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April 29, 2009

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

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  
Response to Request for Additional Information  
Ltr# WLG2009.04-06

Reference: Letter from L.M. Tello (NRC) to B.J. Dolan (Duke Energy), *Request for Additional Information Regarding the Environmental Review of the Combined License Application for William States Lee III Nuclear Station, Units 1 and 2*, dated January 21, 2009

Letter from B.J. Dolan to Document Control Desk, Revision 1 to the Environmental Report (Part 3) and Revision 2 to Withheld Information (Part 9) for William States Lee III Nuclear Station Units 1 and 2 Combined License Application, dated March 30, 2009

This letter provides the Duke Energy response to the Nuclear Regulatory Commission's (NRC) request for the following additional information (RAI) item included in the first referenced letter:

RAI 104, Radiological Health  
RAI 107, Radiological Health  
RAI 108, Radiological Health

The response to this NRC request is addressed in a separate enclosure, which also identifies associated changes, when appropriate, that were previously incorporated in Revision 1 to the Environmental Report (Part 3) of the Williams States Lee III Nuclear Station application, transmitted as an enclosure to the second letter referenced above.

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NRW

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If you have any questions or need any additional information, please contact Peter S. Hastings, Nuclear Plant Development Licensing Manager, at 980-373-7820.

A handwritten signature in black ink, appearing to read "Bryan J. Dolan".

Bryan J. Dolan  
Vice President  
Nuclear Plant Development

Enclosure:

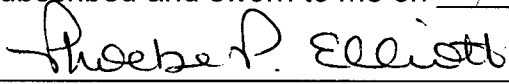
- 1) Response to RAIs 104-107-108, Radiological Health

AFFIDAVIT OF BRYAN J. DOLAN

Bryan J. Dolan, being duly sworn, states that he is Vice President, Nuclear Plant Development, Duke Energy Carolinas, LLC, that he is authorized on the part of said Company to sign and file with the U. S. Nuclear Regulatory Commission this supplement to the combined license application for the William States Lee III Nuclear Station and that all the matter and facts set forth herein are true and correct to the best of his knowledge.

  
Bryan J. Dolan

Subscribed and sworn to me on April 29, 2009

  
Notary Public

My commission expires: June 26, 2011

SEAL

A circular notary seal for Thos. P. Elliott, Notary Public, State of North Carolina. The seal is partially obscured by the word "SEAL" and the text "NOTARY PUBLIC STATE OF NORTH CAROLINA" is visible around the perimeter.

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April xx, 2009  
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xc (w/o enclosure):

Loren Plisco, Deputy Regional Administrator, Region II  
Stephanie Coffin, Branch Chief, DNRL  
Robert Schaaf, Branch Chief, DSER

xc (w/ enclosure):

Linda Tello, Project Manager, DSER  
Brian Hughes, Senior Project Manager, DNRL

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

**RAI Letter Dated:** January 21, 2009

**Reference NRC RAI Numbers:** ER RAI 104, ER RAI 107, ER RAI 108

**NRC RAIs:**

ER RAI 104: Inhalation doses in ER Table 5.4-8 could not be replicated using NRCDose and input values provided by applicant. Provide the methodology used, and either verify that the values in Table 5.4-8 are correct or provide updates.

The values in 5.4-8 (Annual Dose to a Maximally Exposed Individual from Gaseous Effluents) can be exactly replicated using the information in the ER, except for inhalation.

ER RAI 107: Table 5.4-11 (Annual Population Doses - Gaseous pathway) could not be replicated using NRCDose and input values from the ER:

- a. GASPAR II does not provide collective doses for the Goat Milk Ingestion pathway (see NUREG/CR-4653 page 3.1). What methodology was used for the Goat Milk Ingestion pathway?
- b. The population input in Table 5.4-3 does not provide the required input values for GASPAR. Provide the input population table with sectors in miles used to generate the GASPAR collective dose results to correspond to the required GASPAR inputs.
- c. Provide the methodology used to calculate the dose values in Table 5.4-11 from the meat pathway, and either verify that the values in Table 5.4-8 are correct or provide updates.

ER RAI 108: For Table 5.4-14:

- a. What methodology was used to calculate the values in Table 5.4-14? Verify that the values in Table 5.4-14 are correct, or provide updates.
- b. The "Dose to Another Organ" values in Tables 5.4-14 could not be replicated. Verify that the values in Table 5.4-14 are correct, or provide updates.

