Duke Energy®

Bryan J. Dolan
VP, Nuclear Plant Development

Duke Energy
EC09D/ 526 South Church Street
Charlotte, NC 28201-1006

Mailing Address:
P.O. Box 1006 – EC09D
Charlotte, NC 28201-1006

704-382-0605

bjdolan@duke-energy.com

December 23, 2008

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
(RAI No. 837)
Ltr# WLG2008.12-15

Reference: Letter from Brian Hughes (NRC) to Peter Hastings (Duke Energy), *Request for Additional Information Letter No. 043 Related To SRP Section 02.02.03 – Evaluation of Potential Accidents Application for the William States Lee III Units 1 And 2 Combined License Application*, dated October 22, 2008

This letter provides the Duke Energy responses to the Nuclear Regulatory Commission's requests for additional information (RAIs) included in the referenced letter.

Responses to the NRC information requests described in the referenced letter are addressed in separate enclosures, which also identify associated changes, when appropriate, that will be made in a future revision of the Final Safety Analysis Report for the Lee Nuclear Station. The responses to RAI 02.02.03-001, RAI 02.02.03-002, RAI 02.02.03-003, and RAI 02.02.03-006 contain sensitive information which will be submitted under a separate cover letter.

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

Bryan J. Dolan
Vice President
Nuclear Plant Development

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NRO

Enclosures:

1) Duke Energy Response to Request for Additional Information Letter 043, RAI 02.02.03-001, Publicly Available Version
2) Duke Energy Response to Request for Additional Information Letter 043, RAI 02.02.03-002, Publicly Available Version
3) Duke Energy Response to Request for Additional Information Letter 043, RAI 02.02.03-003, Publicly Available Version
4) Duke Energy Response to Request for Additional Information Letter 043, RAI 02.02.03-004
5) Duke Energy Response to Request for Additional Information Letter 043, RAI 02.02.03-005
6) Duke Energy Response to Request for Additional Information Letter 043, RAI 02.02.03-006, Publicly Available Version
7) Duke Energy Response to Request for Additional Information Letter 043, RAI 02.02.03-007

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
Bryan J. Dolan

Subscribed and sworn to me on December 23, 2008

Kim N. Slays
Notary Public

My commission expires: April 19, 2010

SEAL

KIM N. SLAYS NOTARY PUBLIC NEW HANOVER COUNTY, N.C.

xc (w/o enclosures):

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

xc (w/ enclosures):

Brian Hughes, Senior Project Manager, DNRL

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

RAI Letter No. 043

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

Reference NRC RAI Number(s): RAI 02.02.03-001

NRC RAI:

RG 1.206 provides guidance regarding the information that is needed to ensure potential hazards in the site vicinity are identified and evaluated to meet the siting criteria in 10 CFR 100.21. The NRC Staff has the following questions regarding FSAR Section 2.2.3: What are the assumptions on leak rate and other values in determining the safe standoff distance of 2.83 miles for the Colonial pipeline presented in Section 2.2.3.1.1.2? Please provide a detailed description of the analysis that was performed, with assumed values.

Duke Energy Response:

Duke Energy identified pipelines that are within a five mile radius from the Lee Nuclear Site. The five-mile distance is based on Regulatory Guide 1.70, Section 2.2 and Regulatory Guide 1.206, C.I.2.2, which state that all facilities and activities within five miles of the nuclear plant shall be examined and that facilities at greater distances shall be examined based upon their significance. [

]SRI The postulated pipeline explosion does not generate an overpressure above 1 psi at the site.

Based on several factors, this is a highly conservative result. Those factors include: 1) no consideration is taken for depressurization of the pipe, 2) instantaneous evaporation of the leaked gasoline is assumed, and 3) no credit is taken for the fact the pipe is buried three to four feet underground.

For convenience, Attachments 1 through 7 contain FSAR revisions for this RAI and for RAIs 02.02.03-001 through 02.02.03-006. RAI 02.02.03-007 requires no FSAR revisions. Below is a summary of the FSAR revisions included in the attachments, and the related RAI responses:

- RAI 02.02.03-001: Revision of FSAR Subsections 2.2.3.1.1.2 and 2.2.3.1.2 to further describe the analysis that was performed for the Colonial pipeline regarding leak rate and other values in determining the safe standoff distance due to explosion, with assumed values, are provided in Attachments 2 and 4.
- RAI 02.02.03-002: Revision of FSAR Subsections 2.2.3.1.1.3, 2.2.3.1.3.2, and 2.2.5, to further describe the analysis that was performed for Herbie Famous Fireworks including the bases for the "conservative calculation," and what the total estimated TNT equivalent was used in determining the safe standoff distance for not exceeding peak overpressure of 1 psi, are provided in Attachments 3, 5, and 6.
- RAI 02.02.03-003: Revision of FSAR Subsection 2.2.3.1.1.3, to further describe the bases for determining the confined/unconfined vapor amounts (TNT equivalent) calculated for storage tanks in determining the safe standoff distances due to explosion, is provided in Attachment 3.
- RAI 02.02.03-004: Revision of FSAR Subsection 2.2.3.1.2, to provide the rationale for use of a wind speed of 1.8 mph and D stability as the meteorological data for dispersion modeling analysis using ALOHA, is provided in Attachment 4..
- RAI 02.02.03-005: Revision of FSAR Subsection 2.2.3.1.2 and the addition of new FSAR Tables 2.2-210 and 2.2-211, to further describe the assumptions, general methodology, chemical quantities and other inputs, used in the analyses of a tanker truck rupture using ALOHA, are provided in Attachments 4 and 7.
- RAI 02.02.03-006: Revision of FSAR Subsection 2.2.3.1.3.2.1 and Subsection 2.2.5 to further describe the bases for not addressing certain Broad River Energy Center hazardous chemicals (toxic), are provided in Attachments 5 and 6.
- Attachment 1 contains a revision of FSAR Subsection 2.2.3.1.1.1 not related to these RAI responses in this letter. This revision is provided to include additional details for determining the safe standoff distances due to explosion involving commercial traffic on the nearest public roadway, consistent with the other FSAR changes described in these RAI responses.

Attachments 1 through 7 will be incorporated into a future revision of the Final Safety Analysis Report.

