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September 30, 2013

U.S. Nuclear Regulatory
Attn: Document Control Desk
Washington, DC 20555-0001

10 CFR 52.79

Subject: Duke Energy Carolinas, LLC
William States Lee III Nuclear Station - Docket Nos. 52-018 and 52-019
AP1000 Combined License Application for the William States Lee III Nuclear Station Units 1 and 2
Supplemental Response to Request for Additional Information (RAI) Letter 110, Related to SRP Section 02.03.05 – Long Term Atmospheric Dispersion Estimates for Routine Releases (RAI 7186)
Ltr#: WLG2013.09-01

References:
1. Letter from Thomas Galletta (NRC) to Robert Kitchen (Duke Energy), Request for Additional Information Letter No. 110, Related to SRP Section 02.03.05 – Long-Term Atmospheric Dispersion Estimates for Routine Releases for the William States Lee III Units 1 and 2 Combined License Application, dated July 30, 2013 (ML13211A231)
2. Letter from Christopher M. Fallon (Duke Energy) to Document Control Desk (NRC), Partial Response to Request for Additional Information (RAI) Letter 110, Related to SRP Section 02.03.05 – Long Term Atmospheric Dispersion Estimates for Routing Releases (RAI 7186), WLG2013.08-01, dated August 29, 2013 (ML13248A105)

Duke Energy provided a partial response to the Nuclear Regulatory Commission's Request for Additional Information 7186, Question 02.03.05-6(a) in Reference 2. This letter provides Duke Energy's supplemental response to the Nuclear Regulatory Commission's Request for Additional Information 7186, Question 02.03.05-6(b), included in Reference 1.

The response to the NRC information requests described in Reference 1 are addressed in separate enclosures, which also identify associated changes to be made in a future revision of the Lee Nuclear Station Combined License Application (COLA).

Enclosure 1 contains updated FSAR information regarding the Duke Energy analysis results at the Lee Nuclear Station site boundary for normal routine releases. Enclosure 2 contains environmental specific information regarding the Duke Energy analysis results at the Lee Nuclear Station site boundary for normal routine releases. The analysis shows there is no adverse impact at the site boundary.

D093
NRO

If you have any questions or need any additional information, please contact Robert H. Kitchen, Nuclear Development Licensing Director, at (704) 382-4046.

I declare under penalty of perjury that the foregoing is true and correct. Executed on September 30, 2013.

Sincerely,

Christopher M. Fallon

Christopher M. Fallon
Vice President
Nuclear Development

Enclosures:

1) Response to Request for Additional Information 7186, Question 02.03.05-6(b), Supplemental Information Related to the Safety Review
2) Response to Request for Additional Information 7186, Question 02.03.05-6(b), Supplemental Information Related to the Environmental Review

xc (w/o enclosures):

Frederick Brown, Deputy Regional Administrator, Region II

xc (w/ enclosures):

Brian Hughes, Senior Project Manager, DNRL
Patricia Vokoun, Project Manager, DSER
Thomas Galletta, Project Manager, DNRL
Terri Miley, PNNL

Response to Request for Additional Information 7186
Question 02.03.05-6(b)
Supplemental Information Related to the Safety Review

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 110

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): 02.03.05-6 (eRAI 7186)

NRC RAI:

The Staff considered the Applicant's submittals on December 20, 2012 regarding supplemental information related to design changes to the Lee Units 1 and 2 physical locations (ML12361A057) and its Enclosures 1 and 2 (i.e., ML12361A058, ML12361A060, and ML12361A061), on March 13, 2013 of supplemental information regarding environmental review (ML13087A299), and on May 9, 2013 providing, among other things, Revision 7 of the combined license (COL) Final Safety Analysis Report (FSAR) (ML13144A150).

In its review of the latest version of the long-term routine release atmospheric dispersion modeling analyses under COL FSAR Section 2.3.5 and related sections, tables, and figures, the Staff notes that:

- the closest offsite receptor distances are associated with the Exclusion Area Boundary (EAB) as opposed to the designated site boundary;
- COL FSAR Figures 2.1-209A and 2.1-209B illustrate that for at least the northwest clockwise through the east-southeast direction sectors (extending, perhaps, to the southeast sector as well) that the EAB and site boundary are not co-located, as is the case for the other direction sectors, with the EAB located beyond the site boundary, farther away from potential routine gaseous release points;
- COL FSAR Section 2.1.2 indicates that the EAB is the boundary on which limits for the release of radioactive effluents are based, that the "site" is clearly posted with no trespassing signs and "information on actions to be taken by security force personnel in the event of unauthorized persons crossing the EAB during emergency operations" (emphasis added);
- COL FSAR Subsection 2.1.2.1 indicates that certain properties within the EAB that lay beyond the site boundary are currently not owned by Duke Energy, that negotiations have been initiated regarding Duke Energy ownership or control of these properties, and that such ownership or control "will be obtained prior to start of construction"; and that
- COL FSAR Subsection 2.1.2.2 states (among other things), with respect to the control of activities unrelated to plant operation, that there are "no unauthorized commercial activities" and that there are "only limited recreational activities" within the Exclusion area, and that these recreational activities are limited to the Broad River.

NUREG-0800, SRP Section 2.3.5, Subsection II (Acceptance Criteria), SRP Acceptance Criterion (6A) calls for "Maximum annual average X/Q values and D/Q values at or beyond the site boundary and at specific locations of potential receptors of interest" to be used for the assessment of the consequences of routine airborne radiological releases as described in Section 2.3.5.2 of Regulatory Guide (RG) 1.206.

Section II of Appendix I to 10 CFR Part 50 specifies that an applicant shall provide reasonable assurance that, among other things, the calculated annual total quantity of all radioactive material above background to be released from each light-water-cooled nuclear power reactor to the atmosphere will not result in an estimated annual air dose from gaseous effluents "at any location near ground level which could be occupied by individuals in unrestricted areas" in excess of prescribed limits. Technical Rationale Item (1) under Subsection II (Acceptance Criteria) of SRP Section 2.3.5 essentially reiterates this requirement.

Given the preceding regulatory citation and one of several criteria the Staff uses to determine acceptable conformance to the NRC's regulations relevant to routine operational releases of radioactive material to the atmosphere, and cross-references to information provided in Revision 7 of the COL FSAR, it appears that the Applicant has not provided sufficient information and analyses to demonstrate that the dose objectives in 10 CFR Part 50, Appendix I, Section II will be met. As a result, the Applicant should:

(a) As might reasonably be inferred from the referenced statement in COL FSAR Subsection 2.1.2.2, confirm whether there are any authorized commercial activities (emphasis added) within the Exclusion Area and, if so, address where such activities are located relative to the planned routine release points for Unit 1 and Unit 2, and other relevant characteristics (e.g., number of people and duration present over the course of a typical year); and

(b) Determine the appropriate annual average relative concentration (X/Q) and relative deposition (D/Q) values and applicable dose rates at the site boundary for those direction sectors where the site boundary and EAB are not co-located as illustrated in COL FSAR Figures 2.1-209A and 2.1-209B, including, but not limited to:

- Identifying and justifying the appropriate downwind distances by affected sector;
- Reanalyzing any XOQDOQ routine release dispersion modeling and related dose calculation analyses;
- Revising or preparing any associated current or new tables and figures;
- Updating / clarifying / reconciling any associated discussions under COL FSAR Sections 2.3.5, 2.1, or Chapter 11;
- Providing copies of updated model input and output files; and
- Updating and providing any supplemental information or analyses specific to the environmental review.

Duke Energy Response:

The results of Duke Energy's analysis for the annual average relative concentration (X/Q), relative deposition (D/Q), and applicable dose rates at the site boundary meet regulatory limits, and are in compliance with the AP1000 DCD parameters.

The limiting atmospheric dispersion factor is 1.5×10^{-5} sec/m^3 located 1401 feet (approximately 0.27 mi., or 427 meters) NW of the Unit 1 effluent release boundary. The directional sectors and distances from the Units 1 and 2 effluent release boundaries are shown in Attachment 1, Figures 1 and 2. The associated revisions to FSAR Sections 2.0 and 2.3 are presented in Attachments 5, 6, and 7.

The analysis for individual doses from routine gaseous releases at the site boundary show the doses remain below the applicable regulatory criteria in 10 CFR 50 Appendix I, 10 CFR

20.1301, and 40 CFR Part 190. The associated revisions to Chapter 11 of the FSAR are included in Attachments 8 and 9. Note, the revisions to FSAR Tables 11.3-205, 11.3-206, and 11.3-207 include the revisions previously identified and submitted in Duke Energy's response to RAI Ltr. 109 (Reference 2).

The XOQDOQ and GASPAR input and output files used in the Duke Energy analysis are included in Attachments 2 and 3.

During Duke Energy's analysis, a discrepancy was found on the site boundary presented in FSAR Figure 1.1-202, "Site Layout." The associated revisions to Figure 1.1-202 are presented in Attachment 4.

Conforming changes to Part 4, Technical Specifications, Figures 4.1-1 and 4.1-2 are provided in Attachment 10. These changes provide consistency between the site boundary and exclusion area boundary presented in Part 2 and Part 4 of the WLS license application.

Supplemental information specific to the environmental review is provided in Enclosure 2.

