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March 4, 2010

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
Supplemental Response to Request for Additional Information (RAI No. 50)
Ltr# WLG2010.03-02

Reference: Letter from Brian C. Anderson (NRC) to Peter S. Hastings (Duke Energy), *Request for Additional Information Letter No. 025 Related To SRP Section 13.3 for the William States Lee III Units 1 and 2 Combined License Application*, dated September 26, 2008.

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

The enclosed supplemental responses address five topics that affect the Duke Energy submittals provided in response to the referenced letter. The five topics consist of:

1. Changes to the software that formatted traffic control specifications input for the Evacuation Time Estimate model.
2. Changes to anticipated peak construction year for consistency across multiple prior responses.
3. Additional special facilities data collection.
4. Additional analyses associated with single-wave and multiple-wave evacuations of school populations based on state and local agency input.
5. Clarification of traffic management information based on state and local agency input.

The supplemental responses to the NRC information request 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 to the William States Lee Nuclear Station Development of Evacuation Time Estimates Report.

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NRO

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

Bryan J. Dolan
Vice President
Nuclear Plant Development

Enclosures:

1. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-006
2. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-009
3. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-012
4. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-014
5. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-015
6. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-026
7. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-028
8. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-029
9. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-030
10. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-031
11. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-032
12. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-033
13. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-035
14. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-036
15. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-037
16. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-038
17. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-041
18. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-045
19. Duke Energy Supplemental Response to Request for Additional Information Letter 025, RAI 13.03-048

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, Vice President

Subscribed and sworn to me: March 4, 2010
Date

Notary Public

My commission expires: April 19, 2010
Date

xc (w/out enclosures):

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

xc (w/ enclosures):

Brian Hughes, Senior Project Manager, DNRL
Denise McGovern, Project Manager, DNRL

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-006

NRC RAI:

ETE-6:

Section 2.1 (2) "Data Estimates," states that population estimates at special facilities are based on available data from county emergency management offices. A review of publicly available information indicates that there may be additional facilities in the area including the J. Claude Fort Community Residence; Magnolias of Gaffney Assisted Living, and others. Discuss whether any other sources of data were used in identifying special facilities. If necessary, identify changes to the ETE that may occur if additional facilities, not in the current listing in Appendix E, "Special Facility Data," must be added.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 11, 2008 response to the NRCs Request for Additional Information (RAI) 13.03-006 (Reference 1), as described below.

Data obtained for the Magnolias of Gaffney Assisted Living, Ivy Grove Residential Care, Bethel Senior Day Care Center, J Claude Fort Community Residence Building I and J Claude Fort Community Residence Building II facilities was provided in Duke Energy's December 9, 2008 response to RAI 13.03-026 (Reference 2) and incorporated in Table 8-4 as shown in Attachment 1 of that response. The following additional revisions will be made to Table 8-4, as shown in Attachment 1 of this supplemental response:

- The data shown as "N/A" for the Upstate Carolina Medical Center in Table 8-4, provided as Attachment 1 to Duke Energy's December 9, 2008 response to RAI 13.03-026, will be revised to use average percentages calculated with detailed census data provided from the other facilities. Footnote number 3 will be added to Table 8-4 to discuss this method.
- Data inconsistencies for the Peachtree Medical Center in Attachment 1 to Duke Energy's December 9, 2008 response to RAI 13.03-026 were identified during review of the additional facility information. The data provided by Peachtree Healthcare on June 6, 2006, indicated that the facility had a capacity of 145 persons with a current census of 132 persons, of which 35 were ambulatory, 97 were wheelchair bound and 15 were bedridden. Summing the ambulatory, wheelchair bound, and bedridden patients result in a total of 147 people, exceeding the current census and the facility capacity. The identified inconsistency was the result of including the 15 bedridden patients in the total of wheelchair bound patients, a double accounting of 15 individuals. The number of wheelchair bound patients for the Peachtree Medical Center provided in Table 8-4 will be revised to reflect a correct value of 82. The number of wheelchair bus runs will also be revised to reflect the reduced number of bus runs (21) necessary to evacuate the wheelchair bound patients.

- The calculated EPZ totals in Table 8-4 will be revised to address the changes described above. In addition, all facilities described in Table 8-4 are located within Cherokee County; therefore, the table will be revised to reformat and remove the redundant row titled "Cherokee County Total".

Section 8.4 of the ETE report will be revised as provided in Attachment 2 to reflect the associated changes to Table 8-4:

- In the "Evacuation of Ambulatory Persons from Special Facilities" sub-section, "48 wheelchair bus runs" will be revised to "54 wheelchair bus runs."
- In the "Emergency Medical Services (EMS) Vehicles" sub-section, "20 ambulance runs" will be revised to "24 ambulance runs."

The table titled "Lee EPZ: Medical Facilities & Nursing Homes (as of January 2007) located on page E-4 of Rev. 1 of the Lee Nuclear Station ETE report will be revised to include the additional facilities, as provided in Attachment 3 to this response.

Additionally, Figure E-2 provided in Attachment 2 to Duke Energy's November 25, 2008 response to RAI 13.03-032 (Reference 3) will be revised to include the additional facilities as provided in Attachment 1 of the supplemental response to RAI 13.03-032 (Enclosure 15) included in this letter.

The changes described in this supplemental response will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

References:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.11-05, dated November 11, 2008. (ADAMS Accession No. ML083180158)
2) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12. 01, dated December 9, 2008. (ADAMS Accession No. ML083460112)
3) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) WLG2008.11-11, dated November 25, 2008. (ADAMS Accession No. ML090690313)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Table 8-4 of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 1.

Revise Section 8.4 of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 2.

Revise Appendix E of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 3.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

1) Markup of the Affected Portion of ETE Report (Rev. 1), Table 8-4, "Special Facility Transit Demand"
2) Markup of the Affected Portion of ETE Report (Rev. 1), Section 8.4, "Evacuation Time Estimates for Transit-Dependent People"
3) Markup of the Affected Portion of ETE Report (Rev. 1), Appendix E, "Special Facility Data"

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

Attachment 1 to RAI 13.03-006

Markup of the Affected Portion of ETE Report (Rev. 1) Table 8-4, "Special Facility Transit Demand"

Table 8-4. Special Facility Transit Demand

ERPA	Distance (miles)	Direction	Facility Name	Municipality	Capacity	Current Census	Ambulatory	Wheelchair Bound	Bedridden	Ambulance Runs	Wheelchair Bus Runs	Bus Runs
Cherokee County[1]												
H-2	8.2	W	Brookview Healthcare Center	Gaffney	132	120	6	90	24	12	23	1
H-2	7.9	WNW	Peachtree Healthcare Center	Gaffney	145	132	35	8297	15	8	2125	2
J-2	7.9	WNW	Upstate Carolina Medical Center[3]	Gaffney	125	88	41N/A	39N/A	8N/A	4N/A	10N/A	2 N/A
H-2	9.3	W	Magnolias of Gaffney Assisted Living	Gaffney	84	84	84	0	0	Local contract for buses		
H-2	8.6	WNW	Ivy Grove Residential Care	Gaffney	62	47	42	5	0	Buses provided by Providence Baptist Church		
H-2	8.3	WNW	Bethel Senior Day Care Center	Gaffney	0[2]	18	15	3	0	Facility Owned Vans		
H-2	9.0	WNW	J Claude Fort Community Residence Building I	Gaffney	8	7	6	1	0	Facility Owned Vans		
H-2	9.0	WNW	J Claude Fort Community Residence Building II	Gaffney	8	8	7	1	0	Facility Owned Vans		
			~~Cherokee County Totals~~		~~277~~	~~252~~	~~41~~	~~187~~	~~39~~	~~20~~	~~48~~	~~3~~
			Cherokee County and EPZ Totals:		564277	504252	23641	221187	4739	2420	5448	53

Notes:

[1] There are no facilities in York County or Cleveland County portions of the EPZ

[2] This facility does not have overnight accommodations

[3] Detailed data (other than capacity and current census) were not available for this facility. The number of ambulatory, wheelchair-bound and bed-ridden patients for this facility were estimated using average percentages from the other facilities which provided detailed census data.

Note: The above table includes revisions that were included in the December 9, 2008 response to RAI 13.03-026 with changes highlighted.

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

Attachment 2 to RAI 13.03-006

Markup of the Affected Portion of ETE Report (Rev. 1), Section 8.4, "Evacuation Time Estimates for Transit-Dependent People"

required. It follows, therefore, that about one hour and fifteen minutes would have to be added to the calculated ETE for special facilities, in the event they are evacuated as a "second wave".

All of the medical facilities are located in Gaffney near the EPZ boundary. It is estimated that buses will have to travel 2 miles, on average, to leave the EPZ. The average speed output by the model at 90 minutes for Region 3, Scenario 1 is 21.2 mph; thus, travel time out of the EPZ is 6 minutes.

The ETE for buses evacuating ambulatory patients at medical facilities is the sum of the mobilization time, total passenger loading time, and travel time out of the EPZ. For example, the calculation of ETE for the Peachtree Healthcare Center with 35 ambulatory residents is:

ETE: 90 + 35 x 1 + 6 = 131 min. or 2:15 rounded up. 3:30 for "second wave".

Table 8-4 indicates that ~~48~~54 wheelchair bus runs are needed for the entire EPZ. Wheelchair buses and vans are often scarce; however, regular buses can be used to transport wheelchair bound patients. Patients would occupy the front portion of the bus and their wheelchairs would be folded and stacked in the back of the bus. Loading times are estimated at 2 minutes per wheelchair bound person as staff will have to assist them in boarding the bus. For example, the ETE for the wheelchair bound at the Peachtree Healthcare Center is:

ETE: 90 + 90 x 2 + 6 = 4:40 (rounded up to the nearest 5 minutes).

Thus, the ETE for special facilities may exceed the general population ETE.