**Duke Energy Response:**

Section 5.4 of the Environmental Report (ER) has been revised to correct errors contained in Revision (Rev.) 0 of the ER. The following revised and attached tables have been included in Rev. 1 of the ER:

- ER Table 5.4-8 – 'Annual Dose to Maximally Exposed Individual from Gaseous Effluents (Per Unit)', as discussed in the Duke Energy response to ER RAI 106 (WLG2009.03-05, March 6, 2009), and included herein in Attachment 104/107/108-1.
  - Revised to correct errors in the original table where the maximum individual dose results for airborne pathways were not consistent with the FSAR.

The doses reported in ER Table 5.4-8 are calculated using the GASPAR II code and the inputs from ER Tables 5.4-6 and 5.4-7, consistent with Regulatory Guide 1.109.

- ER Table 5.4-11 – ‘Annual Population Doses – Gaseous Pathway (Per Unit),’ included herein in Attachment 104/107/108-1.
  - Revised to correct errors in the original table where the population dose results for airborne pathways were not consistent with the FSAR.
  - The population dose from ingestion of goat milk was removed from Table 5.4-11 because it is not a significant population dose pathway.

The population doses reported in ER Table 5.4-11, including those from the meat ingestion pathway are calculated using the GASPARD II code and the inputs from ER Tables 5.4-6 and 5.4-7, consistent with Regulatory Guide 1.109. The population distribution used as input to the GASPARD II code (i.e., population for each of the 22½-degree radial sectors centered on the 16 cardinal compass directions for radial distances of 1, 2, 3, 4, 5, 10, 20, 30, 40, and 50 miles) is calculated based on Tables 2.1-203 and 2.1-204 in the Lee Nuclear Station FSAR, which gives the projected populations in sectors of 0, 2, 4, 6, 8, 10, 16, 40, 60, and 80 km. To adjust the population distributions to the radial sectors given in miles, the population distributions are assumed to be uniform throughout the given sectors in kilometers. The population distributions for the radial segments in miles are then adjusted, based on the ratio of the land area of that radial segment that falls within the different radial segments in kilometers, to the total land area in each relevant radial segment in kilometers. The linear difference between 50 mi. and 80 km is ignored because it has a negligible impact on the population distribution. Also, the regulatory guidance uses 50 mi. and 80 km interchangeably. The projected population for the year 2056 in each radial segment in miles from the Lee Nuclear Site is given in the table provided in Attachment 104/107/108-2.

- ER Table 5.4-14 – ‘Comparison of Maximum Site Individual Dose to 40 CFR Part 190 Limits,’ included herein in Attachment 104/107/108-1.
  - The liquid pathway dose calculation, noted in the response to Environmental Report (ER) RAI 39 (WLG2008.12-17, December 12, 2008), was revised. Consequent to the additional corrections in Section 5.4 of the ER and associated tables, ER Table 5.4-14 was revised.
  - Revised to modify footnotes to clarify how Table 5.4-14 values are calculated.

In addition to the ER table changes described above in response to ER RAIs 104, 107, and 108, other related ER tables reporting gaseous pathway dose results have been revised to correct similar ER Rev. 0 errors as follows:

- ER Table 5.4-6 – ‘GASPARD Input Data,’ included herein in Attachment 104/107/108-1.
  - Revised to correct errors in the original table where the special locations that were used to calculate maximum individual doses from airborne radiological effluents were not consistent with the FSAR.
- ER Table 5.4-12 – ‘Comparison of Maximum Individual Dose to 10 CFR 50, Appendix I Objectives – Gaseous Pathway (Per Unit),’ included herein in Attachment 104/107/108-1.

- Revised to correct errors in the original table where the maximum individual dose result comparison to 10 CFR 50, Appendix I objectives for airborne pathways were not consistent with the FSAR.

The revised versions of tables included as attachments to this enclosure have been included in Rev. 1 of the Environmental Report. The mark-ups provided with this response show changes between Rev. 0 and Rev. 1 of the Environmental Report.

Supporting calculations are available for inspection at the Duke Energy office in Charlotte, NC or at our consultant's offices in Richland, WA and Bethesda, MD.