References:

1. Letter from Christopher M. Fallon (Duke Energy) to NRC Document Control Desk, Partial Response to Request for Additional Information (RAI) Letter 110, Related to SRP Section 02.03.05 – Long Term Atmospheric Dispersion Estimates for Routine Releases (RAI 7186), Ltr# WLG2013.08-01, dated August 29, 2013 (ML13248A105)
2. Letter from Christopher M. Fallon (Duke Energy) to NRC Document Control Desk, Response to Request for Additional Information (eRAI 7159), Ltr# WLG2013.08-02, dated August 23, 2013 (ML13239A054)

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

1. FSAR Figure 1.1-202
2. FSAR Table 2.0-201, Sheet 6 of 8
3. FSAR Subsection 2.3.5
4. FSAR Tables 2.3-282 and 2.3-289
5. FSAR Subsections 11.3.3.4 and 11.3.3.4.1
6. FSAR Tables 11.2-206, 11.3-202, 11.3-203, 11.3-205, 11.3-206, and 11.3-207

Associated Revision to the Lee Nuclear Technical Specifications:

1. Technical Specification Figures 4.1-1 and 4.1-2

Attachments:

1. Attachment 1 – Figures 1 and 2
2. Attachment 2 – XOQDOQ Input and Output Files
3. Attachment 3 – GASPAR Input and Output Files
4. Attachment 4 – Revision to FSAR Figure 1.1-202

5. Attachment 5 – Revision to FSAR Table 2.0-201
6. Attachment 6 – Revisions to FSAR Subsection 2.3.5
7. Attachment 7 – Revisions to FSAR Tables 2.3-282 and 2.3-289
8. Attachment 8 – Revisions to FSAR Subsection 11.3.3.4
9. Attachment 9 – Revisions to FSAR Tables 11.2-206, 11.3-202, 11.3-203, 11.3-205, 11.3-206 and 11.3-207
10. Attachment 10 – Revisions to Technical Specifications Figures 4.1-1 and 4.1-2

Attachment 1

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

Figures 1 and 2

Figure 1 - Unit 1 Distance to the Site Boundary

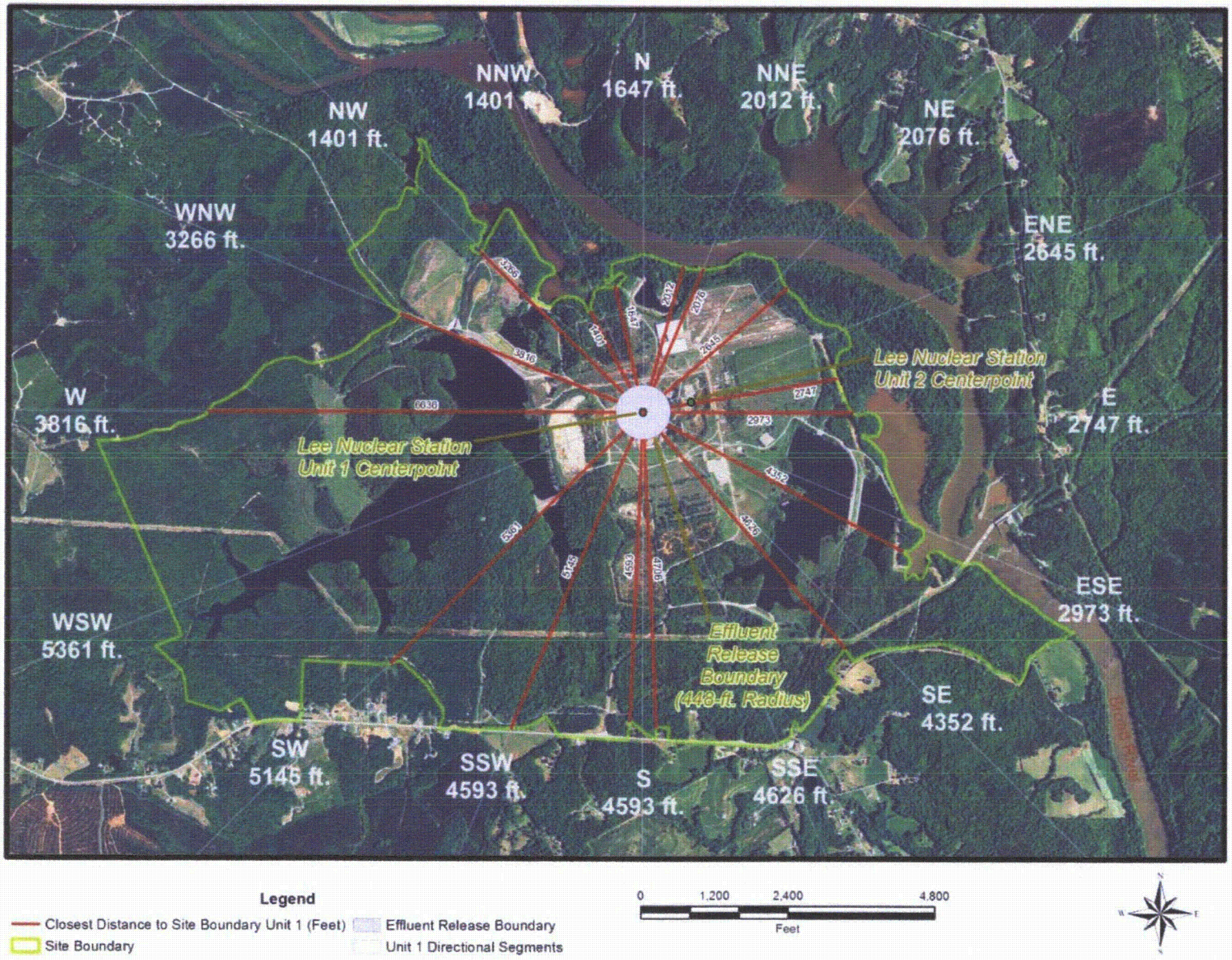
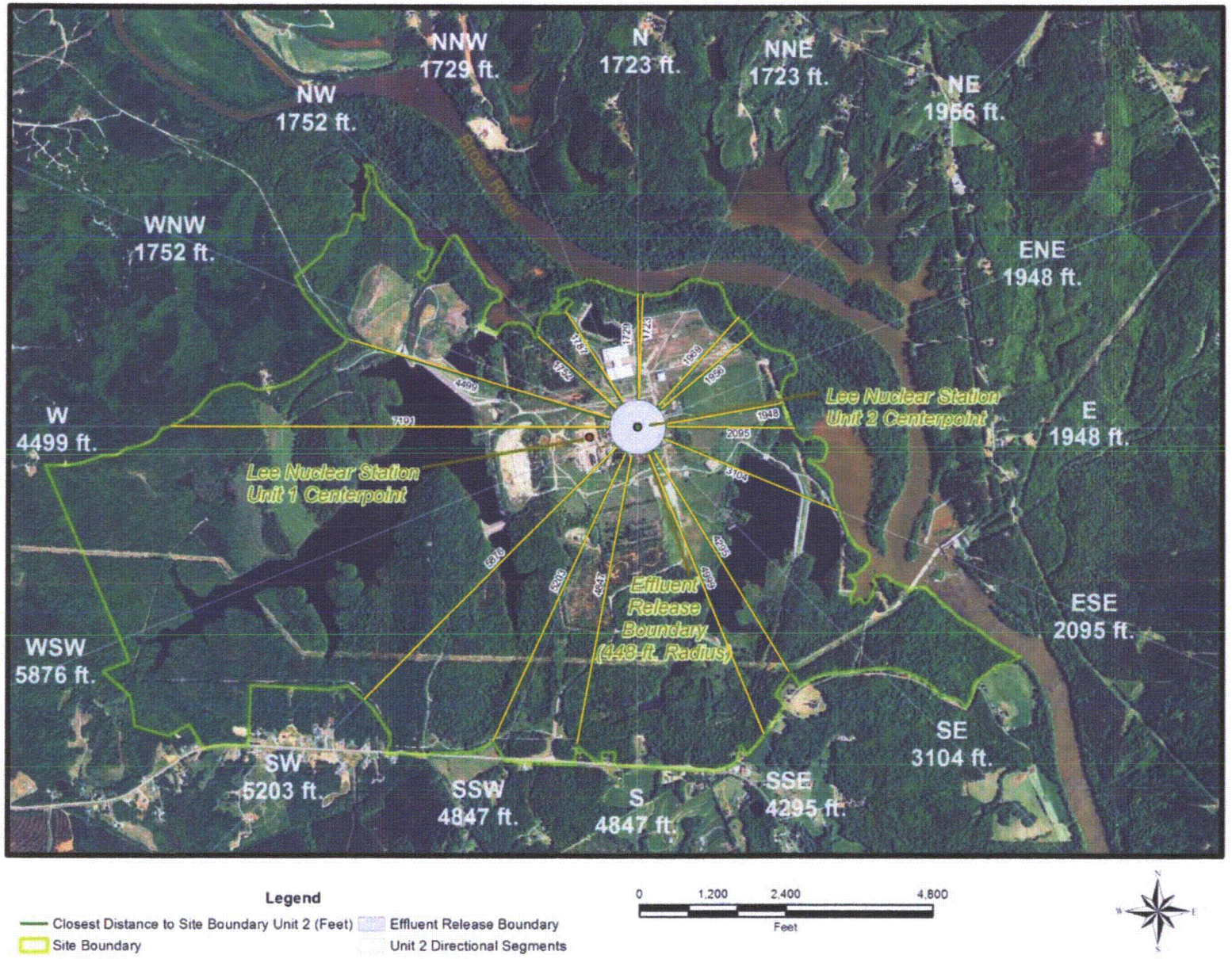


Figure 2 - Unit 2 Distance to Site Boundary



Attachment 2

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

XOQDOQ Input and Output Files provided on Compact Disk

Attachment 3

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

GASPAR Input and Output Files provided on Compact Disk

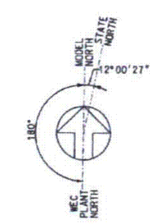
Attachment 4

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

Revision to FSAR Figure 1.1-202

1. COLA Part 2, FSAR Figure 1.1-202 is revised as follows:



NOTES:

1. DRAWING COORDINATES ARE BASED ON THE WS LEE MODEL COORDINATES WHICH HAVE THE UNIT 1 CENTER AT N 50,887.93 AND E 11,412.48, AND IS ALIGNED TO MODEL NORTH (AS SHOWN ON THE NORTH ARROW).
2. VERTICAL DATUM IS REFERENCED TO MEAN SEA LEVEL DATUM (NAVD 1988).
3. EXISTING CONDITIONS AND TOPOGRAPHY ARE BASED ON AERIAL TOPOGRAPHICAL SURVEY AND SANBORN MAPS.
4. FOR CONSTRUCTION FACILITIES SEE CONSTRUCTION FACILITIES SITE PLAN, DWG WLG-0000-X2-800008.
5. WETLANDS LOCATIONS ARE BASED ON SHAPE FILES PREPARED AND DELIVERED BY DUKE ENERGY.
6. FOR STANDARD PLANT BUILDING NAMES, SEE REFERENCE 1.
7. GRADE ADJACENT TO NUCLEAR ISLAND BUILDINGS 592.00'.
8. SITE BOUNDARY AS RECEIVED FROM DUKE ENERGY.
9. FACILITIES WITH CONTROLLED COORDINATE LOCATION MAY NOT BE RELOCATED WITHOUT PRIOR APPROVAL OF THE DESIGN CONTROL REVIEW BOARD. DASH (-) INDICATES NOT CONTROLLED.