References:

1. Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers, GEMS 1288209, ABS Consulting, Inc. under contract for the Federal Energy Regulatory Commission under contract number FERC04C40196, May 13, 2004.
2. Lahey, R.T and Moody, F.J. "The Thermal-Hydraulics of a Boiling Water Nuclear Reactor, Second Edition," American Nuclear Society, La Grange Park, Illinois, 1993, Equation 5.249.
3. Crane Company, "Flow of Fluids through Valves, Fittings, and Pipe," Technical Paper 410, Crane Company, Joilet, Illinois, 1988.
4. "Safety and the Environment: Assuring Safe Operations." March 17, 2007, The Colonial Pipeline Company (www.colpipe.com) http://www.colpipe.com/en_so.asp.

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

FSAR Subsections 2.2.3.1.1.2 and 2.2.3.1.2

Attachments:

1) Revision to FSAR Subsection 2.2.3.1.1.1
2) Revision to FSAR Subsection 2.2.3.1.1.2
3) Revision to FSAR Subsection 2.2.3.1.1.3
4) Revision to FSAR Subsection 2.2.3.1.2
5) Revision to FSAR Subsection 2.2.3.1.3.2.1
6) Revision to FSAR Subsection 2.2.5
7) Addition of FSAR Tables 2.2-210 and 2.2-211

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

Attachment 1 to RAI 02.02.03-001

Revision to FSAR Subsection 2.2.3.1.1.1

COLA Part 2, FSAR, Chapter 2, Subsection 2.2.3.1.1.1 will be revised as follows:

Accidents were postulated for the nearby highways and railroads. Accidents on the Broad River were not evaluated because this river is considered to be non-navigable. The nearest highway with heavy commercial traffic is US Highway 29, which passes approximately 4.24 miles northwest of the Lee Nuclear Site at its closest point to the site boundary. The accident of concern along US Highway 29 is one that results in the detonation of a highly explosive cargo carried by a truck. It is necessary to demonstrate that such an explosion on the highway does not result in a peak positive incident overpressure that exceeds 1psi at the critical structures on-site. The maximum probable hazardous cargo for a single highway truck is based on Regulatory Guide 1.91, Revision 1, in terms of equivalent trinitrotoluene (TNT). The TNT equivalency is based on (Reference 235):

$W_E = \frac{H^d_{EXP}}{H^d_{TNT}} W_{EXP}$, where W_E is the effective charge weight, H^d_{EXP} is the heat of detonation of the explosive in question, H^d_{TNT} is the heat of detonation of TNT, and W_{EXP} is the weight of the explosive in question.

The methodology presented in Regulatory Guide 1.91, Revision 1, established the safe distance beyond which no damage would be expected (i.e. a peak positive incident overpressure of less than 1 psi at the critical structures on the Lee Nuclear Site) from a truck explosion along U.S. Highway 29 at its closest point. An evaluation performed for materials with a TNT equivalency of 2.24 and using the maximum cargo for two trucks (50,000 lbs. per truck) determined the safe distance to be 0.52 miles, hence, there is considerable margin between the required safe distance and the actual distance. The effects of blast-generated missiles are less than those associated with the blast overpressure levels considered in Regulatory Guide 1.91, Revision 1. Because the overpressure criteria of the guide are not exceeded, the effects of blast-generated missiles are not considered.

The Norfolk Southern Railroad passes approximately 4.18 miles northeast of the site at its closest point. The maximum probable quantity of explosive material shipped by a single railroad boxcar in terms of equivalent pounds of TNT is based on Regulatory Guide 1.91, Revision 1. It is recognized that cargo shipments by railroad typically constitute the usage of more than one boxcar. For the purpose of qualifying the explosion hazard involved in this railroad analysis, thirty combined boxcar values for intended explosives are incorporated into the calculation. This corresponds to a TNT equivalency of 8,870,400 lbs (30 boxcars x 132,000 lbs/boxcar x 2.24). These values may be considered conservatively bounding because it is reasonable to assume the initial explosion would involve only one boxcar associated with initiating the explosion. Should additional boxcars become involved, related explosions would be subsequent in time and neither coincident with, nor additive to, the effects associated with those from the first boxcar explosion. The evaluation determined the required safe distance to be 1.76 miles, which is less than the distance of 4.18 miles from the railroad to the site at its closest point. Therefore the proximity to the railroad does not present an explosion hazard.

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

Attachment 2 to RAI 02.02.03-001

Revision to FSAR Subsection 2.2.3.1.1.2

COLA Part 9, FSAR, Chapter 2, Subsection 2.2.3.1.1.2 will be revised as follows:

If the natural gas pipeline were to rupture resulting in natural gas released into the atmosphere, the vapor plume would not detonate in such a fashion to cause an overpressure event. Instead, it would burn with a relatively slow deflagration rate. A natural gas release would not explode if the release is into an unconfined space, therefore a free vapor cloud explosion of a release is into an unconfined space, and therefore a free vapor cloud explosion of a release from the natural gas pipeline is not credible.

The Colonial Pipeline and Plantation Pipeline contain refined petroleum products and are located 3.24 miles from the Lee Nuclear Site at the closest point. The 40-inch Colonial Pipeline was analyzed because it has the largest diameter of the refined petroleum pipelines. ~~A conservative estimate of potential leakage from the Colonial Pipeline determined that the safe standoff distance is 2.83 miles, which is less than the actual distance from the pipeline to the site, hence the refined petroleum pipelines are not an explosion hazard.~~[

][SRI] Using Equation 1 from Regulatory Guide 1.91, Revision 1, the safe standoff distance is calculated as 14,948 ft or 2.83 miles.

The result for the unconfined vapor explosion safe standoff distance is less than the distance of the pipeline to the site boundary at its closest point of 3.24 miles. Therefore, the postulated pipeline explosion does not generate an overpressure above 1 psi at the site. Based on several factors, this is a conservative result, e.g., no consideration is taken for depressurization of the pipe, instantaneous evaporation of the leaked gasoline is assumed, and no credit is taken for the fact the pipe is buried three to four feet underground. Hence, it is concluded the refined petroleum pipelines are not an explosion hazard for the Lee Nuclear Site.

