At all times.

ACTION:

a. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.6 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tank when reactor coolant system activity exceeds $\cancel{\frac{100}{\bar{E}}}$.

518.9 μCi/gram DOSE EQUIVALENT XE-133.

RADIOACTIVE EFFLUENTS

GAS STORAGE TANKS

LIMITING CONDITION FOR OPERATION

3.11.2.6 The quantity of radioactivity contained in each gas storage tank shall be limited to less than or equal to 165,000 curies noble gases (considered as Xe-133).

APPLICABILITY: At all times.

ACTION:

a. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.6 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tank when reactor coolant system activity exceeds 518.9 μCi/gram DOSE EQUIVALENT XE-133.