REFERENCES:

1. APP-0000-X2-025, STANDARD PLANT SITE PLAN OVERALL YARD LAYOUT

OPEN ITEMS:

THIS DRAWING CONTAINS EXTENSIVE OPEN ITEMS INCLUDING THE FOLLOWING:

1. AP1000 DESIGN REQUIRES CONFIRMATION UPON RELEASE OF THE REFERENCED DOCUMENT TO WILLIAM STATES LEE III NUCLEAR STATION PROJECT.
2. PROPOSED GRADING TO BE FINALIZED AT A LATER TIME.
3. FACILITY SIZES AND LOCATIONS OF UNCONTROLLED FACILITIES WILL BE FINALIZED LATER.

NUCLEAR SUPPORT FACILITIES

FEATURE NO.	DUKE BLDG NO.	DESCRIPTION	CONTROLLED LOCATION (SEE NOTE 9)
9A	-	CIRCULATING WATER PUMP HOUSE UNIT 1	-
9B	-	CIRCULATING WATER PUMP HOUSE UNIT 2	-
12A	-	CWS COOLING TOWER UNIT 1 A	CENTER OF STRUCTURE
12B	-	CWS COOLING TOWER UNIT 1 B	CENTER OF STRUCTURE
13A	-	CWS COOLING TOWER UNIT 2 A	CENTER OF STRUCTURE
13B	-	CWS COOLING TOWER UNIT 2 B	CENTER OF STRUCTURE
145	8890	CENTRAL CHILLER PLANT	NORTHEAST CORNER
165	88651	TRAINING CENTER/SIMULATOR	-
166	88661	MAIN ENTRANCE SECURITY CHECKPOINT	CENTER OF STRUCTURE
167	88672	VEHICLE MAINTENANCE FACILITY	NORTHEAST CORNER
169	8868	VISITOR CENTER	NORTHWEST CORNER
170	-	NOT USED	-
171	88661	RECEIVING WAREHOUSE	SOUTHEAST CORNER
172	88662	WAREHOUSE 1	SOUTHWEST CORNER
173	88663	WAREHOUSE 2	NORTHWEST CORNER
174	-	PERSONNEL ACCESS PORTAL	-
201	-	CLARIFIER BUILDING	-
202	-	CLARIFIED WATER STORAGE TANK	-
203	-	RWS CLARIFIER	-
204	-	CLARIFIED WATER TRANSFER TANK	-
206	-	YARD FIRE WATER TANKS/PUMP ENCLOSURE	CENTER OF TANK
207A	-	CWS POWER DISTRIBUTION CENTER UNIT 1 A	-
207B	-	CWS POWER DISTRIBUTION CENTER UNIT 1 B	-
208A	-	CWS POWER DISTRIBUTION CENTER UNIT 2 A	-
208B	-	CWS POWER DISTRIBUTION CENTER UNIT 2 B	-
209	-	MAKE-UP POND B POWER DISTRIBUTION CENTER	-
210	-	MAKE-UP POND B INTAKE/REFILL STRUCTURE	CENTER OF STRUCTURE
211	-	MAKE-UP POND B REFILL STRUCTURE	CENTER OF STRUCTURE
212	-	MAKE-UP POND A POWER DISTRIBUTION CENTER	-
213	-	MAKE-UP POND A INTAKE STRUCTURE	NORTHEAST CORNER
214	-	MAKE-UP POND A REFILL STRUCTURE	-
215	-	RIVER WATER INTAKE STRUCTURE	CENTER OF STRUCTURE
217	-	RWS RIVER POWER DISTRIBUTION CENTER	-
218	88671	MAINTENANCE SUPPORT BUILDING	-
219	8865	ADMINISTRATION BUILDING	-
220A	-	PRIMARY VEHICLE ACCESS PORTAL	NORTHWEST CORNER
220B	-	SECONDARY VEHICLE ACCESS PORTAL	NORTHWEST CORNER
221	-	PERMANENT PLANT GAS STORAGE	-
222A	-	UNIT 1 WASTE WATER RETENTION BASIN	SOUTHEAST CORNER
222B	-	UNIT 2 WASTE WATER RETENTION BASIN	SOUTHEAST CORNER
223A	-	RWS YARD POWER DISTRIBUTION CENTER UNIT 1	-
223B	-	RWS YARD POWER DISTRIBUTION CENTER UNIT 2	-
224	-	20,000 GALLON OFF ROAD DIESEL TANK	-
225	-	WWS BLOWDOWN SUMP	SOUTHEAST CORNER
226	88014	SWITCHYARD CONTROL BUILDING RELAY HOUSE	-
227	-	RWS BREAK TANK #1	-
228	-	NOT USED	-
229	-	NOT USED	-
230	-	NOT USED	-
231	-	NOT USED	-
232	-	12,000 GALLON ON-ROAD DIESEL TANK	-
233	-	8,000 GALLON GASOLINE TANK	-
-	-	PROTECTED AREA FENCE	-
-	-	UNIT 1	CENTER OF CONTAINMENT
-	-	UNIT 2	CENTER OF CONTAINMENT
		CONSTRUCTION FACILITIES PERMANENT	
111	88813	LEE OFFICE BUILDING	-
118	88841	CARPENTER SHOP	SOUTHWEST CORNER
120	88842	MECHANICAL AND STRUCTURAL FABRICATION SHOP	SOUTHWEST CORNER
122	88844	BLAST SHOP/COATING FACILITY	SOUTHWEST CORNER
124	88831	PAINT STORAGE FACILITY	SOUTHEAST CORNER
159	88894	NON-DESTRUCTIVE TESTING (NDT) BUILDING	SOUTHEAST CORNER

0 200' 400' 800' 1200'
SCALE: 1" = 400'

WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Site Layout

FIGURE 1.1-202

WLS COL 2.1-1

Attachment 5

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

Revision to FSAR Table 2.0-201

1. COLA Part 2, FSAR Chapter 2, Table 2.0-201, Sheet 6 of 8 is revised as follows:

WLS SUP 2.0-1

TABLE 2.0-201 (Sheet 6 of 8)
COMPARISON OF AP1000 DCD SITE PARAMETERS AND LEE NUCLEAR STATION UNITS 1 & 2 SITE CHARACTERISTICS

	AP 1000 DCD Site Parameters	Lee Site Characteristic	Lee FSAR Reference	Lee Within Site Parameter
Precipitation				
Rain	20.7 in./hr [1-hr 1-mi^2 PMP]	18.9 in./hr. [1-hr 1-mi^2 PMP]	Table 2.4.2-203	Yes
Snow / Ice	75 pounds per square foot on ground with exposure factor of 1.0 and importance factors of 1.2 (safety) and 1.0 (non-safety)	17.7 pounds per square foot	Subsection 2.3.1.2.7.3	Yes
Atmospheric Dispersion Values χ/Q[(g)]				
Site Boundary (0-2 hr)[(g)]	≤ 5.1 x 10^{-4} sec/m^3	Unit 1: 3.32 x 10^{-4} sec/m^3 Unit 2: 3.55 x 10^{-4} sec/m^3	Table 2.3-283 Subsection 2.3.4.2	Yes
Site Boundary (Annual Average)	≤ 2.0 x 10^{-5} sec/m^3	~~6.30 x 10^{-6}~~ 1.5 x 10^{-5} sec/m^3	Table 2.3-289 (~~EAB~~ Site Boundary Unit ~~2~~1 ~~SE~~NW)	Yes
Low population zone boundary				
0-8 hr	≤ 2.2 x 10^{-4} sec/m^3	8.05 x 10^{-5} sec/m^3	Table 2.3-283	Yes
8-24 hr	≤ 1.6 x 10^{-4} sec/m^3	5.52 x 10^{-5} sec/m^3	Table 2.3-283	Yes
24-96 hr	≤ 1.0 x 10^{-4} sec/m^3	2.43 x 10^{-5} sec/m^3	Table 2.3-283	Yes
96-720 hr	≤ 8.0 x 10^{-5} sec/m^3	7.52 x 10^{-6} sec/m^3	Table 2.3-283	Yes
Control Room	Table 2.0-202	Table 2.0-202	Table 2.0-202	Yes

Attachment 6

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

Revisions to FSAR Subsection 2.3.5

1. COLA Part 2, FSAR Chapter 2, Subsection 2.3.5.1, fourth paragraph, first sentence is revised as follows:

For receptors located at the ~~EAB~~site boundary, the analysis assumed a ground level point source located at the Effluent Release Boundary closest to the receptor.

2. COLA Part 2, FSAR Chapter 2, Subsection 2.3.5.2, second paragraph is revised as follows:

The results of the analysis, based on two years of data collected on site, are presented in Tables 2.3-287 through 2.3-292. The limiting atmospheric dispersion factor (χ/Q) at the site boundary~~EAB~~, ~~6.30 x 10^{-6}~~ 1.5×10^{-5} sec/m^3, is in the ~~SE~~ NW direction from Unit ~~2~~ 1 at ~~1309 meters~~427 meters (approximately 0.27 mi.) from the effluent release boundary. The limiting atmospheric dispersion at the nearest residence, 4.60×10^{-6} sec/m^3, is ~~also~~ in the SE direction at 1588 meters. Atmospheric dispersion factors for other receptors are given in Table 2.3-289. Long term atmospheric dispersion factors are not given in the AP1000 DCD except at the EAB. The DCD site boundary annual average χ/Q is 2.0×10^{-5} sec/m^3. This bounds the Lee Nuclear Station annual average routine release ~~EAB~~ site boundary χ/Q value of ~~6.3×10^{-6}~~ 1.5×10^{-5} sec/m^3. Table 2.0-201 provided a comparison of the Lee Nuclear Station site characteristics with the DCD design parameters.