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

Attachment 3 to RAI 02.02.03-001

Revision to FSAR Subsection 2.2.3.1.1.3

COLA Part 9, FSAR, Chapter 2, Subsection 2.2.3.1.1.3 will be revised as follows:

Herbie Famous Fireworks is a 1.4G consumer fireworks wholesale distribution company located 2.31 miles from the Lee Nuclear Site boundary. The U.S. Department of Transportation labels Division 1.4G as explosives that present a minor explosion hazard. The explosive effects are largely confined to the package and no blast or projection of appreciable size or range is expected. ~~A conservative calculation assuming all of the stored fireworks simultaneously explode demonstrates that the distance from Herbie Famous Fireworks exceeds the safe standoff distance of 0.48 miles as defined in Equation 1 of Regulatory Guide 1.91, Revision 1.~~
[

][SRI] Using Equation 1 from Regulatory Guide 1.91, Revision 1, the safe standoff distance is calculated as 2,522 ft or 0.48 miles. Since the safe standoff distance is less than the distance to Herbie Famous Fireworks, the postulated explosion at Herbie Famous Fireworks does not generate an overpressure above 1 psi at the site.

As shown in Table 2.2-201, the Broad River Energy Center has the largest capacity of registered storage tanks and has the only above ground tanks listed. The Broad River Energy Center is located 4.34 miles from the site boundary. ~~The evaluation of the confined and unconfined vapor explosions concluded that the distance from the Broad River Energy Center to the site exceeds the safe standoff distance as defined in Equation 1 of Regulatory Guide 1.91, Revision 1. The safe standoff distance for the confined vapor explosion is 1.44 miles and for the unconfined vapor is 2.51 miles.~~ [

][SRI] Using Equation 1 from Regulatory Guide 1.91, Revision 1, the safe standoff distance for a confined vapor explosion is calculated as 7,588 ft (1.44 miles), and the safe standoff distance for an unconfined vapor explosion is calculated as 13,269 ft (2.51 miles). Since the safe standoff distances are less than the distance to the Broad River Energy Center, the postulated confined and unconfined vapor explosions do not generate an overpressure above 1 psi at the site.

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

Attachment 4 to RAI 02.02.03-001

Revision to FSAR Subsection 2.2.3.1.2

COLA Part 9, FSAR, Chapter 2, Subsection 2.2.3.1.2 will be revised as follows:

The potential for detonation in a plume resulting from release of the commodities from a transportation accident is evaluated, as well as a potential release from nearby facilities and pipelines. This evaluation assumes dispersion downwind toward the Lee Nuclear Station, with a delayed ignition. For each commodity of interest, the vapor dispersion is based on a wind speed of 1.8 mph, a Stability Class of D, and a 90°F ambient air temperature. These meteorological conditions are intended to maximize the vaporization rate of the commodity of interest while limiting the downwind dispersion. The ALOHA code (Reference 236) is used to evaluate the dispersion and detonation of the vapor clouds.

For the evaluation of the potential effects of accidents on US Highway 29, conservatively large tanker truck volumes (9,000 gallons) are assumed along with an assumed 48.4 square feet rupture size. The basis for a 48.4 square feet rupture size is that, for this scenario, this rupture size is the largest permissible by the ALOHA code. ALOHA's constraints do not have an impact on the analysis because all the chemicals from a tanker of this size are capable of being released within the allotted time duration, eliminating the need to postulate a larger rupture. Because almost any commodity can be transported along the highways, various commodities are assumed. Gasoline and propane are analyzed due to the fact that these are commonly transported commodities.

Other less popular commodities are analyzed that have a relatively low flash point and relatively high heats of combustion, hence have a potential to result in a high overpressure if the vapor cloud is ignited. The results are summarized in Table 2.2-210.

Similarly, for the Norfolk Southern Railroad, various commodities are analyzed with the ALOHA code, assuming conservatively large tanker sizes (40,000 gallons) and rupture sizes of 48.4 square feet. The results are summarized in Table 2.2-211.

For the evaluation of the vapor cloud resulting from ruptured pipelines, rupture sizes equivalent to pipe cross-sectional areas are assumed. The pipelines are assumed to leak for a duration of one hour. [

]SRI

For the postulated accidents on U.S. Highway 29, the Norfolk Southern Railroad, and natural gas pipelines, the overpressure at the Lee Nuclear Station resulting from the delayed ignition of a vapor cloud is negligible. The only postulated accident that results in a slight overpressure at the Lee Nuclear Site is the postulated rupture of the refined petroleum pipeline, where a conservatively large release of gasoline is assumed. Even for this case, the overpressure is less than 1 psi at the Lee Nuclear Site.

In order to demonstrate that the atmospheric conditions assumed were conservative, a sensitivity study was performed for the situation that caused the largest overpressure at the site, which was a pipeline carrying gasoline, which produced a maximum overpressure of 0.459 psi for a release rate of 3,920 ft^3 /sec. The wind speed was increased from 1.55 knots (0.8 m/s) to

1 m/s, while at the same time the Stability Class was changed from "D" to "F". For this case the overpressure dropped to 0.455 psi. Increasing the wind speed would allow for the chemical to evaporate more quickly and travel at a quicker rate. However, the higher wind speed would disperse the vapor cloud at a quicker rate causing a less significant overpressure. The Stability Class is a measurement of how turbulent the atmosphere is from solar radiation and other contributing factors. By increasing the Stability Class from "D" to "F" the program is decreasing the amount of solar radiation included in the model, allowing for less dispersion to occur. Decreasing the solar radiation also decreases the amount of evaporation that occurs and therefore causes a decrease in overpressure. These results demonstrate that the assumptions of a wind speed of 1.55 knots and a Stability Class of "D" are conservative for this calculation.

Because the resulting overpressure from the delayed ignition of potential vapor clouds is much less than 1 psi, the Regulatory Guide 1.91, Revision 1, acceptance criteria, it is concluded that the delayed ignition of vapor clouds from nearby transportation routes and pipelines does not pose a hazard to the Lee Nuclear Station.

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

Attachment 5 to RAI 02.02.03-001

Revision to FSAR Subsection 2.2.3.1.3.2.1

COLA Part 2, FSAR, Chapter 2, Subsection 2.2.3.1.3.2.1 will be revised as follows:

2.2.3.1.3.2.1 Stationary Sources

There are no site-specific sources of airborne hazardous materials stored on the Lee Nuclear Station site in sufficient quantity to affect control room habitability.