**Associated Revisions to the Lee Nuclear Station Combined License Application:**

ER Table 5.4-6	GASPAR Input Data
ER Table 5.4-8	Annual Dose to Maximally Exposed Individual from Gaseous Effluents (Per Unit)
ER Table 5.4-11	Annual Population Doses – Gaseous Pathway (Per Unit)
ER Table 5.4-12	Comparison of Maximum Individual Dose to 10 CFR 50, Appendix I Objectives – Gaseous Pathway (Per Unit)
ER Table 5.4-14	Comparison of Maximum Site individual Dose to 40 CFR Part 190 Limits

**Associated Attachments:**

Attachment 104/107/108-1	Revised ER Tables
Attachment 104/107/108-2	2056 Projected Population for Each Radial Segment, in Miles

**Attachment 104/107/108-1**

**Revised ER Tables 5.4-6, 5.4-8, 5.4-11, 5.4-12 and 5.4-14**



TABLE 5.4-6  
GASPAR INPUT DATA

Parameter	Value
Fraction of year leafy vegetables are grown	0.58
Fraction of the year milk cows are on pasture	0.75
Fraction of maximum individual's vegetable intake from own garden	0.76
Fraction of milk-cow feed intake from pasture while on pasture	1
Average absolute humidity (GASPAR code default)	8 g/m <sup>3</sup>
Average temperature over growing season <sup>(a)</sup>	0
Fraction of the year goats are on pasture	0.83
Fraction of goat feed intake from pasture while on pasture	1
Fraction of the year beef cattle are on pasture	0.75
Fraction of beef-cattle feed intake from pasture while on pasture	1
Nearest <del>Residence</del> <u>Meat Animal</u> <sup>(b)</sup>	SE, <u>23731607</u> m
Nearest Garden <sup>(b)</sup>	<del>NESSE</del> , <u>16271794</u> m
Nearest Milk <u>Cow</u> <del>Animal</del> <sup>(b)</sup>	<del>SSWE</del> , <u>174905</u> m
<u>Nearest Milk Goat</u> <sup>(b)</sup>	<u>SSW</u> , <u>1705</u> m
Nearest Site Boundary <sup>(c)</sup>	<del>NNESE</del> , <u>1339644</u> m

a) Default value when humidity is specified.

b) "Nearest" refers to the location at which the highest radiation dose to an individual from the applicable pathways has been estimated.

c) "Nearest" refers to that site boundary location at which the highest radiation doses due to gaseous effluents have been estimated to occur.

TABLE 5.4-8  
ANNUAL DOSE TO MAXIMALLY EXPOSED INDIVIDUAL FROM GASEOUS EFFLUENTS (PER UNIT)

Dose Rate (mrem/yr)								
Adult Pathway	Whole Body	GI-LHLI <sup>(a)</sup>	Bone	Liver	Kidney	Thyroid	Lung	Skin
PLUME	3.70E-01	3.70E-01	3.70E-01	3.70E-01	3.70E-01	3.70E-01	1.52E-01	2.06E-01
GROUND	3.32E-02	1.05E-02	1.05E-02	1.05E-02	1.05E-02	1.05E-02	1.05E-02	1.23E-02
VEGET	1.10E-01	1.11E-01	1.01E-01	1.01E-01	1.07E-01	1.01E-01	1.02E-01	1.01E-01
MEAT	3.42E-02	3.82E-02	1.50E-02	3.43E-02	3.39E-02	6.03E-02	3.36E-02	3.35E-02
COW MILK	4.71E-02	4.30E-02	1.72E-02	4.95E-02	4.74E-02	7.99E-02	4.21E-02	4.15E-02
GOATMILK	6.60E-02	5.29E-02	1.87E-02	7.19E-02	6.24E-02	1.06E-01	5.31E-02	5.11E-02
INHAL	1.56E-02	1.58E-02	2.42E-02	1.60E-02	1.62E-02	1.46E-02	2.02E-02	1.51E-02
Total	4.49E-01	4.37E-01	1.55E+00	4.49E-01	4.43E-01	3.03E+00	4.36E-01	9.91E-01

Duke Letter Dated: April 29, 2009

TABLE 5.4-8  
ANNUAL DOSE TO MAXIMALLY EXPOSED INDIVIDUAL FROM GASEOUS EFFLUENTS (PER UNIT)