Attachment 7

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

Revisions to FSAR Table 2.3-282 & Table 2.3-289

1. COLA Part 2, FSAR Chapter 2, Table 2.3-282 is revised as follows:

TABLE 2.3-282 (Sheet 1 of 2)
MINIMUM EXCLUSION AREA BOUNDARY (EAB) DISTANCES
AND SITE BOUNDARY DISTANCES
[FROM INNER 448 FT (137 M) RADIUS CIRCLE
ENCOMPASSING ALL SITE RELEASE POINTS]

WLS COL 2.3-4

Direction	EAB Distance (ft)	EAB Distance (m)	Site Boundary Distance (ft)	Site Boundary Distamce (m)
UNIT 1				
S	4593	1400	4593	1400
SSW	4593	1400	4593	1400
SW	5147	1569	5145	1568
WSW	5361	1634	5361	1634
W	3814	1163	3816	1163
WNW	3814	1163	3266	995
NW	3973	1211	1401	427
NNW	3070	936	1401	427
N	3070	936	1647	502
NNE	3190	972	2012	613
NE	3385	1032	2076	633
ENE	4153	1266	2645	806
E	5171	1576	2747	837
ESE	5084	1550	2973	906
SE	4625	1410	4352	1326
SSE	4625	1410	4626	1410

TABLE 2.3-282 (Sheet 2 of 2)
MINIMUM EXCLUSION AREA BOUNDARY (EAB) DISTANCES
AND SITE BOUNDARY DISTANCES
[FROM INNER 448 FT (137 M) RADIUS CIRCLE
ENCOMPASSING ALL SITE RELEASE POINTS]

WLS COL 2.3-4

Direction	EAB Distance (ft)	EAB Distance (m)	Site Boundary Distance (ft)	Site Boundary Distamce (m)
UNIT 2				
S	4847	1477	4847	1477
SSW	4847	1477	4847	1477
SW	5201	1585	5203	1586
WSW	5876	1791	5876	1791
W	4497	1371	4499	1371
WNW	4497	1371	1752	534
NW	3135	956	1752	534
NNW	3130	954	1729	527
N	2914	888	1723	525
NNE	2914	888	1723	525
NE	3159	963	1956	596
ENE	3668	1118	1948	594
E	4379	1335	1948	594
ESE	5116	1559	2095	639
SE	4295	1309	3104	946
SSE	4295	1309	4295	1309

NOTE:

1. Exclusion Area Boundary (EAB) and Site Boundary for Lee Nuclear Station ~~is~~ are shown in FSAR Figures 2.1-209A and 2.1-209B.
2. In accordance with Regulatory Guide 1.145, the distance to the EAB or Site Boundary is the closest distance within a 45-degree section centered on the compass direction of interest.
3. Site Boundary and EAB are co-located in the S, SSE, SSW, SW, WSW, and W directions.

2. COLA Part 2, FSAR Chapter 2, Table 2.3-289, Sheets 1 and 2 are revised as follows:

WLS COL 2.3-5

TABLE 2.3-289 (Sheet 1 of 6)
χ/Q AND D/Q VALUES FOR NORMAL RELEASES

Type of Location	Sector	Distance (miles)	Distance (meters)	χ/Q (sec/m^3) No Decay Undepleted	χ/Q (sec/m^3) No Decay Depleted	χ/Q (sec/m^3) 2.26 Day Decay Undepleted	χ/Q (sec/m^3) 8.00 Day Decay Depleted	D/Q (m^{-2})
SITE BOUNDARY (U1)~~EAB (U1)~~	S	0.87	1400	2.30E-06	2.00E-06	2.20E-06	2.00E-06	4.60E-09
SITE BOUNDARY (U1)~~EAB (U1)~~	SSW	0.87	1400	2.10E-06	1.90E-06	2.10E-06	1.90E-06	5.00E-09
SITE BOUNDARY (U1)~~EAB (U1)~~	SW	0.97	~~1569~~15 68	1.40E-06	1.30E-06	1.40E-06	1.30E-06	4.00E-09
SITE BOUNDARY (U1)~~EAB (U1)~~	WSW	1.02	1634	1.60E-06	1.40E-06	1.60E-06	1.40E-06	3.30E-09
SITE BOUNDARY (U1)~~EAB (U1)~~	W	0.72	1163	2.90E-06	2.50E-06	2.80E-06	2.50E-06	4.90E-09
SITE BOUNDARY (U1)~~EAB (U1)~~	WNW	~~0.72~~0. 62	~~1163~~99 5	~~2.80~~3.70E-06	~~2.50~~3.40E-06	~~2.80~~3.70E-06	~~2.50~~3.40E-06	~~4.60~~5.90E-09
SITE BOUNDARY (U1)~~EAB (U1)~~	NW	~~0.75~~0. 27	~~1211~~42 7	1.50E-05~~2.40E-06~~	1.30E-05~~2.10E-06~~	1.40E-05~~2.40E-06~~	1.30E-05~~2.10E-06~~	2.90E-08~~5.50E-09~~
SITE BOUNDARY (U1)~~EAB (U1)~~	NNW	~~0.58~~0. 27	~~936~~427	1.10E-05~~2.80E-06~~	~~2.50~~9.90E-06	1.10E-05~~2.70E-06~~	~~2.50~~9.90E-06	3.00E-08~~8.70E-09~~
SITE BOUNDARY (U1)~~EAB (U1)~~	N	~~0.58~~0. 31	~~936~~502	~~2.10~~5.90E-06	~~1.90~~5.50E-06	~~2.10~~5.90E-06	~~1.90~~5.50E-06	2.60E-08~~9.60E-09~~

WLS COL 2.3-5

TABLE 2.3-289 (Sheet 1 of 6)
χ/Q AND D/Q VALUES FOR NORMAL RELEASES

Type of Location	Sector	Distance (miles)	Distance (meters)	χ/Q (sec/m^3) No Decay Undepleted	χ/Q (sec/m^3) No Decay Depleted	χ/Q (sec/m^3) 2.26 Day Decay Undepleted	χ/Q (sec/m^3) 8.00 Day Decay Depleted	D/Q (m^{-2})
SITE BOUNDARY (U1)EAB (U1)	NNE	0.600.38	972613	1.503.20E-06	1.302.90E-06	1.503.10E-06	1.302.90E-06	1.002.20E-08
SITE BOUNDARY (U1)EAB (U1)	NE	0.640.39	1032633	1.002.30E-06	2.10E-069.40E-07	1.002.30E-06	2.10E-069.40E-07	1.90E-088.70E-09
SITE BOUNDARY (U1)EAB (U1)	ENE	0.790.50	1266806	1.30E-066.50E-07	1.20E-065.80E-07	1.30E-066.50E-07	1.20E-065.80E-07	4.208.80E-09
SITE BOUNDARY (U1)EAB (U1)	E	0.980.52	1576837	1.60E-065.80E-07	1.50E-065.10E-07	1.60E-065.80E-07	1.50E-065.10E-07	2.005.70E-09
SITE BOUNDARY (U1)EAB (U1)	ESE	0.960.56	1550906	1.904.60E-06	1.604.20E-06	1.804.60E-06	1.604.10E-06	1.10E-084.30E-09
SITE BOUNDARY (U1)EAB (U1)	SE	0.880.82	1410132626	5.606.20E-06	4.905.50E-06	5.606.10E-06	4.905.50E-06	1.201.30E-08
SITE BOUNDARY (U1)EAB (U1)	SSE	0.88	1410	2.90E-06	2.60E-06	2.90E-06	2.60E-06	5.40E-09

WLS COL 2.3-5

TABLE 2.3-289 (Sheet 2 of 6)
χ/Q AND D/Q VALUES FOR NORMAL RELEASES

Type of Location	Sector	Distance (miles)	Distance (meters)	χ/Q (sec/m³) No Decay Undepleted	χ/Q (sec/m³) No Decay Depleted	χ/Q (sec/m³) 2.26 Day Decay Undepleted	χ/Q (sec/m³) 8.00 Day Decay Depleted	D/Q (m^{-2})
SITE BOUNDARY (U2)EAB (U2)	S	0.92	1477	2.10E-06	1.80E-06	2.10E-06	1.80E-06	4.20E-09
SITE BOUNDARY (U2)EAB (U2)	SSW	0.92	1477	1.90E-06	1.70E-06	1.90E-06	1.70E-06	4.50E-09
SITE BOUNDARY (U2)EAB (U2)	SW	0.980.99	15851586	1.40E-06	1.20E-06	1.40E-06	1.20E-06	3.90E-09
SITE BOUNDARY (U2)EAB (U2)	WSW	1.11	1791	1.40E-06	1.20E-06	1.40E-06	1.20E-06	2.80E-09
SITE BOUNDARY (U2)EAB (U2)	W	0.85	1371	2.20E-06	1.90E-06	2.20E-06	1.90E-06	3.70E-09
SITE BOUNDARY (U2)EAB (U2)	WNW	0.850.33	13711534	1.10E-052.20E-06	1.00E-051.90E-06	1.10E-052.20E-06	1.00E-051.90E-06	1.60E-083.50E-09
SITE BOUNDARY (U2)EAB (U2)	NW	0.590.33	956534	3.609.70E-06	3.209.00E-06	3.509.70E-06	3.209.00E-06	2.10E-088.10E-09
SITE BOUNDARY (U2)EAB (U2)	NNW	0.590.33	954527	2.707.30E-06	2.406.70E-06	2.707.30E-06	2.406.70E-06	2.20E-088.40E-09
SITE BOUNDARY (U2)EAB (U2)	N	0.550.33	888525	2.305.50E-06	2.105.10E-06	2.305.50E-06	2.105.10E-06	1.002.40E-08
SITE BOUNDARY (U2)EAB (U2)	NNE	0.550.33	888525	1.704.10E-06	1.603.80E-06	1.704.10E-06	1.603.80E-06	1.202.80E-08