Subsection 2.2.2.1 lists threefour major industrial facilities within a five mile radius of the site or at greater distances as appropriate based on their significance: Herbie Famous Fireworks, Ninety-Nine Islands Hydroelectric Station, and the Broad River Energy Center, and DSE Systems, LLC. Herbie Famous Fireworks has indicated that they do not have potentially dangerous airborne toxic chemicals on site. Although the Broad River Energy Center stores chemicals on site per FSAR Table 2.2-203:, there are no stored potentially poisonous gasses such as chlorine or Aanhydrous Aammonia nor other recognizable hazardous chemicals that may affect control room habitability at the site. The exact quantities of the chemicals in Table 2.2-203 are not known. However, an inquiry was sent to Broad River Energy Center to identify chemicals that are stored in quantities greater than 29,000 pounds or that have an Immediately Dangerous to Life or Health rating less than 30 mg/m^3. Further analysis of the chemicals identified by Broad River Energy Center indicates that there are no toxic chemical release threats to the Lee Nuclear Site from the Broad River Energy Center.

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

Attachment 6 to RAI 02.02.03-001

Revision to FSAR Subsection 2.2.5

COLA Part 2, FSAR, Chapter 2, Subsection 2.2.5 will be revised as follows:

237. Department of Defense, Contractor's Safety Manual for Ammunition and Explosives, DoD 4145.26-M, March 13, 2008.

238. National Fire Protection Association, "NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response," 2007.

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

Attachment 7 to RAI 02.02.03-001

Addition of FSAR Tables 2.2-210 and 2.2-211

TABLE 2.2-210
LEAKAGE FROM ASSUMED LARGE HOLE (4.5 m^2) FROM A TRUCK ON HIGHWAY 29

Chemical	Truck Capacity (tons)	LEL (ppm)	Pool Diameter (yards)	Flammable Area of Vapor Cloud (yards)	Concentration at site (ppm)	Overpressure at site (psi)
Gasoline (n-heptane)	25.4	10,000	102	113	0.0	0.0
Propane	21.9	20,000	91	0	0.0	0.0
Acetylene	12.3	25,000	*	643	0.0	0.0
Ethylacetylene	24.0	16,000	*	874	0.0	0.0
Ethylene Oxide	32.2	30,000	*	836	0.0	0.0
Propylene Oxide	30.6	19,000	99	412	0.0	0.0
1,3 Propylene Oxide	33.2	28,000	101	252	0.0	0.0

* Two-phase flow release.

TABLE 2.2-211
LEAKAGE FROM ASSUMED LARGE HOLE (4.5 m^2) FROM A RAILROAD TANKER

Chemical	Tanker Capacity (tons)	LEL (ppm)	Pool Diameter (yards)	Flammable Area of Vapor Cloud (yards)	Concentration at site (ppm)	Overpressure at site (psi)
Gasoline (n-heptane)	113	10,000	214	303	0.0	0.0
Propane	97.3	20,000	191	20	0.0	0.0
Acetylene	54.4	25,000	*	902	0.0	0.0
Ethylacetylene	107	16,000	*	1,306	0.0	0.0
Ethylene Oxide	143	30,000	*	1,220	0.0	0.0
Propylene Oxide	136	19,000	204	846	0.0	0.0
1,3 Propylene Oxide	148	28,000	210	542	0.0	0.0

* Two-phase flow release.

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

RAI Letter No. 043

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

Reference NRC RAI Number(s): RAI 02.02.03-002

NRC RAI:

RG 1.206 provides guidance regarding the information that is needed to ensure potential hazards in the site vicinity are identified and evaluated to meet the siting criteria in 10 CFR 100.21. The NRC Staff has the following questions regarding FSAR Section 2.2.3: Concerning the discussion of Herbie Famous Fireworks in section 2.2.3.1.1.3, what are the bases for the "conservative calculation," and what is the total estimated TNT equivalent used in determining the standoff distance of 0.48 miles for not exceeding peak overpressure of 1 psi?

Duke Energy Response:

Fixed facilities are screened based upon the specific commodities found at the facility. Commodities are further screened based upon their physical properties to determine if a detailed analysis is required. This screening evaluates the potential for the commodity to form a vapor cloud, the potential for that vapor to be flammable in a confined environment, and the potential for that vapor to be flammable in an unconfined environment.

Duke Energy identified fixed facilities that are within a five mile radius from the Lee Nuclear Station. The five-mile distance is based on Regulatory Guide 1.70, Section 2.2 and Regulatory Guide 1.206, C.I.2.2, which state that all facilities and activities within five miles of the nuclear plant shall be examined and that facilities at greater distances shall be examined based upon their significance. Initial screening identified Herbie Famous Fireworks warehouse facility as being potentially capable of impacting the site due to an explosion hazard, among other facilities.

Herbie Famous Fireworks is a 1.4G consumer fireworks wholesale distribution company. The United States Department of Transportation labels Division 1.4G as explosives that present a minor explosion hazard. The explosive effects are largely confined to the package and no blast or projection of appreciable size or range is expected. [

]SRI Therefore, the postulated explosion at Herbie Famous Fireworks does not generate an overpressure above 1 psi at the site.

References:

1. Barbalace, Kenneth, "USDOT Hazardous Materials Transportation Placards" EnvironmentalChemistry.com. Retrieved May 7, 2007, <http://environmentalchemistry.com/yogi/hazmat/placards/class1.html#1.4>
2. Weaver, Bob, "What is a 500-gram cake?" Fireworksland.com, 2007, <http://www.fireworksland.com/html/500gramcakes.html>

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

FSAR Subsection 2.2.3.1.1.3, Subsection 2.2.3.1.3.2.1, and Subsection 2.2.5, as shown in Enclosure 1 of this letter, response to FSAR RAI 02.02.03-001, Attachments 3, 5, and 6.

Attachments:

None

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

RAI Letter No. 043

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

Reference NRC RAI Number(s): RAI 02.02.03-003

NRC RAI:

RG 1.206 provides guidance regarding the information that is needed to ensure potential hazards in the site vicinity are identified and evaluated to meet the siting criteria in 10 CFR 100.21. The NRC Staff has the following question regarding FSAR Section 2.2.3: What are the bases for determining the confined/unconfined vapor amounts (TNT equivalent) calculated for storage tanks (Section 2.2.3.1.1.3) in determining the standoff distances due to explosion? Provide details.