Emergency Medical Services (EMS) Vehicles

The previous discussion focused on transit operations for ambulatory persons residing at medical facilities within the Evacuation Region. It is also necessary to provide transit services to non-ambulatory persons who do not – or cannot – have access to private vehicles. Based on the data provided in Table 8-4, a total of ~~20~~24 ambulance runs are needed to evacuate all of the bed ridden patients in the EPZ, assuming 2 people per ambulance. These ambulances will be provided by EMS providers within the EPZ. Additional ambulances will be provided by neighboring cities.

It is conservatively estimated that 30 minutes will be needed to mobilize ambulances and travel to the medical facilities. Loading times are also conservatively estimated as 30 minutes. As with the buses transporting ambulatory patients, ambulances will have to travel 2 miles, on average, to leave the EPZ. The average speed output by the model at 1 hour for Region 3, Scenario 1 is 32.1 mph; thus, travel time out of the EPZ is 4 minutes.

The ETE for ambulances is: 30 + 30 + 4 = 1:05 (rounded to the nearest 5 minutes).

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

Attachment 3 to RAI 13.03-006

Markup of the Affected Portion of ETE Report (Rev. 1), Appendix E, "Special Facility Data"

Lee EPZ: Medical Facilities & Nursing Homes (As of January 2007)								
ERPA	Distance (miles)	Dir-ection	Facility Name	Street Address	Municipality	Phone	Cap-acity	Empl-oyees
CHEROKEE COUNTY								
H-2	8.2	W	Brookview Healthcare Center	510 Thompson St	Gaffney	(864) 489-3101	132	75
H-2	7.9	WNW	Peachtree Healthcare Center	1434 N Limestone St	Gaffney	(864) 487-2717	145	85
H-2	7.9	WNW	Upstate Carolina Medical Center	1530 N Limestone St	Gaffney	(864) 487-4271	125	175
H-2	8.3	WNW	Bethel Senior Day Care Center	218 Dr. LM Rosemond Ln	Gaffney	(864) 489-7552	0	10
H-2	8.6	WNW	Ivy Grove Residential Care	483 Lockhart Ln	Gaffney	(864) 487-0896	62	17
H-2	9.0	WNW	J Claude Fort Community Residence Building I	816 W Montgomery St	Gaffney	(864) 487-4786	8	N/A
H-2	9.0	WNW	J Claude Fort Community Residence Building II	818 W Montgomery St	Gaffney	(864) 487-4787	8	N/A
H-2	9.3	W	Magnolias of Gaffney Assisted Living	223 Tiffany Park	Gaffney	(864) 206-0006	84	40
						Total	~~643~~ 564	~~335~~ 402

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-009

NRC RAI:

ETE-9:

Section 2.3, "Study Assumptions," Assumption #7 states that traffic control point numbers and locations depend on personnel resources and region being evacuated. Discuss whether this variable is considered in the ETE calculations and if so, what is the affect if they are not properly staffed?

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 11, 2008 response to the NRCs Request for Additional Information 13.03-009 (Reference 1).

As noted in the supplemental response to RAI 13.03-031 (Enclosure 19 of this letter) all simulations were re-run (including the sensitivity studies documented in Appendix I of the ETE Report) as a result of a data input error correction. The November 11, 2008, response to this RAI indicated that the worst case scenario (50-50 signal cycle split; 50% green time for competing traffic streams) adds 20 minutes to the ETE for an evacuation of the full EPZ, while a 75-25 signal cycle split adds 10 minutes to the ETE for an evacuation of the full EPZ. The results of the new simulation runs indicate that the ETE for an evacuation of the full EPZ are unaffected by changes in signal timing.

The 100th percentile ETE are unaffected by traffic signal timing based on the new simulation runs. In the Rev. 1 sensitivity studies, ETE for the Entire EPZ increased by as much as 20 minutes for less efficient signal timings. As discussed in the supplemental response to RAI 13.03-048 (Enclosure 19 of this letter), traffic congestion within the EPZ clears by 3 hours and 15 minutes based on the new simulations versus 4 hours and 15 minutes in the Rev. 1 runs. The ETE for Region R03 based on the new simulation runs ranges from 4 hours to 4 hours and 10 minutes, which is reflective of the mobilization time of 4 hours. Therefore, there is no congestion within the EPZ over the last 45 minutes of the evacuation (4 hours minus 3 hours and 15 minutes). The use of less efficient signal timings does not increase congestion for more than 45 minutes and as such, the 100th percentile ETE for Region R03 are unaffected.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.11-05, dated November 11, 2008. (ADAMS Accession No. ML083180158)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Appendix I of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 1.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachment:

1) Markup of the Affected Portions to ETE Report (Rev. 1), Appendix I, "Evacuation Sensitivity Studies"

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

Attachment 1 to RAI 13.03-009

Markup of the Affected Portions to ETE Report (Rev. 1), Appendix I, "Evacuation Sensitivity Studies"

A sensitivity study was conducted to determine the effect of traffic control tactics on the ETE. The traffic signals in the PC-DYNEV simulation were modeled as demand responsive signals; as the traffic varies on the routes approaching the signal, the traffic signal changes to service the approaching traffic. This mimics fully actuated signal control and also reflects the technique that would be used by a traffic guide when directing traffic – the majority of the green time is allotted to the approach with the highest demand.

Theoretically, the worst case scenario, in the event the traffic signals fail to operate properly or none of the TCP are manned, the signals will present even amounts of green time to the competing traffic streams, a 50-50 signal cycle split. Sensitivity studies were performed to compare the ETE for a 50-50 signal cycle split and for a 75-25 signal cycle split (with the major evacuation route receiving 75% of the green time), with the ETE computed on the basis of traffic responsive signal settings. Table I-4 indicates that ETE are not affected by signal timing. As indicated in Section 7.2, congestion persists within Gaffney until 3 hours and 15 minutes after the Advisory to Evacuate; however ETE at the 100th percentile approximate 4 hours. The degradation of signals does not prolong congestion to the point that the 100th percentile ETE are impacted. ~~the worst case scenario (50-50 cycle split) adds 20 minutes to the ETE for an evacuation of the full EPZ for a summer, midweek, midday scenario, while the 75-25 split adds only 10 minutes to the ETE. The majority of the traffic congestion is in Gaffney which is beyond the 5 mile boundary which explains why the 2 mile and 5 mile regions are not impacted by the signal cycle split, but the Entire EPZ is.~~

These results indicate that if the signals fail to operate properly, the manning of all traffic control points outlined in Appendix G will ~~at best reduce the ETE by 20 minutes~~ not improve ETE at the 100th percentile. Regardless of signal operations, traffic control guides should man key intersections throughout the EPZ to serve as fixed point surveillance for accidents or other problems that may arise during the evacuation which could reduce capacity and extend the ETE. Traffic control guides also provide needed route guidance to those evacuees who may not be familiar with the area and the roadway system (i.e., transients), and to those residents who are uncertain of the proper direction of travel.

Table I-4. Evacuation Time Estimates for Signal Splits Sensitivity Study

Signal Cycle Split (major route – minor route)	Evacuation Region		
	2-Mile Region (R01)	5-Mile Region (R02)	Entire EPZ (R03)
50 – 50	4:00	4:05	~~4:40~~4:10
75 – 25	4:00	4:05	~~4:30~~4:10
Traffic Responsive (Base)	4:00	4:05	~~4:20~~4:10

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-012

NRC RAI:

ETE-12:

The routes for individuals requiring public transit are identified in Chapter 8, "Transit-Dependent and Special Facility Evacuation Estimates," but there is no mention of how transit dependent individuals get from their residence to these bus routes. Annex Q, "Fixed Nuclear Facility," of the Cherokee County EOP indicates that people may call in for assistance and will be scheduled for pick-up. *"Walk to the nearest public school if it is within one-half mile. If you live over one-half mile from a public school, you should contact the Cherokee County Emergency Management Agency for assistance."* School buses will then be used to transport these individuals to the reception centers.

a. Discuss if the ETE developed for school in session includes consideration that the same buses will be used to evacuate transit dependent individuals.

b. If the same buses are used, explain the effect on the ETE for the transit dependent residents under this scenario.

c. Discuss if the bus routes on Figure 8-2, "Proposed Transit Dependent Bus Routes," pass by schools to pick up residents.

d. Page 7-4 states that summer implies that school is not in session, but Tables 6-3, "Percent of Population Groups for Various Scenarios," and 6-4, "Vehicle Estimates by Scenario," show 10% of school buses evacuating in Scenarios 1 and 2, and 37 buses on the road for scenarios 1 and 2 (summer mid-week mid-day) and also for scenarios 9 and 10 (winter weekend midday). Discuss why 10% of the school buses are planned for use in Scenarios 1 and 2 which are summer and in Scenarios 9 and 10, which are winter weekend. From where are students being evacuated?

e. Regarding Table 8-7A, "Transit Dependent Evacuation Time Estimates - Good Weather," explain how the inbound bus speed was derived. These buses would be traveling through traffic control points that have been established to prevent pass through traffic. Discuss if this has been considered in the travel speed?

f. Provide a basis for using 30 minutes for pick up time in Table 8-7A "Transit Dependent Evacuation Time Estimates - Good Weather," and Table 8-7B, "Transit Dependent Evacuation time Estimates - Rain."

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's December 17, 2008 response to the NRC's Request for Additional Information 13.03-012 (Reference 1).

As discussed in Duke Energy's December 9, 2008 response to RAI 13.03-031 (Reference 2), the network-wide average speed of 21.2 mph used for school buses in Cherokee County in Revision 1 of the ETE Report is not suitable for those routes through Gaffney where congestion is prevalent and travel speeds are low. As a result, route-specific average speeds were computed for all schools and were provided in Attachment 1 to the December 9, 2008 response to RAI 13.03-031. The route-specific speeds for the schools in Gaffney were significantly less than the network-wide average speed of 21.2 mph.