Dose Rate (mrem/yr)								
Teen	Organ							
Pathway	Whole	GI-LLI <sup>(a)</sup>	Bone	Liver	Kidney	Thyroid	Lung	Skin
	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.99E-</u>	<u>2.06E+00</u>
PLUME	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.52E-01</u>	<u>6E-01</u>
	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.23E-</u>
GROUND	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>
	<u>1.951.69E-</u>	<u>1.951.69E-</u>	<u>1.951.69E-</u>	<u>1.951.69E-</u>	<u>1.641.90E-</u>	<u>1.071.20E+0</u>	<u>1.561.81E-</u>	<u>1.551.79E-</u>
VEGET	<u>1.6591E-01</u>	<u>1.6793E-01</u>	<u>9.10E-01</u>	<u>01</u>	<u>01</u>	<u>0</u>	<u>01</u>	<u>01</u>
	<u>2.773.50E-</u>	<u>2.773.50E-</u>	<u>2.773.50E-</u>	<u>2.803.53E-</u>	<u>2.763.49E-</u>	<u>4.675.75E-</u>	<u>2.743.46E-</u>	<u>2.733.45E-</u>
MEAT	<u>02</u>	<u>3.0077E-02</u>	<u>1.2659E-01</u>	<u>02</u>	<u>02</u>	<u>02</u>	<u>02</u>	<u>02</u>
COW MILK	<u>7.79E-02</u>	<u>7.34E-02</u>	<u>3.15E-01</u>	<u>8.55E-02</u>	<u>8.20E-02</u>	<u>1.27E+00</u>	<u>7.28E-02</u>	<u>7.15E-02</u>
	<u>9.977.11E-</u>	<u>8.645.95E-</u>	<u>3.402.41E-</u>	<u>1.208.90E-</u>	<u>1.047.45E-</u>	<u>1.6840E+00</u>	<u>8.806.09E-</u>	<u>8.405.75E-</u>
GOATMILK	<u>02</u>	<u>02</u>	<u>01</u>	<u>042</u>	<u>021</u>	<u>1.6840E+00</u>	<u>02</u>	<u>02</u>
	<u>1.584.82E-</u>	<u>1.594.86E-</u>	<u>2.948.82E-</u>	<u>1.645.00E-</u>	<u>1.685.11E-</u>	<u>1.825.43E-</u>	<u>2.306.98E-</u>	<u>1.534.66E-</u>
INHAL	<u>02</u>	<u>02</u>	<u>03</u>	<u>02</u>	<u>02</u>	<u>01</u>	<u>02</u>	<u>02</u>
	<u>5.628.98E-</u>	<u>5.498.87E-</u>	<u>1.752.11E+0</u>	<u>5.959.30E-</u>	<u>5.719.08E-</u>	<u>4.424.95E+0</u>	<u>5.529.23E-</u>	<u>1.102.57E+0</u>
Total	<u>01</u>	<u>01</u>	<u>0</u>	<u>01</u>	<u>01</u>	<u>0</u>	<u>01</u>	<u>0</u>

TABLE 5.4-8  
ANNUAL DOSE TO MAXIMALLY EXPOSED INDIVIDUAL FROM GASEOUS EFFLUENTS (PER UNIT)