Duke Energy Response:

Fixed facilities are screened based upon the specific commodities found at the facility. Commodities are further screened based upon their physical properties to determine if a detailed analysis is required. This screening evaluates the potential for the commodity to form a vapor cloud, the potential for that vapor to be flammable in a confined environment, and the potential for that vapor to be flammable in an unconfined environment.

Duke Energy identified fixed facilities that are within a five-mile radius from the Lee Nuclear Station site. The five-mile distance is based on Regulatory Guide 1.70, Section 2.2, and Regulatory Guide 1.206, C.I.2.2, which state that all facilities and activities within five miles of the nuclear plant shall be examined and that facilities at greater distances shall be examined based upon their significance. Initial screening identified Broad River Energy Center, among other facilities, as containing above ground storage tanks that may be potentially capable of impacting the site due to an explosion hazard.

Broad River Energy Center is a natural gas-fired peaking electric generating plant. There is a large above ground storage tank that resides on a closed site and currently does not house any materials. However, Broad River Energy Center does maintain hazardous materials on site. In order to qualify the commodities that pose an explosion risk at this location, it is assumed the empty storage tanks are completely filled with gasoline. This is a conservative assumption, because gasoline is a highly volatile commodity with a flash point of -45°F (Reference 2). Further, since the tanks are currently empty (Reference 1), assuming that they contain a volatile substance, such as gasoline, is conservative by nature.

Regulatory Guide 1.91, Revision 1, cites an inequality for R, the minimum safe distance to an overpressure of 1 psi, as:

$$R \geq 45 \cdot W^{\frac{1}{3}} \quad (1)$$

Where:
W = Equivalent mass of TNT (lb)
R = Minimum safe distance to an overpressure of 1 psi (ft)

Mass equivalent of gasoline in the form of TNT must be calculated in order to determine the safe standoff distances attributed to a confined vapor cloud explosion (VCE). The equivalent mass for a VCE is as follows:

$$W = m \frac{HC_{commodity}}{HC_{TNT}} \quad (2)$$

Where:
m = Mass of commodity (lb)
$HC_{commodity}$ *= The heat of combustion of the commodity (kJ/kg)*
HC_{TNT} *= The heat of combustion of TNT (4,680 kJ/kg)*

The enclosed vapor cloud explosion scenario assumes that the storage vessel has been breached and sufficient material has been lost to leave a vapor space filled with an explosive mixture. An ignition source is introduced and combustion occurs. Due to the confined space, the internal pressure rises rapidly and eventually ruptures the vessel. This magnifies the detonation effects. Regulatory Guide 1.91, Revision 1, states that "a reasonable upper bound to the blast energy potentially available based on experimental detonations of confined vapor clouds is a (TNT) mass equivalence of 240%." Therefore, the blast energy for this detonation is assumed to have a mass equivalence of 240%. The mass of material that can be confined is limited, however, due to removal of a significant portion of the commodity being necessary for voiding the space. The mass of the commodity involved in a confined vapor space explosion is derived by the following:

$$M_{full} = \frac{M}{0.8} \quad (3)$$

Where:
M_{full} *= The mass of the commodity needed to fill the entire container (lb)*
M = The maximum possible storage amount of that quantity (lb)

The mass of the commodity retained in the enclosed vessel is conservatively calculated using the allowable vessel volumes (based on maximum storage capacity) and ignoring the necessary volume of oxidants. The volume of the storage vessel is initially assumed to be 80% full of liquid, with 20% vapor space remaining. This implicitly assumes that the mass value derived constitutes the liquid portion of the vessel. This assumption effectively assigns an additional 20% vessel volume on top of the volume necessary to house the maximum liquid mass. Further, in deriving the mass of the commodity retained in the enclosed vessel, it is assumed the entire hold is filled with vapor.

The volume of the container is as follows:

$$V_{container} = \frac{M_{full}}{\rho_{liquid}} = \frac{M}{0.8} * \frac{1}{\rho_{liquid}} \qquad (4)$$

In order to quantify the material involved in the confined VCE, it is necessary to determine the amount of vapor in the container:

$$m = m_{vapor} = V_{container} * \rho_{vapor} = \frac{M}{0.8} * \frac{1}{\rho_{liquid}} * \rho_{vapor} \qquad (5)$$

Finally:

$$m = M \cdot \frac{\left(\frac{\rho_{vapor}}{\rho_{liquid}}\right)}{0.8} \qquad (6)$$

Where:
ρ_{vapor} = *The vapor density (lb/ft^3)*
ρ_{liquid} = *The liquid density (lb/ft^3)*
M = *The maximum possible storage amount of that quantity (lb)*
m = *Mass of commodity (lb)*

Therefore, by combining the above assumptions and Equations 1, 2, and 6, the minimum safe distance to an overpressure of 1 psi for the confined VCE is as follows:

$$R \geq 45 \cdot \left[\left(\frac{2.4}{0.8}\right) \cdot M \cdot \left(\frac{\rho_{vapor}}{\rho_{liquid}}\right) \cdot \left(\frac{HC_{commodity}}{HC_{TNT}}\right)\right]^{\frac{1}{3}} \qquad (7)$$

Where:
R = *The safe distance to an overpressure of 1 psi (ft)*
M = *The mass of the maximum cargo of that commodity (lb)*
ρ_{vapor} = *The vapor density (lb/ft^3)*
ρ_{liquid} = *The liquid density (lb/ft^3)*
$HC_{commodity}$ = *The heat of combustion of the commodity (kJ/kg)*
HC_{TNT} = *The heat of combustion of TNT (4,680 kJ/kg)*

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Broad River Energy Center is approximately 4.34 miles northwest of the site boundary. Therefore, the postulated explosion at this location does not generate an overpressure above 1 psi.

References:

1. Environmental Data Resources Inc., "Cherokee – Cherokee, SC," March 07, 2006, Inquiry Number 01626231.2r.
2. National Institute for Occupational Safety and Health, Department of Health and Human Services, Centers for Disease Control and Prevention, December 2006, http://www.cdc.gov/niosh/npg.