As discussed in the supplemental response to RAI 13.03-031 (Enclosure 10 of this letter), the ETE simulations were re-run based on the correction of errors in the input stream. The new simulation runs resulted in increased route-specific average speeds (Attachment 1 of Supplemental RAI 13.03-031 (Enclosure 10 of this letter)) for buses evacuating school children relative to those speeds provided in Duke Energy's December 9, 2008 response to RAI 13.03-031. Note, however, that these speeds, although increased relative to the December 9, 2008 response, result in a net effect less than the network-wide average speed of 21.2 mph used for school buses in Cherokee County in Revision 1 of the ETE Report. As a result, travel times and ETE for evacuation of the schools show an increase when compared to Revision 1 of the ETE. However, the increase is less than that described in Duke's December 9, 2008 response to RAI 13.03-031.

The use of route-specific bus speeds and the new simulation runs result in an increase in the average school evacuation ETE to the reception center of 5 minutes in good weather and 10 minutes in rain, as opposed to the 15 and 10 minute increases in good weather and rain, respectively, described in the December 9, 2008 response. The average school evacuation ETE to the reception center for school buses is used in the computation of the second-wave ETE for transit dependents. Thus, the second-wave ETE for transit dependents has changed as a result of the change in route-specific school bus speeds.

As discussed in Duke Energy's November 20, 2008 response to RAI 13.03-018 (Reference 3), the use of network-wide average speed is justified for transit-dependent bus routes. The network-wide average speed has increased from 21.2 mph to 31.5 mph as a result of the new simulation runs. The route travel time for the transit-dependent bus routes has decreased as a result of the increase in network-wide average speed.

The net effect of the increases in route-specific speeds and network-wide average speeds on ETE for the transit-dependent population is a decrease of 15 minutes and 10 minutes for good weather and rain, respectively, for a single wave evacuation, while the ETE for a second wave evacuation decreased by 15 minutes for good weather and was unchanged for rain. Based on a comparison of the first and second waves in the revised Tables 8-7A and 8-7B (Attachments 2 and 3 to this response), reliance on a second wave evacuation results in an increase of 1 hour and 35 minutes (Good Weather) and 1 hour 55 minutes (Rain) in the ETE for the transit dependent population rather than an increase of 1 hour and 50 minutes (good weather) and 2 hours (Rain) detailed in the December 17, 2008 response to this RAI (Reference 1).

Section 8, Table 8-7A and Table 8-7B of the ETE Report (Rev. 1) will be revised as shown in Attachments 1, 2 and 3. Table 8-7A is duplicated in the Executive Summary of the Lee Nuclear Station ETE Report and will also be revised as shown in Attachment 2 although a markup specific to the Executive Summary section page are not provided in this response.

The changes described in this supplemental response will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

References:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12. 20, dated December 17, 2008. (ADAMS Accession No. ML083540416)
2) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12. 01, dated December 9, 2008. (ADAMS Accession No. ML083460112)
3) Duke Energy Letter, Partial Response to Request for Additional Information WLG2008.11-09, dated November 20, 2008. (ADAMS Accession No. ML083300288)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Section 8.4 of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 1.

Revise Table 8-7A of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 2.

Revise Table 8-7B of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 3.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

1) Markup of the Affected Portion of ETE Report (Rev. 1), Section 8.4.
2) Markup of the Affected Portion of ETE Report (Rev. 1), Table 8-7A.
3) Markup of the Affected Portion of ETE Report (Rev. 1), Table 8-7B.

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

Attachment 1 to RAI 13.03-012

Markup of the Affected Portion of ETE Report (Rev. 1), Section 8.4

time from the Advisory to Evacuate until the bus exits the EPZ; and (2) The elapsed time until the bus reaches the School Reception Center. The evacuation time out of the EPZ can be computed as the sum of travel times associated with Activities A→B→C, C→D, and D→E (For example: 90 min. + 15 + ~~7~~ 12 = ~~1:55~~2:00, for Gaffney High School, with good weather rounded up to the nearest 5 minutes). The evacuation time to the School Reception Center is determined by adding the time associated with Activity E→F (discussed below), to this EPZ evacuation time.

Evacuation of Transit-Dependent Population

The buses dispatched from the depots to service the transit-dependent evacuees will be scheduled so that they arrive at their respective routes after their passengers have completed their mobilization. As indicated in Section 5, about 85 percent of the evacuees will complete their mobilization when the buses will begin their routes, 90 minutes after the Advisory to Evacuate.

Those buses servicing the transit-dependent evacuees will first travel along their pick-up routes then proceed out of the EPZ. Buses will travel along the major routes in the EPZ as described in Table 8-6. Many of the bus routes will be concentrated in the City of Gaffney as much of the EPZ population lives within the city limits; there are additional routes servicing the smaller towns in the EPZ such as Blacksburg, Grover, Smyrna, Hickory Grove, and Earl. Figure 8-2 depicts proposed bus route pick-up routes graphically. The travel distance along the respective pick-up routes within the EPZ is measured using GIS software. Bus travel times within the EPZ are computed using the same average speeds (output by the model) used for school evacuation. The network-wide average speed for an evacuation of the full EPZ under Scenario 6 (good weather, school in session) conditions at 90 minutes (mobilization time) is 31.5 mph, while the average speed for an evacuation of the full EPZ under Scenario 7 conditions (rain, school in session) is 26.3 mph.

Tables 8-7A and 8-7B present the transit-dependent population evacuation time estimates for each bus route calculated using the above procedures for good weather and rain, respectively. For example, the ETE for Bus Route Number 3 is computed as 90 + ~~45~~30 + 30 = ~~2:45~~2:30 for good weather. Here, ~~45~~30 minutes is the time to travel 15.9 miles at ~~21.2~~31.5 mph, the average speed output by the model at 90 minutes. The ETE for a second wave (discussed below) is presented in the event there is a shortfall of available buses or bus drivers.

Activity: Travel to School Reception Centers (E→F)

The distances from the EPZ boundary to the school reception centers are measured using Geographical Information Systems (GIS) software along the most likely route from the EPZ to the reception center. The reception centers are assumed to be in the center of the nearest neighboring cities. For a one-wave evacuation, this travel time outside the EPZ does not contribute to the ETE. For a two-wave evacuation, the ETE for buses must be considered separately, since it could exceed the ETE for the general public.

Assumed bus speeds of 45 mph and 40 mph for good weather and rain, respectively, will be applied for this activity.

Activity: Passengers Leave Bus (F→G)

A bus can empty within 5 minutes.

Activity: Bus Returns to Route for Second Wave Evacuation (G→C)

The buses assigned to return to the EPZ to perform a "second wave" evacuation of transit-dependent evacuees will be those that evacuated the schoolchildren. These buses are assigned since they will be the first buses to complete their evacuation service and are therefore the first to be available for the second wave. The passengers leave the bus, and the bus then travels to its route and proceeds to pick up transit-dependent evacuees along the route. The travel time back to the EPZ is calculated using distances estimated from GIS and the assumed bus travel speeds.

The travel times for Bus Route Number 3 are computed as follows for good weather:

- Bus arrives at reception center at 2:~~20~~25 in good weather (average of "ETE to RC (min)" column in Table 8-5A).
- Bus discharges passengers (5 minutes) and driver takes a 15-minute rest: 20 minutes.
- Bus returns to EPZ: 24 minutes (average of "Travel time EPZ Bdry to RC" column in Table 8-5A).
- Bus completes pick-ups along route and departs EPZ: 30 minutes + (15.9 miles @ ~~21.2~~31.5 mph) = ~~1:15~~1:00.
- Bus exits EPZ at time 2:~~20~~25 + 0:20 + 0:24 + ~~1:15~~1:00 = 4:~~20~~10 (rounded up to nearest 5 minutes) after the Advisory to Evacuate.

The ETE for the completion of the second wave for all transit-dependent bus routes are given in Table 8-7.

Evacuation of Ambulatory Persons from Special Facilities

The bus operations for this group are similar to those for school evacuation except:

- Buses are assigned on the basis of 25-30 patients to allow for staff to accompany the patients.
- The passenger loading time will be longer at approximately one minute per patient to account for the time to move patients from inside the facility to the vehicles.

As is done for the schools, it is estimated that mobilization time averages 90 minutes. In the event there is a shortfall of transit vehicles for a "first-wave" evacuation, then buses used to evacuate schools will have to return to evacuate the special facilities. The school ETE to the Reception Centers is 2:20~~0~~5 on average, and about 25 minutes of additional inbound travel time to the special facility from the reception area would be

required. It follows, therefore, that about one hour and ~~fifteen~~ twenty minutes would have to be added to the calculated ETE for special facilities, in the event they are evacuated as a "second wave".

All of the medical facilities are located in Gaffney near the EPZ boundary. It is estimated that buses will have to travel 2 miles, on average, to leave the EPZ. The average speed output by the model at 90 minutes for Region 3, Scenario ~~1~~6 is ~~21.2~~31.5 mph; thus, travel time out of the EPZ is ~~6~~4 minutes.

The ETE for buses evacuating ambulatory patients at medical facilities is the sum of the mobilization time, total passenger loading time, and travel time out of the EPZ. For example, the calculation of ETE for the Peachtree Healthcare Center with 35 ambulatory residents is:

ETE: 90 + 35 x 1 + ~~6~~4 = ~~131~~129 min. or 2:1~~5~~0 rounded up. 3:30 for "second wave".

Table 8-4 indicates that 48 wheelchair bus runs are needed for the entire EPZ. Wheelchair buses and vans are often scarce; however, regular buses can be used to transport wheelchair bound patients. Patients would occupy the front portion of the bus and their wheelchairs would be folded and stacked in the back of the bus. Loading times are estimated at 2 minutes per wheelchair bound person as staff will have to assist them in boarding the bus. For example, the ETE for the wheelchair bound at the Peachtree Healthcare Center is:

ETE: 90 + ~~90~~82 x 2 + ~~6~~4 = 4:~~40~~20 (rounded up to the nearest 5 minutes).

Thus, the ETE for special facilities may exceed the general population ETE.

Emergency Medical Services (EMS) Vehicles

The previous discussion focused on transit operations for ambulatory persons residing at medical facilities within the Evacuation Region. It is also necessary to provide transit services to non-ambulatory persons who do not – or cannot – have access to private vehicles. Based on the data provided in Table 8-4, a total of 20 ambulance runs are needed to evacuate all of the bed ridden patients in the EPZ, assuming 2 people per ambulance. These ambulances will be provided by EMS providers within the EPZ. Additional ambulances will be provided by neighboring cities.