WLS COL 2.3-5

TABLE 2.3-289 (Sheet 2 of 6)
χ/Q AND D/Q VALUES FOR NORMAL RELEASES

Type of Location	Sector	Distance (miles)	Distance (meters)	χ/Q (sec/m³) No Decay Undepleted	χ/Q (sec/m³) No Decay Depleted	χ/Q (sec/m³) 2.26 Day Decay Undepleted	χ/Q (sec/m³) 8.00 Day Decay Depleted	D/Q (m^{-2})
SITE BOUNDARY (U2)~~EAB (U2)~~	NE	~~0.600.~~ 37	~~963~~596	~~1.20~~2.50E-06	~~1.00~~2.30E-06	~~1.20~~2.50E-06	~~1.00~~2.30E-06	2.10E-08~~9.70E-09~~
SITE BOUNDARY (U2)~~EAB (U2)~~	ENE	~~0.690.~~ 37	~~111859~~ 4	2.20E-06~~7.90E-07~~	2.10E-06~~7.10E-07~~	2.20E-06~~7.90E-07~~	2.10E-06~~7.00E-07~~	1.40E-08~~5.10E-09~~
SITE BOUNDARY (U2)~~EAB (U2)~~	E	~~0.830.~~ 37	~~133559~~ 4	2.90E-06~~7.50E-07~~	2.70E-06~~6.70E-07~~	2.90E-06~~7.50E-07~~	2.70E-06~~6.70E-07~~	~~2.60~~9.80E-09
SITE BOUNDARY (U2)~~EAB (U2)~~	ESE	~~0.970.~~ 40	~~155963~~ 9	~~1.80~~8.50E-06	~~1.60~~7.80E-06	~~1.80~~8.50E-06	~~1.60~~7.80E-06	1.90E-08~~4.30E-09~~
SITE BOUNDARY (U2)~~EAB (U2)~~	SE	~~0.810.~~ 59	~~130994~~ 6	1.10E-05~~6.30E-06~~	1.00E-05~~5.60E-06~~	1.10E-05~~6.30E-06~~	1.00E-05~~5.60E-06~~	~~1.30~~2.20E-08
SITE BOUNDARY (U2)~~EAB (U2)~~	SSE	0.81	1309	3.30E-06	2.90E-06	3.30E-06	2.90E-06	6.10E-09

Attachment 8

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

Revisions to FSAR Subsection 11.3.3.4

1. COLA Part 2, FSAR Chapter 11, Subsection 11.3.3.4, paragraphs 1 through 4 are revised as follows:

WLS COL 11.3-1
WLS COL 11.5-3

The calculated gaseous doses for the maximum exposed individual are compared to the regulatory limits from Appendix I of 10 CFR Part 50 and 10 CFR Part 20.1301 for acceptance. Table 11.3-205 and Table 11.3-206 display this comparison and demonstrate that the calculated gaseous doses for the maximally exposed individual are less than the regulatory limits. The Lee Nuclear Station site-specific values are bounded by the DCD identified acceptable releases. With the annual airborne releases listed in DCD Table 11.3-3, the site-specific air doses at ground level at the site boundary are ~~0.773~~ 1.25 mrad per year for gamma radiation and ~~3.25~~ 7.32 mrad per year for beta radiation. These doses are based on the annual average atmospheric dispersion factor from Section 2.3. These doses are below the 10 CFR Part 50, Appendix I design objectives of 10 mrad per year for gamma radiation or 20 mrad per year for beta radiation.

Dose and dose rate to man were calculated using the GASPAR II computer code. This code is based on the methodology presented in Regulatory Guide 1.109. Factors common to both estimated individual dose rates and estimated population dose are addressed in this subsection. Unique data are discussed in the respective subsections.

Activity pathways considered are plume, ground deposition, inhalation, and ingestion of vegetables, meat, and milk (cow or goat).

Based on site meteorological conditions, the highest combined dose rate ~~of~~ from plume exposure and ground deposition occurs at the ~~Exclusion Area Boundary~~site boundary ~~(EAB)~~ ~~0.81~~ 0.27 mi. (427 m) ~~SE~~ NW of the Effluent Release Boundary.

2. COLA Part 2, FSAR Chapter 11, Subsection 11.3.3.4.1 is revised as follows:

WLS COL 11.3-1

Dose rates to individuals are calculated for airborne decay and deposition, inhalation, and ingestion of milk (goat or cow), meat and vegetables. Dose from plume and ground deposition are calculated as affecting all age groups equally.

Plume exposure approximately ~~0.81~~ 0.27 mi. ~~SE~~ NW of the Effluent Release Boundary produced a maximum dose rate to a single organ of ~~2.38~~ 4.90 mrem/yr to skin. The maximum total body dose rate was calculated to be ~~4.73~~7.32E-1 mrem/yr.

Ground deposition approximately ~~0.81~~ 0.27 mi. ~~SE~~ NW of the Effluent Release Boundary produced a maximum dose rate to a single organ of ~~1.33~~2.98E-1 mrem/yr to skin. The maximum total body dose rate was calculated to be ~~1.14~~2.53E-1 mrem/yr.

Inhalation Dose at the ~~EAB~~site boundary, ~~0.81~~ 0.27 mi. ~~SE~~ NW of the Effluent Release Boundary, results in a maximum dose rate to a single organ of ~~7.03E-1~~1.54 mrem/yr to a child's thyroid. The maximum total body dose rate is calculated to be ~~5.24E-2~~1.24E-1 mrem/yr to a teenager.

Vegetable consumption assumes that the dose is received from the garden special location, approximately 1.0 mi. SSE of the plant. GASPAR II default vegetable consumption values are used in lieu of site-specific vegetable consumption data as permitted by Regulatory Guide 1.109. The estimated maximum dose rate to a single organ is 2.42 mrem/yr to a child's thyroid. The maximum total body dose rate is calculated to be 4.59E-1 mrem/yr to a child.
Meat consumption assumes that the dose is received from the cow special location, approximately 1.65 mi. SE of the plant. GASPAR II default meat consumption values are used in lieu of site-specific meat consumption data as permitted by Regulatory Guide 1.109. The

estimated maximum dose rate to a single organ is 2.74E-1 mrem/yr to a child's bone. The maximum total body dose rate is calculated to be 5.81E-2 mrem/yr to a child.

Meat consumption assumes that the dose is received from the cow special location, approximately 1.65 mi. SE of the plant. GASPAR II default meat consumption values are used in lieu of site-specific meat consumption data as permitted by Regulatory Guide 1.109. The estimated maximum dose rate to a single organ is 2.74E-1 mrem/yr to a child's bone. The maximum total body dose rate is calculated to be 5.81E-2 mrem/yr to a child.

Cow milk consumption assumes that the dose is received from the cow special location, approximately 1.65 mi. SE of the plant. GASPAR II default cow milk consumption values are used in lieu of site-specific cow milk consumption data as permitted by Regulatory Guide 1.109. The estimated maximum dose rate to a single organ is 6.23 mrem/yr to an infant's thyroid. The maximum total body dose rate is calculated to be 3.99E-1 mrem/yr to an infant.

Goat milk consumption assumes that the dose is received from the nearest milk goat special location, approximately 1.05 mi. SSW of the plant. GASPAR II default goat milk consumption values are used in lieu of site-specific goat milk consumption data as permitted by Regulatory Guide 1.109. The estimated maximum dose rate to a single organ is 7.58 mrem/yr to an infant's thyroid. The maximum total body dose rate is calculated to be 3.26E-1 mrem/yr to an infant.

The maximum dose rate to any organ considering every pathway is calculated to be ~~8.80~~ 9.95 mrem/yr to an infant's thyroid. The maximum total body dose rate is calculated to be ~~1.35~~ 1.81 mrem/yr to a child. These are below the 10 CFR 50, Appendix I design objectives of 5 mrem/yr to total body, and 15 mrem/yr to any organ, including skin.

Table 11.3-201 contains GASPAR II input data for dose rate calculations. Information regarding the special locations for ~~man,~~ cow, goat, garden, site boundary and the EAB is located in Section 2.3. Table 11.3-202 contains total organ dose rates based on age group and pathway. Table 11.3-203 contains total air dose at each special location.

Attachment 9

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

Revisions to

FSAR Table 11.2-206

FSAR Table 11.3-202

FSAR Table 11.3-203

FSAR Table 11.3-205

FSAR Table 11.3-206

FSAR Table 11.3-207

1. COLA Part 2, FSAR Table 11.2-206 is revised as follows:

TABLE 11.2-206
LIQUID AND GASEOUS PATHWAY DOSES COMPARED TO
40 CFR PART 190 LIMITS

Dose	Dose (mrem/yr, per site)[a] 40 CFR 190 Requirements	Assessment of Both Units
Whole Body Dose Equivalent	25	~~2.82~~3.74E+00[b]
Thyroid Dose	75	~~1.77~~2.00E+01[c]
Dose to Another Organ	25	~~8.3~~9.05E+00[d]

a) Direct radiation from containment and other plant buildings is negligible based on information presented in the AP1000 DCD, Tier 2, Chapter 12, Subsection 12.4.2.1

b) This value was conservatively calculated by summing the maximum whole body dose due to the liquid pathway (to an adult) and the maximum whole body dose due to the gaseous pathway (to a child).

c) An infant receives the maximum thyroid dose

d) A child receives the maximum other individual organ dose which is to the bone.