		Dose Rate (mrem/yr)						
Child		Organ						
Pathway	Whole	GI-LLI <sup>(a)</sup>	Bone	Liver	Kidney	Thyroid	Lung	Skin
	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.99E-</u>	<u>2.06E+00</u>
PLUME	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.52E-01</u>	<u>6E-01</u>
	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.23E-</u>
GROUND	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>
	<u>3.654.22E-</u>	<u>3.594.15E-</u>	<u>1.862.15E+0</u>	<u>3.744.32E-</u>	<u>3.624.22E-</u>		<u>3.524.08E-</u>	<u>3.504.06E-</u>
VEGET	<u>01</u>	<u>01</u>	<u>0</u>	<u>01</u>	<u>021</u>	<u>2.4036E+00</u>	<u>01</u>	<u>01</u>
	<u>5.026.34E-</u>	<u>5.126.46E-</u>	<u>2.372.99E-</u>	<u>5.066.39E-</u>	<u>5.026.33E-</u>	<u>7.919.76E-</u>	<u>4.996.30E-</u>	<u>4.996.29E-</u>
MEAT	<u>02</u>	<u>02</u>	<u>01</u>	<u>02</u>	<u>02</u>	<u>02</u>	<u>02</u>	<u>02</u>
COW MILK	<u>1.73E-01</u>	<u>1.67E-01</u>	<u>7.72E-01</u>	<u>1.89E-01</u>	<u>1.83E-01</u>	<u>2.55E+00</u>	<u>1.67E-01</u>	<u>1.65E-01</u>
	<u>2.041.40E-</u>	<u>1.871.28E-</u>	<u>8.285.84E-</u>	<u>2.471.80E-</u>	<u>2.181.55E-</u>	<u>3.352.80E+0</u>	<u>1.911.32E-</u>	<u>1.851.27E-</u>
GOATMILK	<u>01</u>	<u>01</u>	<u>01</u>	<u>01</u>	<u>01</u>	<u>0</u>	<u>01</u>	<u>01</u>
	<u>1.404.26E-</u>	<u>1.384.21E-</u>	<u>3.571.07E-</u>	<u>1.464.44E-</u>	<u>1.494.54E-</u>	<u>2.136.32E-</u>	<u>1.996.04E-</u>	<u>1.354.12E-</u>
INHAL	<u>02</u>	<u>02</u>	<u>02</u>	<u>02</u>	<u>02</u>	<u>01</u>	<u>02</u>	<u>02</u>
	<u>9.791.32E-</u>	<u>9.541.29E-</u>	<u>3.884.29E+0</u>		<u>6.791.34E-</u>		<u>9.651.33E-</u>	<u>1.512.99E+0</u>
Total	<u>+040</u>	<u>+004</u>	<u>0</u>	<u>1.0538E+00</u>	<u>+040</u>	<u>8.4791E+00</u>	<u>+040</u>	<u>0</u>

TABLE 5.4-8  
ANNUAL DOSE TO MAXIMALLY EXPOSED INDIVIDUAL FROM GASEOUS EFFLUENTS (PER UNIT)

Dose Rate (mrem/yr)								
Infant Pathway	Whole	GI-LLI <sup>(a)</sup>	Bone	Liver	Kidney	Thyroid	Lung	Skin
	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.70E-</u>	<u>3.99E-</u>	<u>2.06E+00</u>
PLUME	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.43E-01</u>	<u>011.52E-01</u>	<u>6E-01</u>
	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.05E-</u>	<u>1.23E-</u>
GROUND	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>	<u>013.32E-02</u>
VEGET								
MEAT								
COW MILK	3.46E-01	3.36E-01	1.49E+00	3.84E-01	3.64E-01	6.12E+00	3.38E-01	3.35E-01
	<u>3.842.66E-</u>	<u>3.672.51E-</u>	<u>1.571.10E+0</u>	<u>4.873.55E-</u>	<u>4.192.96E-</u>	<u>8.056.74E+0</u>	<u>3.752.59E-</u>	<u>3.652.50E-</u>
GOATMILK	01	01	0	01	01	0	01	01
	<u>8.072.46E-</u>	<u>7.872.40E-</u>	<u>1.805.39E-</u>	<u>8.722.65E-</u>	<u>8.692.64E-</u>	<u>1.915.66E-</u>	<u>1.223.71E-</u>	<u>7.762.37E-</u>
INHAL	032	023	03	032	032	01	02	023
	<u>9.141.11E-</u>	<u>8.871.09E-</u>			<u>9.681.16E-</u>		<u>9.101.14E-</u>	<u>1.462.79E+0</u>
Total	<u>+040</u>	<u>+040</u>	3.07E+00	1.0624E+00	<u>+040</u>	1.4539E+01	<u>+040</u>	0

a) GI-LLI is the gastrointestinal tract - lower large intestine.

TABLE 5.4-11  
ANNUAL POPULATION DOSES - GASEOUS PATHWAY (PER UNIT)

Pathway	Estimated Dose ( <del>Person</del> Person-rem)	
	Whole Body	Thyroid
Plume	<del>3.70</del> 1.43E- +001	1.43E+003.70E- 01
Ground	<del>1.05E-</del> 012.78E-01	2.78E-011.05E-01
Inhalation	4.263.90E-021	2.996.32E+010
Vegetable Ingestion	4.227.15E-01	2.367.29E+001
Cow Milk Ingestion	2.591.73E-01	2.551.81E+00
<del>Goat Milk Ingestion</del>	<del>3.84E-01</del>	<del>8.05E+00</del>
Meat Ingestion	6.431.72E- +020	9.762.30E+020
Total	1.564.79E+00	1.429.52E+010

Notes:

Per Unit.