It is conservatively estimated that 30 minutes will be needed to mobilize ambulances and travel to the medical facilities. Loading times are also conservatively estimated as 30 minutes. As with the buses transporting ambulatory patients, ambulances will have to travel 2 miles, on average, to leave the EPZ. The average speed output by the model at 1 hour for Region 3, Scenario 1 is 32.1 mph; thus, travel time out of the EPZ is 4 minutes.

The ETE for ambulances is: 30 + 30 + 4 = 1:05 (rounded to the nearest 5 minutes).

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

Attachment 2 to RAI 13.03-012

Markup of the Affected Portion of ETE Report (Rev. 1), Table 8-7A

Table 8-7A. Transit-Dependent Evacuation Time Estimates - GOOD WEATHER

	Single Wave					Second Wave						
Route Number	Mobilization (min.)	Route Length (mi.)	Route Travel Time (min.)	Pickup Time (min.)	ETE (hr:min)	Arrive at RC (min.)	Unload (min.)	Driver Rest (min.)	Return to EPZ (min.)	Route Travel Time (min.)	Pickup Time (min.)	ETE (hr:min)
1	90	22.3	4263	30	2:403:05	145140	5	15	24	4263	30	4:204:40
2	90	9.9	1928	30	2:202:30	145140	5	15	24	1928	30	4:004:05
3	90	15.9	3045	30	2:302:45	145140	5	15	24	3045	30	4:104:20
4	90	23.9	4668	30	2:453:10	145140	5	15	24	4668	30	4:254:45
5	90	7.0	1320	30	2:152:20	145140	5	15	24	1320	30	3:503:55
6	90	9.1	1726	30	2:152:30	145140	5	15	24	1726	30	3:554:00
7	90	12.6	2436	30	2:252:40	145140	5	15	24	2436	30	4:054:10
8	90	12.2	2334	30	2:252:35	145140	5	15	24	2334	30	4:004:10
9	90	17.4	3349	30	2:352:50	145140	5	15	24	3349	30	4:104:25
10	90	18.8	3653	30	2:352:55	145140	5	15	24	3653	30	4:154:30
11	90	15.9	3045	30	2:302:45	145140	5	15	24	3045	30	4:104:20
			Average for EPZ:		2:302:45					Average for EPZ:		4:054:20

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

Attachment 3 to RAI 13.03-012

Markup of the Affected Portion of ETE Report (Rev. 1), Table 8-7B

Table 8-7B. Transit-Dependent Evacuation Time Estimates - RAIN

	Single Wave					Second Wave						
Route Number	Mobilization (min.)	Route Length (mi.)	Route Travel Time (min.)	Pickup Time (min.)	ETE (hr:min)	Arrive at RC (min.)	Unload (min.)	Driver Rest (min.)	Return to EPZ (min.)	Route Travel Time (min.)	Pickup Time (min.)	ETE (hr:min)
1	100	22.3	5166	40	3:103:30	170160	5	15	26	5166	40	5:055:15
2	100	9.9	2329	40	2:452:50	170160	5	15	26	2329	40	4:404:35
3	100	15.9	3647	40	2:553:10	170160	5	15	26	3647	40	4:504:55
4	100	23.9	5570	40	3:153:30	170160	5	15	26	5570	40	5:105:20
5	100	7.0	1621	40	2:352:45	170160	5	15	26	1621	40	4:30
6	100	9.1	2127	40	2:402:50	170160	5	15	26	2127	40	4:35
7	100	12.6	2937	40	2:503:00	170160	5	15	26	2937	40	4:45
8	100	12.2	2836	40	2:503:00	170160	5	15	26	2836	40	4:45
9	100	17.4	4051	40	3:003:15	170160	5	15	26	4051	40	4:555:00
10	100	18.8	4355	40	3:003:15	170160	5	15	26	4355	40	5:005:05
11	100	15.9	3647	40	2:553:10	170160	5	15	26	3647	40	4:504:55
				Average for EPZ:	2:553:05						Average for EPZ:	4:50

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-014

NRC RAI:

ETE-14:

For Table 6-4, "Vehicle Estimates by Scenario," discuss the basis for the number of shadow evacuation vehicles. Explain why the shadow evacuee number of vehicles did not increase for the projected 2011 population whereas the other populations (vehicles) projected to this year did increase.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 20, 2008 response to the NRCs Request for Additional Information (RAI) 13.03-014 (Reference 1).

This response has been revised to reflect anticipated peak construction year 2016 population numbers versus the year 2011 population numbers that were used in Rev. 1 of the ETE Report. The methodology for estimating shadow population discussed in Duke Energy's November 20, 2008 response has not changed but the value has been revised to reflect the population estimates for a peak construction year of 2016. Extrapolating the population an additional 5 years also resulted in increased estimated values for Residents with Commuters, Residents without Commuters and Shadow vehicles as provided in Attachment 1 of this response.

In addition, the value for Special Events vehicles has been revised to incorporate the vehicle information that was provided in Attachment 1 to Duke Energy's November 20, 2008 response to NRC RAI 13.03-021 (Reference 1).

The changes described in this supplemental response and provided as Attachment 1 will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information WLG2008.11-09, dated November 20, 2008. (ADAMS Accession No. ML083300288)

Associated Revision to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Table 6-4 of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 1.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachment:

1) Markup of the Affected Portions of ETE Report (Rev. 1), Table 6-4, "Vehicle Estimates by Scenario"

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

Attachment 1 to RAI 13.03-014

Markup of Affected Portions of ETE Report (Rev. 1), Table 6-4, "Vehicle Estimates by Scenario"

Table 6-4. Vehicle Estimates By Scenario

Scenarios	Residents with Commuters	Residents without Commuters	Employees	Transients	Shadow	Special Events	School Buses	Transit Buses	External Traffic	Total Scenario Vehicles
1	18,136	8,384	8,423	1,395	7,768	-	37	84	9,450	53,677
2	18,136	8,384	8,423	1,395	7,768	-	37	84	9,450	53,677
3	1,814	24,706	4,124	2,790	6,813	-	-	84	9,450	49,781
4	1,814	24,706	4,124	2,790	6,813	-	-	84	9,450	49,781
5	1,814	24,706	877	1,256	6,091	-	-	84	5,670	40,498
6	18,136	8,384	8,774	837	7,847	-	368	84	9,450	53,880
7	18,136	8,384	8,774	837	7,847	-	368	84	9,450	53,880
8	18,136	8,384	8,774	837	7,847	-	368	84	9,450	53,880
9	1,814	24,706	4,124	1,674	6,813	-	37	84	9,450	48,702
10	1,814	24,706	4,124	1,674	6,813	-	37	84	9,450	48,702
11	1,814	24,706	877	698	6,091	-	-	84	5,670	39,940
12	19,264~~18,618~~*	8,928~~8,616~~*	8,423	1,395	8,656~~7,768~~*	~~2,525~~3,100	37	84	9,450	59,337~~54,149~~

***The peak construction year estimated by Duke Energy is ~~2011~~2016. The permanent resident population and shadow population have been extrapolated to ~~2011~~2016 using the estimated average yearly percentage growth provided by the US Census for each county.**

Note: The above changes include revisions previously provided in responses to NRC RAI 13.03-014, RAI 13.03-021 and RAI 13.03-041. The changes discussed in this supplemental response are highlighted.

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-015

NRC RAI:

ETE-15:

In Table 8-1, "Transit Dependent Population Estimates," the transit dependent population definition does not include any individuals with special needs. The South Carolina Radiological Emergency Response Plan, IV, (B)(6)(h) states that transportation will be provided to residents who are homebound and require special transportation. Provide information to support that there are no transit dependent special needs individuals who would require medical support during an evacuation or include appropriate details in the ETE to address this population group.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's December 23, 2008 response to the NRCs Request for Additional Information 13.03-015 (Reference 1).

As discussed in the supplemental response to RAI 13.03-006 (Enclosure 1 of this letter) the number of ambulance runs necessary to evacuate the special needs population has been increased from the 20 discussed in the initial response to RAI 13.03-015 (Reference 1) to a requirement of 24.

This change will be included in Revision 2 of the Lee Nuclear Station ETE Report as provided in Attachment 1.

In addition to the one material change described above, Attachment 1 also identifies numerous editorial and format changes to the markup provided in the initial response that will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

References:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) Ltr #WLG2008.12-24, dated December 23, 2008. (ADAMS Accession No. ML083660272)

Associated Revision to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Section 8.5 of the Lee Nuclear Station ETE Report as incorporated by the December 23, 2008, response to RAI 13.03-015 (Reference 1) as described in Attachment 1.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachment:

1) Markup of Affected Portions of Section 8.5, "Special Needs Population" as Previously Incorporated by the RAI 13.03-015 Response (Reference 1)

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

Attachment 1 to RAI 13.03-015

Markup of Affected Portions of Section 8.5, "Special Needs Population" as Previously Incorporated by the RAI 13.03-015 (Reference 1) Response

8.5 Special Needs Population

For the year 2000, census data yields 13,102 disabled persons compared with a total population in Cherokee County of 52,537, or 24.9%. For York County, in 2000, 30,084 disabled persons out of 164,614 total population yields 18.3%. The statewide figure in 2000 was 20.2%.