2. COLA Part 2, FSAR Table 11.3-202 is revised as follows:

WLS COL 11.3-1
WLS COL 11.5-3

TABLE 11.3-202 (Sheet 1 of 3)
INDIVIDUAL DOSE RATES

	Dose (mrem/yr)							
Pathway	Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Adult								
Plume	~~4.73~~7.32E-01	7.32~~4.73~~E-01	7.32~~4.73~~E-01	7.32~~4.73~~E-01	7.32~~4.73~~E-01	7.32~~4.73~~E-01	~~5.05~~8.04E-01	~~2.38~~4.90E+00
Ground	~~1.14~~2.53E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	~~1.33~~2.98E-01
Vegetable	1.38E-01	1.39E-01	6.09E-01	1.38E-01	1.34E-01	9.08E-01	1.28E-01	1.27E-01
Meat	3.96E-02	4.36E-02	1.73E-01	3.96E-02	3.92E-02	6.59E-02	3.89E-02	3.88E-02
Goat Milk	5.72E-02	4.47E-02	1.60E-01	6.28E-02	5.38E-02	9.96E-01	4.49E-02	4.31E-02
Cow Milk	5.37E-02	4.95E-02	1.98E-01	5.62E-02	5.41E-02	8.13E-01	4.87E-02	4.81E-02
Inhalation	~~5.18E-02~~1.23E-01	~~5.24E-02~~1.24E-01	~~7.99E-03~~1.86E-02	~~5.29E-02~~1.26E-02	~~5.38E-02~~1.27E-01	~~4.82E-01~~1.07E-00	~~6.70E-02~~1.59E-01	~~5.02E-02~~1.20E-01
Total[(a)]	~~8.74E-01~~1.34E+00	~~8.72E-01~~1.34E+00	~~1.57~~1.98E+00	~~8.80E-01~~1.35E+00	~~8.68E-01~~1.34E+00	~~3.04~~4.02E+00	~~9.02E-01~~1.43E+00	~~2.78~~5.53E+00

WLS COL 11.3-1
WLS COL 11.5-3

TABLE 11.3-202 (Sheet 1 of 3)
INDIVIDUAL DOSE RATES

	Dose (mrem/yr)							
Pathway	Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Teen								
Plume	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~5.05~~8.04E-01	~~2.38~~4.90E+00
Ground	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.33~~2.98E-01
Vegetable	2.07E-01	2.09E-01	9.76E-01	2.12E-01	2.06E-01	1.23E+00	1.97E-01	1.96E-01
Meat	3.21E-02	3.44E-02	1.46E-01	3.23E-02	3.20E-02	5.13E-02	3.17E-02	3.16E-02

WLS COL 11.3-1

WLS COL 11.5-3

TABLE 11.3-202 (Sheet 2 of 3)
INDIVIDUAL DOSE RATES

	Dose (mrem/yr)							
Pathway	Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Goat Milk	8.56E-02	7.30E-02	2.91E-01	1.05E-01	8.96E-02	1.58E+00	7.45E-02	7.08E-02
Cow Milk	8.93E-02	8.47E-02	3.63E-01	9.71E-02	9.34E-02	1.29E+00	8.41E-02	8.28E-02
Inhalation	~~5.24E-02~~1.24E-01	~~5.29E-02~~1.26E-01	~~9.68E-03~~2.25E-02	~~5.44E-02~~1.29E-01	~~5.56E-02~~1.31E-01	~~6.02E-01~~1.33E+00	~~7.60E-02~~1.80E-01	~~5.07E-02~~1.21E-01
Total[(a)]	~~9.68E-01~~1.44E+00	~~9.68E-01~~1.44E+00	~~2.08~~2.49E+00	~~9.91E-01~~1.46E+00	~~9.74E-01~~1.45E+00	~~4.05~~5.18E+00	~~1.01~~1.55E+00	~~2.87~~5.63E+00
Child								
Plume	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~5.05~~8.04E-01	~~2.38~~4.90E+00
Ground	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.14~~2.53E-01	~~1.33~~2.98E-01
Vegetable	4.59E-01	4.52E-01	2.31E+00	4.69E-01	4.59E-01	2.42E+00	4.45E-01	4.43E-01
Meat	5.81E-02	5.91E-02	2.74E-01	5.85E-02	5.80E-02	8.73E-02	5.77E-02	5.76E-02
Goat Milk	1.71E-01	1.58E-01	7.07E-01	2.14E-01	1.87E-01	3.15E+00	1.62E-01	1.56E-01

WLS COL 11.3-1

WLS COL 11.5-3

TABLE 11.3-202 (Sheet 2 of 3)
INDIVIDUAL DOSE RATES

	Dose (mrem/yr)							
Pathway	Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Cow Milk	1.99E-01	1.93E-01	8.88E-01	2.16E-01	2.09E-01	2.60E+00	1.93E-01	1.91E-01
Inhalation	~~4.63~~1.10E-~~02~~01	~~4.57~~1.09E-~~02~~01	~~1.18~~2.73E-02	~~4.83~~1.14E-~~02~~01	~~4.94~~1.17E-~~02~~01	~~7.03~~1.54E-~~01~~+00	~~6.58~~1.56E-~~02~~01	~~4.47~~1.07E-~~02~~01
Total[(a)]	~~1.35~~1.81E+00	~~1.34~~1.80E+00	~~4.07~~4.48E+00	~~1.38~~1.84E+00	~~1.36~~1.83E+00	~~6.95~~8.18E+00	~~1.38~~1.91E+00	~~3.25~~6.00E+00

WLS COL 11.3-1
WLS COL 11.5-3

TABLE 11.3-202 (Sheet 3 of 3)
INDIVIDUAL DOSE RATES

	Dose (mrem/yr)							
Pathway	Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Infant								
Plume	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~4.73~~7.32E-01	~~5.05~~8.04E-01	~~2.38~~4.90E+00
Ground	~~1.14~~2.53E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.53~~1.14~~E-01	2.98~~1.33~~E-01
Vegetable	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Meat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goat Milk	3.26E-01	3.09E-01	1.34E+00	4.23E-01	3.58E-01	7.58E+00	3.17E-01	3.07E-01
Cow Milk	3.99E-01	3.89E-01	1.72E+00	4.38E-01	4.17E-01	6.23E+00	3.91E-01	3.88E-01
Inhalation	~~2.68~~6.35E-02	~~2.61~~6.21E-02	~~5.93~~1.36E-~~03~~02	~~2.89~~6.82E-02	~~2.88~~6.78E-02	~~6.30~~1.38E-~~01~~+00	~~4.03~~9.58E-02	~~2.57~~6.13E-02
Total[(a)]	~~1.01~~1.45E+00	~~1.00~~1.44E+00	~~2.31~~2.72E+00	~~1.05~~1.49E+00	~~1.03~~1.47E+00	~~8.80~~9.95E+00	~~1.05~~1.54E+00	~~2.93~~5.65E+00

a) The milk pathway contribution for the total dose of each receptor is conservatively assumed to be the higher of the two milk pathways, either goat milk or cow milk.

3. COLA Part 2, FSAR Table 11.3-203 is revised as follows:

WLS COL 11.3-1
WLS COL 11.5-3

TABLE 11.3-203
DOSE IN MILLIRADS AT SPECIAL LOCATIONS

Special Location	Beta Air Dose	Gamma Air Dose
Cow (Meat, Milk)	1.09E-00	1.99E-01
Goat (Milk)	8.25E-01	1.96E-01
EAB	3.25E-00	7.73E-01
Site Boundary	7.32E+00	1.25E+00
Garden	1.24E-00	2.94E-01

4. COLA Part 2, FSAR Table 11.3-205 is revised as follows:

WLS COL 11.3-1
WLS COL 11.5-3

TABLE 11.3-205
CALCULATED MAXIMUM INDIVIDUAL DOSES COMPARED TO
10 CFR PART 50 APPENDIX I LIMITS

Description	Limit	Calculated Values
Noble Gases[1]		
Gamma Dose (mrad)	10	~~7.73E-01~~1.25E+00
Beta Dose (mrad)	20	~~3.25~~7.32E+00
Total Body Dose (mrem)	5	~~4.73~~7.32E-01
Skin Dose (mrem)	15	~~2.38~~4.90E+00
Radioiodines and Particulates		
Total Body Dose (mrem)	-	~~8.76E-01~~1.08E+00
Max to Any Organ (mrem)[2]	15	~~8.32~~9.21E+00
Maximum Doses to Any Organ Including Noble Gas Total Body dose (mrem)[3]	15	9.95E+00

1) Doses due to noble gases in the released plume are calculated at the location of maximum dose at the site boundary (location of highest χ/Q values). This location is 0.~~81~~ 27 miles (427 m) ~~southeast~~ northwest of the Effluent Release Boundary.

2) The maximum dose to any organ is the dose to the thyroid of an infant.

3) The maximum organ dose listed here includes the dose due to ground exposure, inhalation, food pathways, and the total plume (noble gas) dose given above.

5. COLA Part 2, FSAR Table 11.3-206 is revised as follows:

WLS COL 11.3-1
WLS COL 11.5-3

TABLE 11.3-206
MAXIMUM INDIVIDUAL DOSES FROM BOTH UNITS DUE TO ROUTINE GASEOUS EFFLUENTS COMPARED TO 10 CFR 20.1301 LIMITS

Description	Limit	Calculated Values
TEDE (mrem)[(a)]	100	~~3.12~~4.11E+00
Maximum Dose per Hour (mrem/hr)	2	~~3.56~~4.70E-04

a) Consistent with Regulatory Guide 1.183, the TEDE reported here is 3% of the thyroid dose plus the total body dose from Table 11.3-202. The maximum TEDE is to a child.

6. COLA Part 2, FSAR Table 11.3-207 is revised as follows:

TABLE 11.3-207
COLLECTIVE GASEOUS DOSES COMPARED TO
40 CFR PART 190 LIMITS

Description	Limit	Calculated Values for Both Units
Total Body Dose[(a)] Equivalent (mrem)	25	~~2.70~~3.62E+00
Thyroid Dose (mrem)	75	~~1.76~~1.99E+01
Max to Any Other Organ (mrem)[(~~a~~b)]	25	~~8.14~~8.97E+00

(a) The total body dose resulting from plume (noble gas) and radioiodine and particulate exposure pathways due to radiological releases from both units.

~~(a)~~(b) Note that the maximum dose to any organ other than the thyroid is the dose to the bone of a child. The max dose to any other organ listed here includes the dose due to ground exposure, inhalation, food pathways, and the total body plume (noble gas) as given in Table 11.3-202.