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

FSAR Subsection 2.2.3.1.1.3, as shown in Enclosure 1 of this letter, response to FSAR RAI 02.02.03-001, Attachment 3.

Attachments:

None

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

RAI Letter No. 043

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

Reference NRC RAI Number(s): RAI 02.02.03-004

NRC RAI:

RG 1.206 provides guidance regarding the information that is needed to ensure potential hazards in the site vicinity are identified and evaluated to meet the siting criteria in 10 CFR 100.21. FSAR Section 2.2.3 uses meteorological data for dispersion modeling that appears inconsistent with what the NRC staff would expect. It is general practice to use a conservative wind speed of 1 m/sec and F stability which represent 5% met conditions, in using ALOHA modeling. Provide rationale for use of 1.8 mph and D stability in the analysis (Section 2.2.3.1.2).

Duke Energy Response:

The lowest wind speed allowed by ALOHA is 1.55 knots (0.8 m/s), and this speed is selected in order to create a worst case scenario for the calculation. At very low wind speeds the direction of the vapor cloud is unpredictable, causing the ALOHA program to become unreliable. At very high wind speeds the vapor cloud will disperse very quickly into the atmosphere and become inconsequential to the surroundings.

In order to justify that the atmospheric conditions assumed are conservative, sensitivity studies were performed for the condition that caused the largest overpressure at the site, a pipeline carrying gasoline. The wind speed was increased from 1.55 knots (0.8 m/s or 1.78 mph) to 1 m/s (2.24 mph or 1.94 knots), while at the same time the stability class is changed from "D" to "F". For this study the overpressure decreased by 0.004 psig. Increasing the wind speed would allow the chemical to evaporate more quickly and travel at a quicker rate. However, the higher wind speed would disperse the vapor cloud at a quicker rate causing a less significant overpressure. The stability class is a measurement of how turbulent the atmosphere is from solar radiation and other contributing factors. By increasing the stability class from "D" to "F" the program is decreasing the amount of solar radiation included in the model, allowing for less dispersion to occur. Consequently, decreasing the solar radiation also decreases the amount of evaporation that occurs, and therefore causes a decrease in overpressure. These results justify that the assumptions of a wind speed of 1.55 knots (0.8 m/s or 1.78 mph) and a stability class of "D" are conservative for this calculation.

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

FSAR Subsection 2.2.3.1.2, as shown in Enclosure 1 of this letter, response to FSAR RAI 02.02.03-001, Attachment 4.

Attachments:

None

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

RAI Letter No. 043

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

Reference NRC RAI Number(s): RAI 02.02.03-005

NRC RAI:

RG 1.206 provides guidance regarding the information that is needed to ensure potential hazards in the site vicinity are identified and evaluated to meet the siting criteria in 10 CFR 100.21. The NRC Staff has the following questions regarding FSAR Section 2.2.3: Section 2.2.3.1.2 states that "large tanker truck volumes are assumed along with 48.4 sq.ft rupture size". What is the total volume/amount considered in the analysis? It is also stated in addition to gasoline and propane "other less popular commodities are analyzed." What are these chemicals and their amounts? How are they analyzed to arrive at the conclusion that "the overpressure at the Lee Nuclear Station resulting from the delayed ignition of a vapor cloud is negligible?" Provide assumptions, general methodology, chemical quantities and other inputs used in the analyses.

Duke Energy Response:

The release location of a tanker truck is US Highway 29, which is approximately 4.5 miles northwest of the Lee Nuclear Site. For all cases relating to a tanker truck rupture, the leakage source is assumed to be a leak in a horizontal cylinder with a diameter of eight feet and a length of 23.9 feet, which equates to a volume of 9,000 gallons. The dimensions attributed to the tanker are arbitrary assumptions that have no impact on the analysis, since the release rate is based on the size of the rupture opening and the mass of chemical being transported. The 9,000 gallon volume is chosen because it bounds the capacity of 7,865 gallons of a single tanker truck as shown in Reference 1. A sensitivity study is performed involving an increase in tank volume in the vicinity of the Lee Nuclear Site. The sensitivity study shows that increasing the volume of chemicals transported near the site to 20,000 gallons from 9,000 gallons did not yield an overpressure at the site. ALOHA will not run an analysis with a rupture that spans more than a certain percentage of the total surface area of the tank, therefore a large rupture size of 5 m^2 (as used in previous analyses) cannot be used for smaller tanks, such as a tanker truck. ALOHA only allows the hole size in the tank to be less than the circular cross-sectional area of the tank, or 10% of the total tank surface area, whichever is smaller. For a tanker truck, the rupture opening is assumed to be a rectangular hole with a length of 4.5 meters and a width of 1 meter. A second case is evaluated with an assumed opening area of 1 meter by 1 meter. ALOHA's constraints will not have an impact on the calculation, because all of the chemicals from a tanker of this size can be released within the allotted time duration, eliminating the need for a larger rupture. The opening is assumed to be on the tank bottom, although there is no reasonable mechanism for a failure of this type at this location on the truck. Having the tank rupture at the bottom is a conservative assumption because it will allow for the most spillage to occur and not allow the amount of chemicals released to be limited by the position of the rupture.

All chemicals are assumed to be at ambient temperature (90°F/32°C) except for cryogenic liquids. The only cryogenically stored liquid is propane, which is stored for transportation at -44°F (-42°C), as seen in Reference 3.

The hazards considered are flammability, and damaging overpressure at the accident location directly downwind of the release, which represents the Lee Nuclear Site. ALOHA uses two congestion levels: congested and uncongested. ALOHA's blast (overpressure) estimates are based on experiments that used a volume blockage ratio (volume occupied by obstacles within the cloud divided by cloud volume) of less than 1.5% for an uncongested cloud and greater than 1.5% for a congested cloud. The degree of confinement has a direct effect on the estimated flame speed and resulting overpressure. In general, low confinement means that the gases produced in an explosion are free to expand, while high confinement means they are constrained, as inside a pipe. For the Lee Nuclear Site the existence of water bodies and open land between the assumed accident location and the site is representative of an uncongested area. For the releases considered in the evaluation, an uncongested release is assumed.