The estimate of homebound disabled who are transit dependent, is developed as follows:

1. Assume that a disabled person living at home would not likely live alone, if there were no access to transportation. Based on the telephone survey data performed during preparation of the ETE, documented in Appendix F ~~of the ETE Report~~, 2.55% of households of 2~~, 3~~ or more persons had no access to a privately owned vehicle (POV).
2. Estimate the total number of households (HH) within the EPZ that have 2 or more persons, based on the average of 2.62 persons/HH (p. F-2 ~~of the ETE Report~~):

   $$48{,}249 \div 2.62 \times (470 \div 591) = 14{,}645$$

   In this case, 48,249 is the estimated population in 2007 (Table 3-1 ~~of the ETE Report~~); (470/591) is the proportion of HH with 2+ persons to the total number of HH surveyed.
3. The number of such HH with no privately owned vehicles (POV) available is 14,645 x 0.0255 = 373.
4. Assume no more than one disabled person per HH. Then the blended percentage of HH with a disabled person that are within the EPZ is:

   $$24.9 \times 0.913 + 18.3 \times 0.087 = 24.3\%$$

   For this case 24.9 and 18.3 are the percentages of disabled persons in Cherokee and York Counties, respectively, obtained from census data, and reported above. Cherokee County has 91.3% of the combined population of York and Cherokee Counties within the EPZ. It is assumed that this blended percentage also applies to ERPA A-3 in Cleveland County.
5. Then the number of such HH with disabled persons is:

   $$0.243 \times 373 = 91$$

   It is reasonable to expect that all HH members will accompany the disabled person. Based on the telephone survey results ~~conducted in support of the ETE Report preparation~~, these HH with 2+ persons and no POV average 2.5 persons. Thus, transportation must be provided for:

   $$2.5 \times 91 = 228 \text{ persons, including 91 disabled persons.}$$

Catawba Special Needs Data

The Catawba Nuclear Station is located in York County, approximately 25 miles east of the proposed Lee site. The Catawba EPZ includes parts of York, Mecklenburg, and Gaston Counties. The population within the York County portion of the EPZ is 231,682 people. Based on information provided by York County Office of Emergency Management (OEM), there are 1,096 special needs persons currently registered within the York County portion of the Catawba EPZ. The ~~following data~~ transportation needs of these special needs persons were provided by York County ~~Office of Emergency Management:~~ OEM and are documented in Table 8-9.

~~York County Special Needs Population Residing within Catawba EPZ~~		
~~Transportation Needed~~	~~Number of Persons~~	~~Percentage of York County EPZ Population~~
~~Non-Specific Transportation~~	~~573~~	~~0.25%~~
~~Ambulance~~	~~91~~	~~0.04%~~
~~Wheelchair Van~~	~~67~~	~~0.03%~~
~~No Transportation Assistance needed~~	~~365~~	~~0.16%~~
~~Total~~	~~1,096~~	~~0.48%~~

~~A comparison with Lee follows:~~

~~Population~~	~~Lee EPZ (based on Census data)~~	~~Catawba EPZ (based on special needs registration data)~~
~~Entire EPZ~~	~~48,249~~	~~231,682~~
~~Special Needs persons~~	~~228~~	~~1,096~~
~~Percent~~	~~0.47~~	~~0.48~~

A comparison of the special needs population estimates for the proposed Lee EPZ and the existing special needs population within the Catawba EPZ is provided in Table 8-10. Given this close agreement of two independent estimates in the same region, as shown in Table 8-9 it appears that these estimates of special needs persons within the Lee EPZ provided above are reasonable.

Data are not available at this time to estimate the number of homebound individuals within the proposed Lee EPZ that require special vehicles/specially equipped vehicles. These individuals will be self identified to the counties by responding to annual mailings to EPZ residents. Once the number of individuals fitting this small category is identified, future planning efforts will develop appropriate mechanisms for evacuation.

Due to the close proximity of the proposed Lee EPZ and the existing Catawba EPZ, it is appropriate to use the special needs transportation data from Catawba to estimate the needs for the proposed Lee EPZ. Based on the analysis shown above, the following transportation needs are estimated for the Lee EPZ:

- 19 people $[228 \times (91 \div 1096)]$ will require an ambulance to be evacuated.
- 14 people $[228 \times (67 \div 1096)]$ will require a wheelchair van to be evacuated.
- 120 people $[228 \times (573 \div 1096)]$ will require "non-specific transportation" which is assumed to be buses.

ETE for Special Needs Persons

Ambulances

It is estimated that 2~~0~~4 ambulance runs will be needed to evacuate the institutionalized bed-ridden population within the EPZ. The ETE for these ambulances is estimated at 1:05 ~~minutes(hr:min)~~ as discussed on page 8-~~8~~9 ~~of the ETE Report~~. These ambulances would be able to return to the EPZ by 2 hours and 15 minutes (1:05 + 30 + 15 + 25) if the institutionalized bed-ridden population is evacuated to host hospitals in Spartanburg, given 30 minutes to travel to Spartanburg, 15 minutes to unload and 25 minutes to return to the EPZ. The return trip is quicker as the vehicle is traveling counter to the flow of evacuees. As estimated above, there are 19 homebound special needs persons who require an ambulance to be evacuated. Assuming a capacity of 2 persons per ambulance (see page 8-4 ~~of the ETE Report~~), 10 ambulances are needed. Each ambulance will make 2 stops with an estimated distance of 5 miles between stops and an estimated distance of 5 miles to the EPZ boundary after the final stop. It is conservatively assumed that ambulances will travel at 30 mph within the EPZ.

The ETE are computed as follows:

a. Ambulances arrives at first household: 2:15
b. Loading time at first household: 30 minutes
c. Ambulance travels to second household: 5 miles @ 30 mph = 10 minutes
d. Loading time at second household: 30 minutes
e. Ambulance travel time to EPZ boundary at 3:25: 5 miles @ 30 mph = 10 minutes

ETE: 2:15 + 30 + 10 + 30 + 10 = 3:35

If additional ambulances are available in Spartanburg – assume that 90 minutes would be needed to mobilize the ambulances and arrive at the first household.

ETE: 1:30 + 30 + 10 + 30 + 10 = 2:50

Wheel-Chair Vans

Page 8-4 ~~of the ETE Report~~ identifies a wheelchair van capacity of 4 wheelchairs per trip. As estimated above, there are 14 special needs persons within the EPZ requiring wheelchair van transportation; therefore 4 wheelchair vans are needed. Assuming one special needs person per household, each wheelchair van will service about 4 households. It is conservatively assumed that the households are spaced 5 miles apart and that van speeds approximate those of school buses = 20 mph between households.

a. Assumed mobilization time for wheelchair van resources to arrive at first household: 1:30
b. Loading time at first household: 15 minutes
c. Travel to next household: 3 @ 15 minutes (5 miles @ 20 mph) = 45 minutes
d. Loading time: 3 @ 15 minutes = 45 minutes
e. Wheelchair van travel time to EPZ boundary at 3:15: 5 miles @ 20 mph = 15 minutes

ETE: 1:30 + 15 + 45 + 45 + 15 = 3:30

Non-Specific Transportation

This population is considered to be ambulatory and are included in the transit-dependent population evacuated following the completion of school evacuations. It is assumed that the majority of these individuals will be able to reach the designated school pickup locations; those that are unable to get to a pickup location are expected to register with the county emergency management agency so that a bus can be dispatched to their residence for pickup.

While these individuals may require longer boarding time per stop and may require the bus to travel a distance further off the designated route; given the relatively small numbers, it is not expected that the time will have any significant negative impact on the overall ETE.

Table 8-9: York County Special Needs Population Residing within the Catawba EPZ		
Transportation Needed	**Number of Persons**	**Percentage of York County EPZ Population**
Non-Specific Transportation	573	0.25%
Ambulance	91	0.04%
Wheelchair Van	67	0.03%
No Transportation Assistance needed	365	0.16%
Total	**1,096**	**0.48%**

Table 8-10: Comparison of Special Needs Population		
Population	**Lee EPZ (based on Census data)**	**Catawba EPZ (based on special needs registration data)**
Entire EPZ	48,249	231,682
Special Needs persons	228	1,096
Percent	**0.47**	**0.48**

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-026

NRC RAI:

ETE-26

Table 8-4, "Special Facility-Transit Demands," does not appear to include all of the special facilities within the EPZ. Discuss why the J. Claude Fort Community Residence; Magnolias of Gaffney Assisted Living; and others were not included in the table. Explain any effect on the ETE if additional facilities are included in the ETE calculation.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's December 9, 2008 response to the NRCs Request for Additional Information 13.03-026 (Reference 1).

Table 8-4 of Revision 1 of the Lee Nuclear Station ETE Report will be revised as described and shown in Attachment 1 of the supplemental response to RAI 13.03-006 (Enclosure 1of this letter) to incorporate information associated with the additional facilities identified within the Lee Nuclear Station Emergency Planning Zone.

The changes described will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12. 01, dated December 9, 2008. (ADAMS Accession No. ML083460112)

Associated Revision to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Table 8-4 of the Lee Nuclear Station ETE Report (Rev 1) as provided in the supplemental response to RAI 13.03-006 (Enclosure 1, this letter).

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachment:

None

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-028

NRC RAI:

ETE-28:

Table 8-2, "School Population Demand Estimates," indicates approximately 200 buses are needed to support the school evacuation. The ETE provided in Table 8-5A, "School Evacuation Time Estimates-Good Weather," and Table 8-5B, "School Evacuation Time Estimates-Rain," indicates one bus run. No information is provided to support that there are enough buses available to evacuate all schools simultaneously. Section 8-4, "Evacuation Time Estimates for Transit-Dependent-People, (page 8-4) states that if the impacted region is other than R3, there will likely be ample transit resources. It appears that R22 would impact all of the schools in Gaffney and Blacksburg and R21 would possibly affect these schools as well.

a. Provide information to support that there are enough buses available to evacuate all schools simultaneously and begin the bus routes for transit dependent residents?

b. If there are not enough buses to complete these activities concurrently, explain any effect on the ETE if multiple bus trips must be made.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 25, 2008 response to the NRC's Request for Additional Information 13.03-028 (Reference 1).

As discussed in the November 25, 2008 response to this RAI, Cherokee County does not have sufficient buses to accomplish a single wave evacuation of the school children. There are 60 buses available county-wide and 172 buses are needed to accomplish evacuation of school children in a single wave. Relying solely on Cherokee County resources would entail a three-wave evacuation for Cherokee County schools. Duke Energy's December 11, 2009 response to the NRC's Request for Additional Information 13.03-076 (Reference 2) provides additional information addressing the existing agreements established between the state and counties coordinating agencies discussed here. The South Carolina Statewide Mutual Aid Agreement for Catastrophic Disaster Response and Recovery (Mutual Aid Agreement) implements the South Carolina Code of Laws, Section 6-11-1810, which provides that "any municipality, fire district, fire protection agency, or other emergency service entity may provide mutual aid assistance, upon request, from any other municipality, fire district, fire protection agency, or other emergency service delivery system in South Carolina at the time of a significant incident such as fire, earthquake, hurricane, flood, tornado, hazardous material event, or other such disaster." As a signatory to the Mutual Aid Agreement, Cherokee County can request additional buses to support evacuation of schools and transit-dependent individuals.