Attachment 10

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI 02.03.05-6(b)

Revisions to

Technical Specification Figure 4.1-1

Technical Specification Figure 4.1-2

1) COLA Part 4, Figure 4.1-1 is revised as follows:

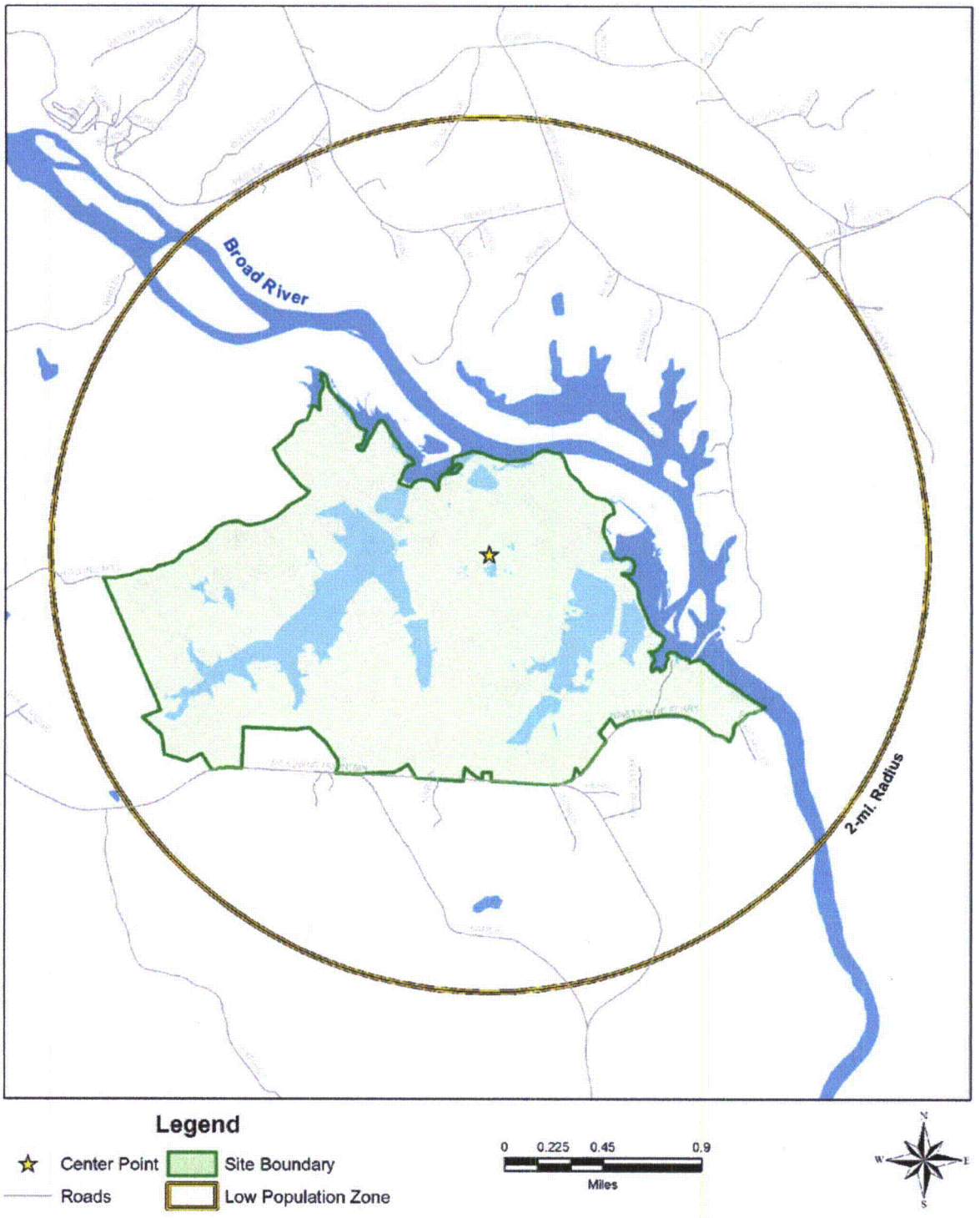


FIGURE 4.1-1 Low Population Zone and Site Boundary Map

2) COLA Part 4, Figure 4.1-2 is revised as follows:

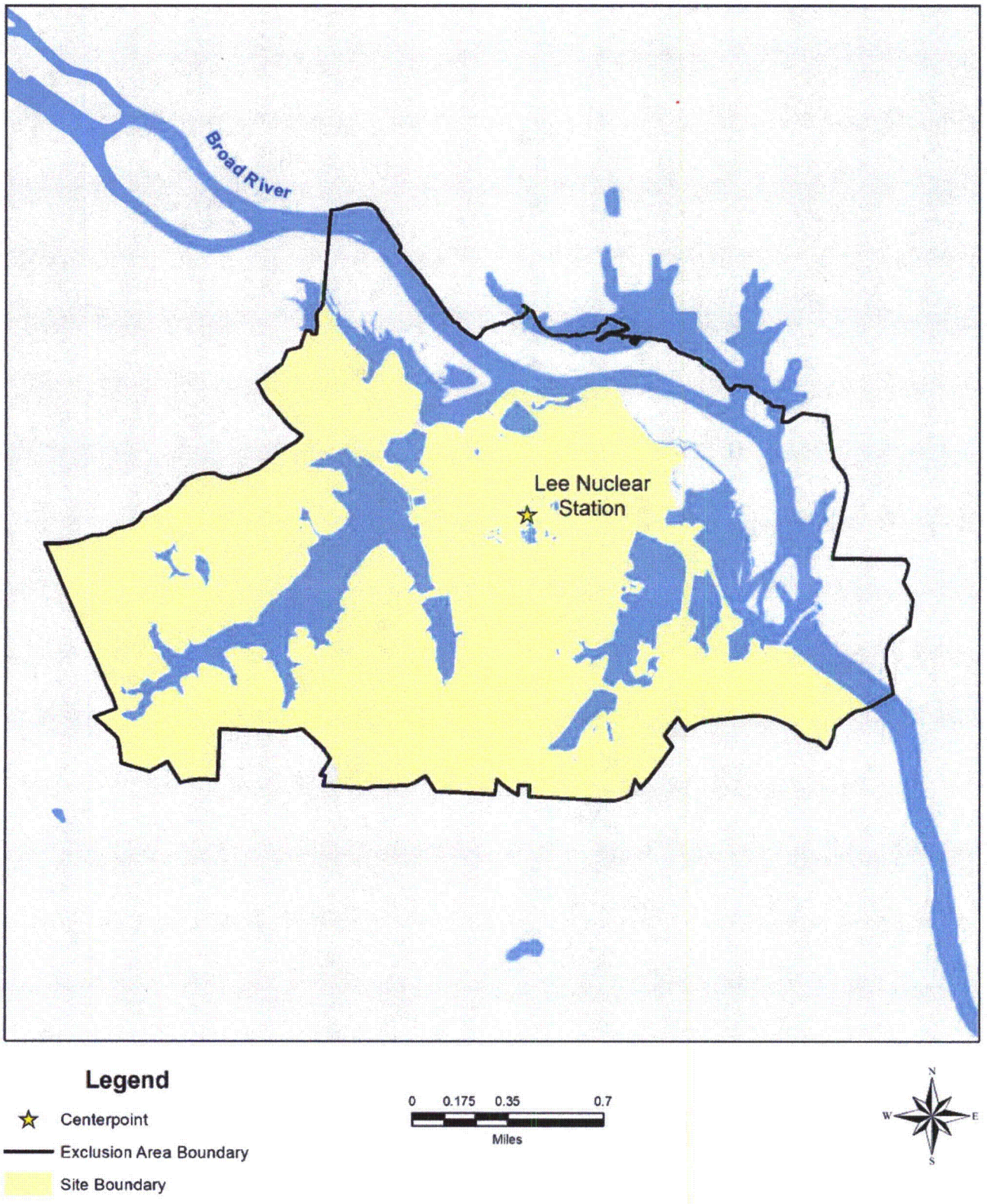


FIGURE 4.1-2 Exclusion Area Boundary

Response to Request for Additional Information 7186
Question 02.03.05-6(b),
Supplemental Information Related to the Environmental Review

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 110

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): 02.03.05-6 (eRAI 7186)

NRC RAI:

The Staff considered the Applicant's submittals on December 20, 2012 regarding supplemental information related to design changes to the Lee Units 1 and 2 physical locations (ML12361A057) and its Enclosures 1 and 2 (i.e., ML12361A058, ML12361A060, and ML12361A061), on March 13, 2013 of supplemental information regarding environmental review (ML13087A299), and on May 9, 2013 providing, among other things, Revision 7 of the combined license (COL) Final Safety Analysis Report (FSAR) (ML13144A150).

In its review of the latest version of the long-term routine release atmospheric dispersion modeling analyses under COL FSAR Section 2.3.5 and related sections, tables, and figures, the Staff notes that:

- the closest offsite receptor distances are associated with the Exclusion Area Boundary (EAB) as opposed to the designated site boundary;
- COL FSAR Figures 2.1-209A and 2.1-209B illustrate that for at least the northwest clockwise through the east-southeast direction sectors (extending, perhaps, to the southeast sector as well) that the EAB and site boundary are not co-located, as is the case for the other direction sectors, with the EAB located beyond the site boundary, farther away from potential routine gaseous release points;
- COL FSAR Section 2.1.2 indicates that the EAB is the boundary on which limits for the release of radioactive effluents are based, that the "site" is clearly posted with no trespassing signs and "information on actions to be taken by security force personnel in the event of unauthorized persons crossing the EAB during emergency operations" (emphasis added);
- COL FSAR Subsection 2.1.2.1 indicates that certain properties within the EAB that lay beyond the site boundary are currently not owned by Duke Energy, that negotiations have been initiated regarding Duke Energy ownership or control of these properties, and that such ownership or control "will be obtained prior to start of construction"; and that
- COL FSAR Subsection 2.1.2.2 states (among other things), with respect to the control of activities unrelated to plant operation, that there are "no unauthorized commercial activities" and that there are "only limited recreational activities" within the Exclusion area, and that these recreational activities are limited to the Broad River.