Each commodity is examined to determine which commodities would be modeled in ALOHA. This examination process investigates the properties of the commodities, paying closest attention to the flash points of each of the chemicals. The flash point of a chemical is:

> "The temperature at which a flammable liquid produces enough vapors to be ignited, is the most significant property of all. More than any other single factor, flash point, determines the flammability of a liquid. Every hazard rating of flammable liquids recognizes this fact. The reason flash point is so important is that flammable liquids are not ordinarily flammable. It is the vapors they produce that ignite or explode." (Reference 4)

This means the lower the flash point of a chemical, the greater the possibility it is to become a hazardous vapor cloud likely to ignite and combust. For the calculation, any chemical with a flash point greater than 100°F (37°C) is ignored as a possible vapor cloud contribution. The National Fire Protection Association Hazard Identification System (NFPA 704M) cites this temperature as the transition point between flammability hazard ratings 2 and 3. Therefore, only hazards classified as 3 or 4 are considered in the calculation. Hazard rating 2 materials must be moderately heated or exposed to a relatively high ambient temperature in order to support ignition.

There are only a few chemicals in ALOHA's chemical library that have a high enough fuel reactivity to result in a vapor cloud explosion when the cloud is ignited by a spark or a flame in an uncongested area: acetylene, ethylacetylene, chlorine monoxide, hydrogen, ethylene oxide, propylene oxide, and 1,3 propylene oxide. Two of these chemicals, chlorine monoxide and hydrogen, can be eliminated from further review. Hydrogen is significantly lighter than air, so it is assumed that it will not be a vapor cloud explosion concern, because it will disperse easily into the atmosphere. The density of hydrogen (0.005612 lb/ft^3) (Reference 5) is less than 1/14th that of air (0.08071 lb/ft^3). To further illustrate that hydrogen is not a threat to the Lee Nuclear Site, an ALOHA model was run where 40,000 gallons of cryogenically frozen hydrogen is transported via railway at a distance of 4.5 miles, assuming a rupture size of 4.5 square meters. For this evaluation the atmospheric conditions are set to the assumed atmospheric conditions for a railway release, except an inversion height was entered into the code. An inversion height was necessary for this situation, because hydrogen is lighter than air gas, therefore an inversion height will make the scenario more conservative. Using meteorological data from the available weather center, Greensboro, North Carolina, it is determined that the lowest average inversion height for the area is approximately 900 meters. This inversion height is then conservatively reduced by half. The results of this model show a concentration level of 1,700 ppm at a point 2 miles downwind from the proposed accident location. Since the Lee Nuclear Site is an additional two and a half miles further downwind from this point, it can be concluded that the concentration level at the site will be less than 1,700 ppm, which is well below hydrogen's lower explosive limit of 40,000 ppm.

Chlorine monoxide is a hazardous by-product of the decomposition of halocarbons (chemicals with covalent bonds attached to halogen atoms), and has no identifiable industrial uses. The Montreal Protocol on Substances that Deplete the Ozone Layer, a treaty signed by all but five countries worldwide regarding environmental concerns, has listed halocarbons on a list of controlled and banned substances. Due to the Montreal Protocol's restrictions and the apparent lack of industrial uses for chlorine monoxide, it is assumed that there will be no need to transport the chemical in any quantity near the vicinity of the Lee Nuclear Site. Therefore, it is not examined as a vapor cloud explosion threat.

In order to perform a model in ALOHA, a site "Location" must be entered designated by a town and a state, which can be found in ALOHA's data bank. This information is used to determine longitude and latitude, which in turn is used to find the angle of the sun for certain aspects of the model. The Lee Nuclear Site is located in Cherokee County, South Carolina in the town of Gaffney. The closest recognizable town in ALOHA is Spartanburg, South Carolina, which is about 16 miles southwest of the site. Another input for ALOHA is the date and time for the accident. Originally, ALOHA assumes that the accident occurs on the date and time associated on the computer's internal clock. However, this can be manually changed to any date and time that the user specifies. The calculation uses mid June as the date, because it represents a summer month that would yield high temperatures. Noon or 12:00 PM is selected as the time of day, because it represents a period of time when the sun would be the strongest causing the most evaporation.

The following weather conditions are assumed for the analysis:

- Wind speed 1.55 knots from the direction of the accident measured at 3 meters,
- Ground roughness is assumed to be open country,
- Cloud cover 10%,
- Air temperature 90°F (32°C),
- Stability Class D,
- Relative Humidity 50% (humidity has a minimal effect on the calculation, where increasing or decreasing this value to its maximum or minimum has negligible effects), and
- No inversion height (inversion height is an atmospheric condition in which an unstable layer of air near the ground lies beneath a very stable layer of air above, this inversion can trap light gases closer to the ground and cause higher concentrations, however all the hazards modeled in the calculation use a heavy gas model, where all of the gases stay close to the ground causing the inversion height to be irrelevant).

Various sensitivity studies are performed on the assumed weather conditions to confirm that they are conservative for the calculation.

There are no state or federal regulations prohibiting the shipment of any hazardous material on US Highway 29. Several differing chemicals are selected to depict hazardous materials that may be traveling on US Highway 29 at any given time. Gasoline and propane are selected due to their being common commodities. The chemicals of concern for roadways for the calculation are:

- Gasoline,
- Propane,
- Acetylene,
- Ethylacetylene,
- Ethylene Oxide,
- Propylene Oxide, and
- 1,3 Propylene Oxide.

All of these chemicals are assumed to be carried via tanker truck (described above) at full capacity. That is the tankers are carrying 9,000 gallons of each chemical that are examined.

The model examines the maximum concentration at the site during the first hour, and the overpressure at the site from any explosions that may occur. Overpressure is the sudden onset of a pressure wave formed after an explosion and is a major hazard associated with any explosion. This pressure wave, which travels at the speed of sound, is caused by the energy released in the initial explosion, where the bigger the explosion, the more damaging the pressure wave can be. The damaging effects of the overpressure would be greatest near the source of the explosion and would lessen at distances farther away from the source.

The calculation concludes that none of the chemicals released in a tanker truck accident yields an overpressure at the Lee Nuclear Site. ALOHA calculates an overpressure of 0.0 psi for each release situation. Therefore, the overpressure produced by a tanker truck release is considered negligible.