Given that the ETE analysis is an emergency planning tool that assesses, in an organized and systematic fashion, the feasibility of taking protective measures for the population in the area surrounding a nuclear power plant it serves as a tool for preplanning as well as protective action decision making. As such, the ETE Report will be revised to include evacuation times for a two-wave and a three-wave evacuation although exercising the Mutual Aid Agreement may allow for a single-wave evacuation using additional buses provided from the adjoining counties. The additional information will allow State and local officials to determine, on an event-specific basis, the appropriate resources needed for evacuation of the Cherokee County schools.

Table 8-5C and Table 8-5D will be added to the ETE Report to provide a second-wave ETE for Cherokee County schools in good weather and rain, respectively. Table 8-5E and Table 8-5F will be added to the ETE Report to provide a third-wave ETE for Cherokee County schools in good weather and rain, respectively. Text will be added to Section 8.4 of the ETE Report to discuss the shortfall of buses in Cherokee County, the South Carolina state-wide mutual aid agreement and to reference Tables 8-5C through 8-5F.

The changes described in this supplemental response, as provided in Attachment 1, will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) WLG2008.11-11, dated November 25, 2008. (ADAMS Accession No. ML090690313)
2) Duke Energy Letter, Response to Request for Additional Information (RAI No. 3255) WLG2009.12-06, dated December 11, 2009. (ADAMS Accession No. ML093490764)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Section 8 of the Lee Nuclear Station ETE Report (Rev 1), Subsection 8.4 and add new Tables 8-5C through 8-5F as provided in Attachment 1.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachment:

1) Markup of the Affected Portions of ETE Report (Rev 1), Section 8, "Transit-Dependent and Special Facility Evacuation Time Estimates"

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

Attachment 1 to RAI 13.03-028

Markup of the Affected Portions of ETE Report (Rev 1), Section 8, "Transit-Dependent and Special Facility Evacuation Time Estimates"

Evacuation Time Estimates for Transit Trips were developed using both good weather and adverse weather conditions. Figure 8-1 presents the chronology of events relevant to transit operations. The elapsed time for each activity will now be discussed with reference to Figure 8-1.

Activity: Mobilize Drivers (A→B→C)

Mobilization is the elapsed time from the Advisory to Evacuate until the time the buses arrive at the facility to be evacuated. It is assumed that for a rapidly escalating radiological emergency with no observable indication before the fact, drivers would likely require 90 minutes to be contacted, to travel to the depot, be briefed, and to travel to the transit-dependent facilities. Mobilization time is slightly longer – 100 minutes – when raining. The buses are kept at the school for Hickory Grove-Sharon Elementary in York County and Grover Elementary in Cleveland County, thus the mobilization time is only 30 minutes for these schools, 35 minutes when raining.

Activity: Board Passengers (C→D)

Fort Mill School District in York County conducted evacuation drills in 2006 and estimated bus loading times during the drills. The loading times ranged from 12 to 20 minutes with an average loading time of 15 minutes. Therefore, the bus loading time used for this study is 15 minutes, 20 minutes in rain. Transit dependent bus loading time is estimated at 30 minutes (40 minutes for rain) to account for the delay incurred in making multiple stops along routes to pick up passengers.

Activity: Travel to EPZ Boundary (D→E)

School Evacuation

Discussions with county emergency management officials indicate the following bus resources, by county:

- Cherokee County: 60 Buses
- Cleveland County: 178 Buses
- York County: 40 Buses

Comparison of the available bus resources with the number of buses needed in Table 8-2 indicates that Cherokee County does not have sufficient bus resources to evacuate school children in a single wave. A state-wide mutual aid agreement exists in South Carolina whereby neighboring counties would assist Cherokee County. Nonetheless, a three-wave school evacuation is considered for Cherokee County Schools in the event the county is unable to obtain assistance through the state-wide mutual aid agreement.

The distance from a school to the EPZ boundary is measured using Geographical Information Systems (GIS) software along the most likely route out of the EPZ. The travel times to the EPZ boundary are based on evacuation speeds computed by the model. The average speed for an evacuation of the full EPZ under Scenario 1 (good weather) condition at 90 minutes (mobilization time) is 21.2 mph, while the average speed for an evacuation of the full EPZ under Scenario 2 conditions (Rain) is 20.4 mph. The average speeds are 47.9 mph. The travel time from the EPZ boundary to the Reception Center was computed assuming an average speed of 45 mph and 40 mph for good weather and rain, respectively. Based on discussions with the counties, there are adequate buses to evacuate the schoolchildren in a single wave.

Tables 8-5A (good weather) and 8-5B (rain) present evacuation time estimates (rounded up to the nearest 5 minutes) for schools in the EPZ: (1) The elapsed time from the Advisory to Evacuate until the bus exits the EPZ; and (2) The elapsed time until the bus reaches the School Reception Center. The evacuation time out of the EPZ can be computed as the sum of travel times associated with Activities A→B→C, C→D, and D→E (For example: 90 min. + 15 + 7 = 1.55, for Gaffney High School, with good weather rounded up to the nearest 5 minutes). The evacuation time to the School Reception Center is determined by adding the time associated with Activity E→F (discussed below), to this EPZ evacuation time.

Tables 8-5C and D present ETE for a two-wave evacuation of Cherokee County Schools in good weather and rain, respectively, while Tables 8-5E and F present ETE for a three-wave evacuation.

Evacuation of Transit-Dependent Population

The buses dispatched from the depots to service the transit-dependent evacuees will be scheduled so that they arrive at their respective routes after their passengers have completed their mobilization. As indicated in Section 5, about 85 percent of the evacuees will complete their mobilization when the buses will begin their routes, 90 minutes after the Advisory to Evacuate.

Those buses servicing the transit-dependent evacuees will first travel along their pick-up routes then proceed out of the EPZ. Buses will travel along the major routes in the EPZ as described in Table 8-6. Many of the bus routes will be concentrated in the City of Gaffney as much of the EPZ population lives within the city limits; there are additional routes servicing the smaller towns in the EPZ such as Blacksburg, Grover, Smyrna, Hickory Grove, and Earl. Figure 8-2 depicts proposed bus route pick-up routes graphically. The travel distance along the respective pick-up routes within the EPZ is measured using GIS software. Bus travel times within the EPZ are computed using the same average speeds (output by the model) used for school evacuation.

Tables 8-7A and 8-7B present the transit-dependent population evacuation time estimates for each bus route calculated using the above procedures for good weather and rain, respectively. For example, the ETE for Bus Route Number 3 is computed as 90 + 45 + 30 = 2:45 for good weather. Here, 45 minutes is the time to travel 15.9 miles at 21.2 mph, the average speed output by the model at 90 minutes. The ETE for a second wave (discussed below) is presented in the event there is a shortfall of available buses or bus drivers.

Activity: Travel to School Reception Centers (E→F)

The distances from the EPZ boundary to the school reception centers are measured using Geographical Information Systems (GIS) software along the most likely route from the EPZ to the reception center. The reception centers are assumed to be in the center of the nearest neighboring cities. For a one-wave evacuation, this travel time outside the EPZ does not contribute to the ETE. For a two-wave evacuation, the ETE for buses must be considered separately, since it could exceed the ETE for the general public.

Table 8-5C. Second Wave School Evacuation Time Estimates - Good Weather										
School	Arrive at RC First Wave (min)	Driver Rest Time (min)	Travel Time back to EPZ Bdry	Loading Time (min)	Dist. to EPZ Boundary (mi.)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bndry to R.C. (mi.)	Travel Time EPZ Bdry to RC (min)	ETE to R.C. (hr:min)
Cherokee County Schools										
Blacksburg Middle	135	15	19	15	8.4	11	3:15	14.2	19	3:35
Cherokee Technology Center	160	15	22	15	6.9	9	3:45	15.8	22	4:05
Blacksburg Elementary	135	15	19	15	8.3	11	3:15	14.2	19	3:35
Blacksburg High	135	15	19	15	8.2	11	3:15	14.2	19	3:35
Blacksburg Primary	135	15	19	15	5.8	8	3:15	14.2	19	3:35
Corinth Elementary	145	15	29	15	6.4	9	3:35	21.4	29	4:05
Limestone-Central Elementary	155	15	29	15	4.3	6	3:40	21.7	29	4:10
Limestone College	135	15	22	15	4.9	7	3:15	15.8	22	3:40
Alma Elementary	160	15	22	15	7.3	10	3:45	15.8	22	4:05
B.D. Lee Elementary	185	15	28	15	4.2	6	4:10	20.4	28	4:40
Draytonville Elementary	165	15	22	15	10.5	14	3:55	15.8	22	4:15
Ewing Middle	160	15	22	15	6.8	9	3:45	15.8	22	4:05
Gaffney Christian Academy	185	15	28	15	4.2	6	4:10	20.4	28	4:40
Gaffney High	145	15	28	15	2.2	3	3:30	20.4	28	3:55
Gaffney Middle	155	15	22	15	5.3	7	3:35	15.8	22	4:00
Granard Middle	150	15	28	15	2.9	4	3:35	20.4	28	4:00
Grassy Pond Elementary	140	15	34	15	0.4	1	3:25	25.1	34	4:00
Heritage Christian School	160	15	22	15	9.2	12	3:45	15.8	22	4:10
Luther Vaughan Elementary	185	15	28	15	4.8	6	4:10	20.4	28	4:40
Mary Bramlett Elementary	155	15	22	15	5.8	8	3:35	15.8	22	4:00
						Average for EPZ:	3:35		Average:	4:00