NUREG-0800, SRP Section 2.3.5, Subsection II (Acceptance Criteria), SRP Acceptance Criterion (6A) calls for "Maximum annual average X/Q values and D/Q values at or beyond the site boundary and at specific locations of potential receptors of interest" to be used for the assessment of the consequences of routine airborne radiological releases as described in Section 2.3.5.2 of Regulatory Guide (RG) 1.206.

Section II of Appendix I to 10 CFR Part 50 specifies that an applicant shall provide reasonable assurance that, among other things, the calculated annual total quantity of all radioactive material above background to be released from each light-water-cooled nuclear power reactor to the atmosphere will not result in an estimated annual air dose from gaseous effluents "at any location near ground level which could be occupied by individuals in unrestricted areas" in excess of prescribed limits. Technical Rationale Item (1) under Subsection II (Acceptance Criteria) of SRP Section 2.3.5 essentially reiterates this requirement.

Given the preceding regulatory citation and one of several criteria the Staff uses to determine acceptable conformance to the NRC's regulations relevant to routine operational releases of radioactive material to the atmosphere, and cross-references to information provided in Revision 7 of the COL FSAR, it appears that the Applicant has not provided sufficient information and analyses to demonstrate that the dose objectives in 10 CFR Part 50, Appendix I, Section II will be met. As a result, the Applicant should:

(a) As might reasonably be inferred from the referenced statement in COL FSAR Subsection 2.1.2.2, confirm whether there are any authorized commercial activities (emphasis added) within the Exclusion Area and, if so, address where such activities are located relative to the planned routine release points for Unit 1 and Unit 2, and other relevant characteristics (e.g., number of people and duration present over the course of a typical year); and

(b) Determine the appropriate annual average relative concentration (X/Q) and relative deposition (D/Q) values and applicable dose rates at the site boundary for those direction sectors where the site boundary and EAB are not co-located as illustrated in COL FSAR Figures 2.1-209A and 2.1-209B, including, but not limited to:

- Identifying and justifying the appropriate downwind distances by affected sector;
- Reanalyzing any XOQDOQ routine release dispersion modeling and related dose calculation analyses;
- Revising or preparing any associated current or new tables and figures;
- Updating / clarifying / reconciling any associated discussions under COL FSAR Sections 2.3.5, 2.1, or Chapter 11;
- Providing copies of updated model input and output files; and
- Updating and providing any supplemental information or analyses specific to the environmental review.

Duke Energy Response:

Duke Energy's analysis of the annual average relative concentration (X/Q), relative deposition (D/Q), and applicable dose rates at the site boundary result in changes to the information presented in previous environmental submittals (Reference 1 and Reference 2).

Reference 2 provided information on the long-term atmospheric dispersion factors and the normal effluent doses for the Lee Nuclear Station. The following tables present the updated results for the long-term atmospheric dispersion factors (Table 2.1) and the normal effluent doses (Table 2.2) from Duke Energy's analysis.

The XOQDOQ code (NUREG/CR-2919) determines the annual average relative concentration (X/Q) values for normal radionuclide releases. A summary of the atmospheric dispersion analysis results are shown below in Table 2.1. The limiting receptor location for the long-term X/Q values is at the Lee Nuclear Station site boundary, approximately 0.27 miles NW of Unit 1.

Table 2.1

Long-Term Atmospheric Dispersion Factors for Lee Nuclear Station

Receptor	Downwind Sector	Distance (miles)	No Decay Undepleted X/Q (s/m^3)	No Decay Depleted X/Q (s/m^3)	D/Q ($1/m^2$)
Site Boundary	NW, Unit 1	0.27	$1.50x10^{-5}$	$1.30x10^{-5}$	$2.90x10^{-8}$
EAB	SE, Unit 2	0.81	$6.3x10^{-6}$	$5.6x10^{-6}$	$1.3x10^{-8}$
Residence	SE	0.99	$4.6x10^{-6}$	$4.0x10^{-6}$	$9.4x10^{-9}$
Meat Animal	SE	1.65	$2.2x10^{-6}$	$1.8x10^{-6}$	$3.9x10^{-9}$
Vegetable Garden	SSE	1.00	$2.4x10^{-6}$	$2.1x10^{-6}$	$4.3x10^{-9}$
Milk Cow	SE	1.65	$2.2x10^{-6}$	$1.8x10^{-6}$	$3.9x10^{-9}$
Milk Goat	SSW	1.05	$1.6x10^{-6}$	$1.4x10^{-6}$	$3.6x10^{-9}$

The GASPAR code (NUREG/CR-4653) is used to determine the off-site dose consequences resulting from nominal radionuclide effluent releases. The analysis used the updated long-term X/Q values at the Lee Nuclear Station site boundary (see Enclosure 1, Attachment 2). The analysis considered the following exposure pathways: plume immersion, direct shine from deposited radionuclides, ingestion of vegetables, and ingestion of milk and meat. A summary of the results from this analysis is shown below in Table 2.2 (previously submitted as Table 3.1 in Reference 2).

Table 2.2

Normal Effluent Doses for Lee Nuclear Station at the Site Boundary

Pathway	Age Group	Total Body Dose (mrem/yr)	Max Internal Organ Dose (mrem/yr)	Skin Dose (mrem/yr)	Thyroid Dose (mrem/yr)
Plume	All	0.732	0.804 (lung)	4.900	0.732
Ground	All	0.253	0.253 (thyroid)	0.298	0.253
Inhalation	Adult	0.123	1.070 (thyroid)	0.120	1.070
	Teen	0.124	1.330 (thyroid)	0.121	1.330
	Child	0.110	1.540 (thyroid)	0.107	1.540
	Infant	0.064	1.380 (thyroid)	0.061	1.380

Table 2.2

Normal Effluent Doses for Lee Nuclear Station at the Site Boundary

Pathway	Age Group	Total Body Dose (mrem/yr)	Max Internal Organ Dose (mrem/yr)	Skin Dose (mrem/yr)	Thyroid Dose (mrem/yr)
Vegetables	Adult	0.138	0.908 (thyroid)	0.127	0.908
	Teen	0.207	1.230 (thyroid)	0.196	1.230
	Child	0.459	2.420 (thyroid)	0.443	2.420
Meat	Adult	0.040	0.173 (bone)	0.039	0.066
	Teen	0.032	0.146 (bone)	0.032	0.051
	Child	0.058	0.274 (bone)	0.058	0.087
Cow Milk (1.65 mi, SE)	Adult	0.054	0.813 (thyroid)	0.048	0.813
	Teen	0.089	1.290 (thyroid)	0.083	1.290
	Child	0.199	2.600 (thyroid)	0.191	2.600
	Infant	0.399	6.230 (thyroid)	0.388	6.230
Goat Milk (1.05 mi, SSW)	Adult	0.057	0.996 (thyroid)	0.043	0.996
	Teen	0.086	1.580 (thyroid)	0.071	1.580
	Child	0.171	3.150 (thyroid)	0.156	3.150
	Infant	0.326	7.580 (thyroid)	0.307	7.580
TOTAL	Adult	1.343	---	5.532	4.025
	Teen	1.437	---	5.630	5.176
	Child	1.811	---	5.997	8.182
	Infant	1.448	---	5.647	9.945

The maximum individual body dose remains below 10 CFR 50, Appendix I dose design objectives. The total body plume pathway dose is 0.732 millirem per year (mrem/yr), which remains below the objective of 5 mrem/yr. The maximum organ dose (infant thyroid) is 9.9 mrem/yr, which is below the objective of 15 mrem/yr.

The normal doses from liquid and gaseous effluents also remain below the standards in 40 CFR Part 190 (see Table 2.3).

Table 2.3

Comparison of MEI Dose Estimates from Liquid and Gaseous Effluents to 40 CFR Part 190 Standards

Dose	Estimate (mrem/yr)[a]	Standards (mrem/yr)
Whole Body Dose	3.74	25
Thyroid Dose	20.00	75
Dose to Another Organ	9.05 (child bone)	25

a. Sum of dose from liquid and gaseous effluent releases for two proposed units.

The analysis of biota was previously conducted at the Lee Nuclear Station Exclusion Area Boundary. The updated analysis considers biota to be located at the Lee Nuclear Station site boundary, which in some instances is closer to Units 1 and 2. The analysis results for the normal gaseous effluent and total body doses for biota at the Lee Nuclear Station site boundary are shown in Tables 2.4 and 2.5.

Table 2.4

Biota Dose for the Lee Nuclear Station Units 1 and 2

Biota	Liquid Effluents Dose (mrad/yr)	Gaseous Effluents Dose (mrad/yr)	Total Body Biota Dose All Pathways (mrad/yr)
Fish	0.57	-	0.57
Invertebrate	1.61	-	1.61
Algae	4.64	-	4.64
Muskrat	1.71	4.06	5.77
Raccoon	0.67	3.25	3.92
Heron	7.82	3.18	11.00
Duck	1.64	3.80	5.44

Table 2.5

Comparison of Biota Doses from Lee Units 1 and 2 to

IAEA Guidelines for Biota Protection

Biota	Total Body Biota Dose All Pathways[a] (mrad/d)	IAEA/NCRP Guidelines for Protection of Biota Populations (mrad/d)
Fish	$1.6x10^{-3}$	1000
Invertebrate	$4.4x10^{-3}$	1000
Algae	$1.3x10^{-2}$	1000
Muskrat	$1.6x10^{-2}$	100
Raccoon	$1.1x10^{-2}$	100
Heron	$3.0x10^{-2}$	100
Duck	$1.5x10^{-2}$	100

a. Total Body Biota Dose All Pathways from Table 2.4 based on a 365-day year

The Duke Energy analysis shows there is no adverse impact at the site boundary. Routine releases for the Lee Nuclear Station remain below the regulatory limits and standards.

References:

1. Letter from Christopher M. Fallon (Duke Energy) to NRC Document Control Desk, Supplemental Information Regarding Environmental Review, Ltr# WLG2013.03-01, dated March 13, 2013 (ML13087A299)
2. Letter from Christopher M. Fallon (Duke Energy) to NRC Document Control Desk, Response to Requests for Additional Information (RAI) 7106, 7118, 7120, 7122, and 7123, Ltr# WLG2013.07-02, dated July 1, 2013 (ML13192A410)