References:

1. Iowa Department of Transportation, Cargo Comparison, www.ingrambarge.com.
2. Department of Transportation, Research and Special Program Administrations, 49 CFR Parts 171, 172 et al., www.dot.gov.
3. TECHNICOLD SERVICES INC., San Antonio, Texas, 78240, http://www.gcbtechnicold.biz.atmostore.htm.
4. Flammable Hazardous Materials, Second Edition, ISBN: 0-02-476570-8.
5. Pocket Ref, Second Edition, Glover, Thomas J., ISBN: 1-885071-00-0.

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

FSAR Subsection 2.2.3.1.2 and the addition of new FSAR Tables 2.2-210 and 2.2-211 as shown in Enclosure 1 of this letter, response to FSAR RAI 02.02.03-001, Attachments 4 and 7.

Attachments:

None

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

RAI Letter No. 043

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

Reference NRC RAI Number(s): RAI 02.02.03-006

NRC RAI:

RG 1.206 provides guidance regarding the information that is needed to ensure potential hazards in the site vicinity are identified and evaluated to meet the siting criteria in 10 CFR 100.21. FSAR Section 2.2.3: Table 2.2-203 states the Broad River Energy Center's hazardous chemicals (toxic). The OSHA permissible limits for toxic chemicals are identified in Table 2.2-204. Provide the bases for not addressing these chemicals in Section 2.2.3.1.3.2.1.

Duke Energy Response:

Following Regulatory Guide 1.78, Revision 1, Appendix A guidelines (Reference 1), a screening criterion was developed to determine the maximum allowed weights of toxic chemicals that are to be considered for the control room evaluation. These maximum allowed weights are determined using the following relation:

$$CW = TableMass \cdot \frac{AER}{ActualAER} \cdot \frac{TL}{50\frac{mg}{m^3}} \cdot SCF \qquad (1)$$

Where:
CW = Chemical weight, the maximum allowed release weight (lb)
Table Mass = Weight of hazardous chemical that requires consideration (Reference 1) (lb)
AER = Air exchange rate of reference control room (Reference 1)
Actual AER = Air exchange rate of AP1000 control room
TL = Toxicity limit of chemical being considered (mg/m^3)
SCF = Atmospheric stability class factor G

From Reference 1, the reference weight of hazardous chemical that requires consideration (Table Mass) is 110,000 lbs, which is based on a distance from the control room of 4 to 5 miles with a reference control room air exchange rate (AER) of 1.2 exchanges per hour.

The actual air exchange rate of an AP1000 control room (Actual AER) is calculated as follows:

$$ActualAER = \frac{\frac{AirFlow}{hour}}{Volume_{ControlRoom}}$$

From the AP1000 Design Control Document (Reference 2), the volume of heating, ventilation, and air conditioning (HVAC) total is 105,500 ft^3, and the normal air intake flow is 1,925 ft^3/min. Therefore, the actual air exchange rate for an AP1000 control room is as follows:

$$ActualAER = \frac{1{,}925\frac{ft^3}{\min}\cdot\frac{60\min}{1hour}}{105{,}500ft^3} = \frac{1.09}{hour}$$

The toxicity limit is assumed to be a National Institute for Safety and Health (NIOSH) Immediately Dangerous to Life and Health (IDLH) of 30 mg/m^3. This IDLH corresponds to that of chlorine (as defined in Reference 1), and is chosen because it has a relatively low toxicity limit compared to other chemicals. Therefore, all chemicals with an IDLH less than 30 mg/m^3 are considered potential hazards and require further evaluation.

From Reference 1, the atmospheric stability class factor of G is equal to 0.4. Therefore, the maximum allowed release weight (CW) is as follows:

$$CW = 110{,}000lb\cdot\frac{\frac{1.2}{hour}}{\frac{1.09}{hour}}\cdot\frac{30\frac{mg}{m^3}}{50\frac{mg}{m^3}}\cdot 0.4 = 29{,}064lb$$

Therefore, any chemical at the Broad River Energy Center with an IDLH greater than 30 mg/m^3 and on-site weight less than 29,000 pounds is not considered a hazard. Any chemical at the facility with an IDLH equal to or less than 30 mg/m^3 is considered a potential hazard.

Based on these criteria, an inquiry was sent to Broad River Energy Center, asking the facility to identify chemicals that are stored in quantities greater than 29,000 pounds or that have an IDLH less than or equal to 30 mg/m^3. The following chemicals and quantities are identified (Reference 3):

Table 1. Broad River Energy Center Chemicals

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Based on the evaluations performed, none of the Broad River Energy Center chemicals are housed in sufficient quantity to pose a toxic release threat to the Lee Nuclear Station site.

References:

1. Regulatory Guide 1.78, Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release, Revision 1, 12/2001
2. AP1000 Design Control Document, Revision 17, Chapter 15, Table 15.6.5-2
3. Annual Emergency and Hazardous Chemical Inventory Report (Tier 2) provided by the Broad River Energy Center, October 8, 2008 and October 14, 2008

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

FSAR Subsection 2.2.3.1.3.2.1 and Subsection 2.2.5 as shown in Enclosure 1 of this letter, response to FSAR RAI 02.02.03-001, Attachments 5 and 6.

Attachments:

None

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

RAI Letter No. 043

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

Reference NRC RAI Number(s): RAI 02.02.03-007

NRC RAI:

RG 1.206 provides guidance regarding the information that is needed to ensure potential hazards in the site vicinity are identified and evaluated to meet the siting criteria in 10 CFR 100.21. The NRC Staff has the following questions regarding FSAR Section 2.2.3: What is the basis for the chlorine amount of 20,000 kg? What are the calculated concentrations of chlorine at the intake of the control room and inside the control room? Clarify the apparently conflicting statement made for the concentration of chlorine in FSAR Section 2.2.3.1.3.3 and FSAR Section 6.4.4.2.

Duke Energy Response:

The response to this RAI is addressed in the Duke Energy responses to FSAR RAIs 06.04-001 and 06.04-002 (Reference 1).

Reference:

1. Letter from Bryan J. Dolan to Document Control Desk, U.S. Nuclear Regulatory Commission, WLG2008.12-29, William States Lee III Nuclear Station Units 1 and 2 Response to Request for Additional Information (RAI Nos. 907, 908 and 925), dated December 23, 2008.

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

None

Attachments:

None