Table 8-5D. Second Wave School Evacuation Time Estimates - Rain										
School	Arrive at RC First Wave (min)	Driver Rest Time (min)	Travel Time back to EPZ Bdry	Loading Time (min)	Dist. to EPZ Boundary (mi.)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bndry to R.C. (mi.)	Travel Time EPZ Bdry to RC (min)	ETE to R.C. (hr:min)
Cherokee County Schools										
Blacksburg Middle	155	15	22	20	8.4	13	3:45	14.2	22	4:10
Cherokee Technology Center	190	15	24	20	6.9	10	4:20	15.8	24	4:45
Blacksburg Elementary	155	15	22	20	8.3	12	3:45	14.2	22	4:10
Blacksburg High	155	15	22	20	8.2	12	3:45	14.2	22	4:10
Blacksburg Primary	155	15	22	20	5.8	9	3:45	14.2	22	4:05
Corinth Elementary	170	15	33	20	6.4	10	4:10	21.4	33	4:45
Limestone-Central Elementary	175	15	33	20	4.3	6	4:10	21.7	33	4:45
Limestone College	155	15	24	20	4.9	7	3:45	15.8	24	4:05
Alma Elementary	190	15	24	20	7.3	11	4:20	15.8	24	4:45
B.D. Lee Elementary	215	15	31	20	4.2	6	4:50	20.4	31	5:20
Draytonville Elementary	180	15	24	20	10.5	16	4:15	15.8	24	4:40
Ewing Middle	180	15	24	20	6.8	10	4:10	15.8	24	4:35
Gaffney Christian Academy	215	15	31	20	4.2	6	4:50	20.4	31	5:20
Gaffney High	170	15	31	20	2.2	3	4:00	20.4	31	4:30
Gaffney Middle	175	15	24	20	5.3	8	4:05	15.8	24	4:30
Granard Middle	170	15	31	20	2.9	4	4:00	20.4	31	4:35
Grassy Pond Elementary	160	15	38	20	0.4	1	3:55	25.1	38	4:35
Heritage Christian School	195	15	24	20	9.2	14	4:30	15.8	24	4:55
Luther Vaughan Elementary	210	15	31	20	4.8	7	4:45	20.4	31	5:15
Mary Bramlett Elementary	190	15	24	20	5.8	9	4:20	15.8	24	4:45
						Average for EPZ:	4:10		Average:	4:40

Table 8-5E. Third Wave School Evacuation Time Estimates - Good Weather										
School	Arrive at RC Second Wave (min)	Driver Rest Time (min)	Travel Time back to EPZ Bdry	Loading Time (min)	Dist. to EPZ Boundary (mi.)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bndry to R.C. (mi.)	Travel Time EPZ Bdry to RC (min)	ETE to R.C. (hr:min)
Cherokee County Schools										
Blacksburg Middle	215	15	19	15	8.4	11	4:35	14.2	19	4:55
Cherokee Technology Center	245	15	22	15	6.9	9	5:10	15.8	22	5:30
Blacksburg Elementary	215	15	19	15	8.3	11	4:35	14.2	19	4:55
Blacksburg High	215	15	19	15	8.2	11	4:35	14.2	19	4:55
Blacksburg Primary	215	15	19	15	5.8	8	4:35	14.2	19	4:55
Corinth Elementary	245	15	29	15	6.4	9	5:15	21.4	29	5:45
Limestone-Central Elementary	250	15	29	15	4.3	6	5:15	21.7	29	5:45
Limestone College	220	15	22	15	4.9	7	4:40	15.8	22	5:05
Alma Elementary	245	15	22	15	7.3	10	5:10	15.8	22	5:30
B.D. Lee Elementary	280	15	28	15	4.2	6	5:45	20.4	28	6:15
Draytonville Elementary	255	15	22	15	10.5	14	5:25	15.8	22	5:45
Ewing Middle	245	15	22	15	6.8	9	5:10	15.8	22	5:30
Gaffney Christian Academy	280	15	28	15	4.2	6	5:45	20.4	28	6:15
Gaffney High	235	15	28	15	2.2	3	5:00	20.4	28	5:25
Gaffney Middle	240	15	22	15	5.3	7	5:00	15.8	22	5:25
Granard Middle	240	15	28	15	2.9	4	5:05	20.4	28	5:30
Grassy Pond Elementary	240	15	34	15	0.4	1	5:05	25.1	34	5:40
Heritage Christian School	250	15	22	15	9.2	12	5:15	15.8	22	5:40
Luther Vaughan Elementary	280	15	28	15	4.8	6	5:45	20.4	28	6:15
Mary Bramlett Elementary	240	15	22	15	5.8	8	5:00	15.8	22	5:25
						Average for EPZ:	5:05		Average:	5:30

Table 8-5F. Third Wave School Evacuation Time Estimates - Rain										
School	Arrive at RC Second Wave (min)	Driver Rest Time (min)	Travel Time back to EPZ Bdry	Loading Time (min)	Dist. to EPZ Boundary (mi.)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bndry to R.C. (mi.)	Travel Time EPZ Bdry to RC (min)	ETE to R.C. (hr:min)
Cherokee County Schools										
Blacksburg Middle	250	15	22	20	8.4	13	5:20	14.2	22	5:45
Cherokee Technology Center	285	15	24	20	6.9	10	5:55	15.8	24	6:20
Blacksburg Elementary	250	15	22	20	8.3	12	5:20	14.2	22	5:45
Blacksburg High	250	15	22	20	8.2	12	5:20	14.2	22	5:45
Blacksburg Primary	245	15	22	20	5.8	9	5:15	14.2	22	5:35
Corinth Elementary	285	15	33	20	6.4	10	6:05	21.4	33	6:40
Limestone-Central Elementary	285	15	33	20	4.3	6	6:00	21.7	33	6:35
Limestone College	245	15	24	20	4.9	7	5:15	15.8	24	5:35
Alma Elementary	285	15	24	20	7.3	11	5:55	15.8	24	6:20
B.D. Lee Elementary	320	15	31	20	4.2	6	6:35	20.4	31	7:05
Draytonville Elementary	280	15	24	20	10.5	16	5:55	15.8	24	6:20
Ewing Middle	275	15	24	20	6.8	10	5:45	15.8	24	6:10
Gaffney Christian Academy	320	15	31	20	4.2	6	6:35	20.4	31	7:05
Gaffney High	270	15	31	20	2.2	3	5:40	20.4	31	6:10
Gaffney Middle	270	15	24	20	5.3	8	5:40	15.8	24	6:05
Granard Middle	275	15	31	20	2.9	4	5:45	20.4	31	6:20
Grassy Pond Elementary	275	15	38	20	0.4	1	5:50	25.1	38	6:30
Heritage Christian School	295	15	24	20	9.2	14	6:10	15.8	24	6:35
Luther Vaughan Elementary	315	15	31	20	4.8	7	6:30	20.4	31	7:00
Mary Bramlett Elementary	285	15	24	20	5.8	9	5:55	15.8	24	6:20
						Average for EPZ:	5:50		Average:	6:20

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-029

NRC RAI:

ETE-29:

The values in Table 8-4, "Special Facility Transit Demand," do not sum to the value in the table. The capacity of the three facilities listed sums to 402, but the value listed in the table is 277. Explain the difference in values.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 25, 2008 response to the NRCs Request for Additional Information 13.03-029 (Reference 1).

As discussed in Duke Energy's December 9, 2008 response to RAI 13.03-026 (Reference 2) and the supplemental response to RAI 13.03-006 (Enclosure 1 of this letter), five additional facilities have been identified within the Lee Nuclear Station EPZ. As a result, the total capacity of the medical facilities and nursing homes within the EPZ has increased from 402 persons (as corrected in the initial RAI response) to 564 persons shown in Attachment 1 to the supplemental response to RAI 13.03-006 (Enclosure 1 of this letter).

The changes described in Attachment 1 to the November 25, 2008 response to RAI 13.03-029 (Reference 1) are incorporated by the revisions to Table 8-4 shown in Attachment 1 of the supplemental response to RAI 13.03-026 (Enclosure 6 of this letter).

References:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) WLG2008.11-11, dated November 25, 2008. (ADAMS Accession No. ML090690313)

2) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12. 01, dated December 9, 2008. (ADAMS Accession No. ML083460112)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

None

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

None

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-030

NRC RAI:

ETE-30:

Table 8-4, "Special Facility Transit-Demand," indicates that 20 ambulance runs are required. Explain whether this value will increase if additional facilities are included. Identify the assumptions on mobilization time, number of available ambulances, loading time, etc., to support a determination of number of waves needed. Discuss any impact on the ETE.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's December 9, 2008 response to the NRCs Request for Additional Information 13.03-030 (Reference 1).

As noted in the supplemental response to RAI 13.03-006 provided as Enclosure 1 of this letter, a total of 24 ambulance runs are required for the evacuation of the special facilities population, as opposed to the 20 ambulance runs described in the ETE Report (Rev. 1) and discussed in the initial response to this RAI.

In addition, all simulations have been re-run based on a data input error correction as discussed in the supplemental response to RAI 13.03-031 and provided as Enclosure 10 of this letter. The new simulation run resulted in an increase of the average speed at 1 hour after the advisory to evacuate from 32.1 to 36.9 mph. This increase in the average speed decreases the travel time out of the EPZ from the 4 minutes (discussed in the December 9, 2008 response) to 3 minutes. The second-wave ETE for EMS vehicles computed in the December 9, 2008 response to this RAI included travel time out of the EPZ. This travel time was computed using an assumed travel distance of 2 miles to the EPZ boundary and the average speed output by the model at 1 hour after the advisory to evacuate. The second-wave ETE are unaffected because ETE are rounded to the nearest 5 minutes and the change in travel time of 1 minute does not affect the rounding. All other times used in the second-wave computations in the December 9, 2008 response remain valid.

Given that Scenario 6 has the highest number of evacuating vehicles for non-special event scenarios, (Table 6-4, as revised) (Reference 2) average speeds will be the lowest for this scenario. The "Emergency Medical Services (EMS) Vehicles" subsection of Section 8.4 of the ETE Report will be revised, as provided in Attachment 1 to this response, using the average speeds from Scenario 6 to provide a conservative ETE.