TABLE 5.4-12  
COMPARISON OF MAXIMUM INDIVIDUAL DOSE TO 10 CFR 50, APPENDIX I  
OBJECTIVES - GASEOUS PATHWAY  
(PER UNIT)

Type of Dose	Point of Evaluation	Calculated Dose	Design Objective <sup>(a)</sup>
Gamma <del>a</del> Air <del>d</del> Dose	Exclusion Area Boundary	<del>0.6</del> 13E-01 mrad	10 mrad
Beta <del>a</del> Air <del>d</del> Dose	Exclusion Area Boundary	2.93 mrad	20 mrad
Total <del>b</del> Body <del>d</del> Dose <sup>(b)</sup> (Child)	Highest Dose Location	<del>0.9</del> 79370E-01 mrem	5 mrem
Skin <del>d</del> Dose <sup>(b)</sup> (Child)	Highest Dose Location	<del>1.5</del> 2.06 mrem	15 mrem
Thyroid <del>Maximum</del> Organ Dose <sup>(c)</sup> (Child)	Highest Dose Location	<del>8.47</del> 13.9 mrem	15 mrem

Notes:

(a) Source 10 CFR 50, Appendix I.

a) Source 10 CFR 50, Appendix I Limits.

b) Dose is due to noble gases only (plume immersion).

c) Maximum Organ Dose is the dose to the thyroid of an infant due to radioiodines and particulates. This value conservatively includes both the cow milk and goat milk pathways.

TABLE 5.4-14  
COMPARISON OF MAXIMUM SITE INDIVIDUAL DOSE TO 40 CFR PART 190 LIMITS

Type of Dose (Annual)	Dose per Unit <sup>(a)</sup> (mrem)	Total Site Dose <sup>(b)</sup> (mrem)	Dose Limit <sup>(c)</sup> (mrem)
Whole Body Dose <sup>(d)</sup> <del>(adult)</del>	<del>8.49E+01</del> 1.38E+00	<del>1.70E+00</del> 2.76E+00	25
Thyroid Dose <del>(child)</del> infant)	1.40E+01	2.79E+01	75
Dose to Another Organ (childliver bone)	<del>1.46E+00</del> 4.33E+00	<del>2.91E+00</del> 8.67E+00	25

- a) Includes all pathways for all effluents and direction radiation sources. Direct radiation has been shown to be negligible per Subsection 12.4.2.1 of the AP1000 DCD.
- b) Includes all pathways for all effluents and direction radiation sources for all units at the site. Direct radiation has been shown to be negligible per Subsection ~~5.4.2.3~~12.4.2.1 of the AP1000 DCD.
- c) ~~Source: Reference 4.40~~ CFR Part 190 dose limits.
- d) The whole body doses were conservatively calculated by summing the maximum individual doses from due to normal liquid releases (to an adult) and the maximum individual doses from due to normal gaseous releases (to a child).



**Attachment 104/107/108-2**

**Table of the 2056 Projected Population for Each Radial Segment in  
Miles**

2056 Projected Population for Each Radial Segment in Miles

Direction	0-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
N	18	76	160	314	637	5,150	29,277	30,148	31,255	65,569
NNE	16	63	120	173	205	2,690	22,173	42,941	69,784	96,132
NE	15	48	73	93	131	1,431	48,023	65,908	84,724	127,831
ENE	12	23	29	71	208	2,108	32,207	105,315	331,190	783,607
E	11	27	29	33	64	1,372	24,844	95,125	246,892	468,889
ESE	3	22	42	71	120	1,045	18,848	54,700	83,971	52,928
SE	1	20	31	37	62	1,866	3,750	10,907	16,433	9,222
SSE	7	39	39	18	25	378	1,779	2,497	3,000	3,764
S	10	51	57	53	103	274	2,283	2,956	3,812	6,455
SSW	7	36	52	55	59	422	10,582	8,888	7,851	23,872
SW	3	47	80	81	52	654	4,415	10,538	22,039	38,601
WSW	0	52	87	96	113	2,790	38,221	65,171	111,733	193,920
W	1	54	141	292	552	7,584	29,102	57,774	89,520	107,391
WNW	3	53	197	369	459	25,572	14,405	17,530	19,043	29,049
NW	4	37	109	199	272	3,166	10,825	24,816	32,221	11,536
NNW	8	104	214	329	462	2,664	13,729	13,523	13,446	30,148