The changes described in this supplemental response will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters

acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12-01, dated December 9, 2008. (ADAMS Accession No. ML083460112)
2) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.11-09, dated November 20, 2008. (ADAMS Accession No. ML083300288)

Associated Revision to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Section 8.4 of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 1.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachment:

1) Markup of the Affected Portions of ETE Report (Rev. 1), Section 8.4, Subsection Titled "Emergency Medical Services (EMS) Vehicles"

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

Attachment 1 to RAI 13.03-030

Markup of the Affected Portions of ETE Report (Rev. 1), Section 8.4, Subsection Titled "Emergency Medical Services (EMS) Vehicles"

required. It follows, therefore, that about one hour and fifteen minutes would have to be added to the calculated ETE for special facilities, in the event they are evacuated as a "second wave".

All of the medical facilities are located in Gaffney near the EPZ boundary. It is estimated that buses will have to travel 2 miles, on average, to leave the EPZ. The average speed output by the model at 90 minutes for Region 3, Scenario 1 is 21.2 mph; thus, travel time out of the EPZ is 6 minutes.

The ETE for buses evacuating ambulatory patients at medical facilities is the sum of the mobilization time, total passenger loading time, and travel time out of the EPZ. For example, the calculation of ETE for the Peachtree Healthcare Center with 35 ambulatory residents is:

ETE: 90 + 35 x 1 + 6 = 131 min. or 2:15 rounded up. 3:30 for "second wave".

Table 8-4 indicates that 48 wheelchair bus runs are needed for the entire EPZ. Wheelchair buses and vans are often scarce; however, regular buses can be used to transport wheelchair bound patients. Patients would occupy the front portion of the bus and their wheelchairs would be folded and stacked in the back of the bus. Loading times are estimated at 2 minutes per wheelchair bound person as staff will have to assist them in boarding the bus. For example, the ETE for the wheelchair bound at the Peachtree Healthcare Center is:

ETE: 90 + 90 x 2 + 6 = 4:40 (rounded up to the nearest 5 minutes).

Thus, the ETE for special facilities may exceed the general population ETE.

Emergency Medical Services (EMS) Vehicles

The previous discussion focused on transit operations for ambulatory persons residing at medical facilities within the Evacuation Region. It is also necessary to provide transit services to non-ambulatory persons who do not – or cannot – have access to private vehicles. Based on the data provided in Table 8-4, a total of 24 ambulance runs are needed to evacuate all of the bed ridden patients in the EPZ, assuming 2 people per ambulance. These ambulances will be provided by EMS providers within the EPZ. Additional ambulances will be provided by neighboring cities.

It is conservatively estimated that 30 minutes will be needed to mobilize ambulances and travel to the medical facilities. Loading times are also conservatively estimated as 30 minutes. As with the buses transporting ambulatory patients, ambulances will have to travel 2 miles, on average, to leave the EPZ. The average speed output by the model at 1 hour for Region 3, Scenario ~~1~~6 is ~~32.1~~36.9 mph; thus, travel time out of the EPZ is 4~~3~~ minutes.

The ETE for ambulances is: 30 + 30 + 4~~3~~ = 1:05 (rounded to the nearest 5 minutes).

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-031

NRC RAI:

ETE-31:

In Table 8-5A, "School Evacuation Time Estimates Good Weather," the speed of the outbound school buses is approximately 20 mph. The speed is discussed in Section 8.3 (page 8-5) and use of the model output is an excellent approach for establishing speeds. However, Figures 7-3 thru 7-5 "Areas of Traffic Congestion after Advisory to Evacuate" would indicate a level of service of F for many roadways during this timeframe. It may not be appropriate to use average speeds. Explain why the average speed for the evacuation was used rather than the speeds that would exist during this timeframe for the evacuation.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's December 9, 2008 response to the NRCs Request for Additional Information 13.03-031 (Reference 1).

An error in the pre-processing software that was used to prepare the input to the PC-DYNEV model was discovered. Traffic control devices (traffic signals, stop and yield signs) are input to the PC-DYNEV model using a series of numeric codes for each approach to intersections. The code "0" is used to indicate a yield sign at the approach to an intersection and the code "1" is used for perpetual green or uninhibited flow (i.e. no control). PC-DYNEV interprets these codes to properly model the flow of traffic through an intersection.

The error caused a "yield" sign (code "0") to be placed at certain intersections when there should have been code "1" (i.e., no control) on the flow of traffic entering those intersections. This resulted in traffic yielding on approaches to intersections rather than maintaining free flow in the simulation model. The net effect of this error was to lengthen the time it took evacuating vehicles to access Interstate 85, reducing that flow, causing local congestion in the EPZ, and causing the simulation model to re-route many of the vehicles to other, longer paths.

As an example, link (84, 83) models the southbound access ramp to Interstate 85 from State Hwy 105 (Hyatt St) in Gaffney. The access ramp has a long acceleration lane and is uncontrolled (free flow). The input error caused vehicles in the simulation to yield rather than maintain free flow on this link. In the Rev. 1 simulation for an evacuation of the full EPZ (Region R03) under Scenario 1 (summer, midweek, midday, good weather) conditions, the average speed on this link at 90 minutes after the advisory to evacuate was 1.9 mph and 263 vehicles traversed the link in the 90 minutes following the advisory to evacuate. In the Rev. 2 simulation for Region R03, Scenario 1, however, the average speed on this link at 90 minutes after the advisory to evacuate is 9.9 mph and 1,514 vehicles traverse the link in the 90 minutes following the advisory to evacuate. Thus, in Rev. 1, fewer vehicles were able to use the Interstate 85 access ramps in Gaffney which increased congestion within Gaffney and prolonged the ETE. The error in the

pre-processing software discussed above has been corrected and all simulations have been re-run.

The following revisions are made to the December 9, 2008 response to this RAI:

- First paragraph - Average network speed of 21.2 mph is revised to 31.5 mph.
- Fourth paragraph – Average route-specific calculated speeds range from 5.22 to 60.00 mph for good weather and 4.19 to 53.86 mph for rain based on the new simulation runs. The table provided as Attachment 1 in the initial response to RAI 13.03-031 will be revised to reflect the new data and added to the ETE report in Revision 2 as Table 8-8, as provided in Attachment 1 of this enclosure, to document the average speeds computed for each school bus route.
- Fourth paragraph – Text stating that "11 of the schools have average speeds exceeding 20 mph, while the buses servicing the other 11 schools have average speeds less than 20 mph" is revised to "9 of the schools have average speeds exceeding 20 mph, while the buses servicing the other 13 schools have average speeds less than 20 mph." As discussed above, the data input error correction resulted in some rerouting. This rerouting caused some minor changes in congestion patterns which caused the average speed for some school bus routes to decrease.
- Fourth paragraph – Text stating "In rain, the buses servicing 10 of the schools have average speeds exceeding 20 mph, while the buses servicing 12 of the schools have average speeds less than 20 mph," is revised to "In rain, the buses servicing 8 of the schools have average speeds exceeding 20 mph, while the buses servicing 14 of the schools have average speeds less than 20 mph."
- Fifth paragraph – Tables 8-5A and 8-5B will be revised based on the new simulation runs and the changes in bus route-specific speed. The revised Tables 8-5A and B provided in Attachment 2 to this response supersede and replace the tables provided in the initial response. Table 8-5A is duplicated in the Executive Summary of the Lee Nuclear Station ETE Report and will also be revised as shown in Attachment 2 although markups specific to the Executive Summary section page is not provided in this response. Comparison of the revised tables with those in Revision 1 of the ETE Report indicates that the average ETE for schools to arrive at the reception centers has increased by 5 minutes (from 2:20 to 2:25) for good weather and by 10 minutes (from 2:40 to 2:50) for rain as a result of the changes in bus route-specific speeds in the new simulation runs. The increase in the average ETE for schools is discussed in the supplemental response to RAI 13.03-012 provided in Enclosure 3 of this letter.

The "School Evacuation" and the "Activity: Bus Returns to Route for Second Wave Evacuation (G→C)" sub-sections in Section 8.4 of the ETE report will be revised to reference the new information provided in Table 8-8 and to revise the sample ETE calculations based on the changes in average speed. These revisions are shown in Attachment 3 to this response.

The changes described in this supplemental response will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters

acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12-01, dated December 9, 2008. (ADAMS Accession No. ML083460112)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Section 8 of the Lee Nuclear Station ETE Report (Rev 1) to add Table 8-8 as provided in Attachment 1.

Revise Tables 8-5A and 8-5B of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 2.

Revise Section 8.4 of the Lee Nuclear Station ETE Report (Rev 1), modified in the initial response to RAI 13.03-031, as provided in Attachment 3.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

1) New Table 8-8 "Average Bus Speeds Computed from DYNEV Output"
2) Markup of the Affected Portion of ETE Report (Rev. 1), Section 8, Tables 8-5A and B, "School Evacuation Time Estimates"
3) Markup of the Affection Portion of ETE Report (Rev. 1), Section 8.4 as modified by the initial response to RAI 13.03-031

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

Attachment 1 to RAI 13.03-031

New Table 8-8 "Average Bus Speeds Computed from DYNEV Output"

Table 8-8: Average Bus Speeds Computed from DYNEV Output				
	Good Weather		Rain	
School	Calculated Bus Speed (mph)	Adjusted Bus Speed (mph)	Calculated Bus Speed (mph)	Adjusted Bus Speed (mph)
CHEROKEE COUNTY				
Blacksburg Middle	54.18	45.00	48.70	40.00
Cherokee Technology Center	13.97	13.97	9.66	9.66
Blacksburg Elementary	54.18	45.00	48.70	40.00
Blacksburg High	54.18	45.00	48.70	40.00
Blacksburg Primary	56.66	45.00	50.98	40.00
Corinth Elementary	47.02	45.00	26.20	26.20
Limestone-Central Elementary	12.78	12.78	11.93	11.93
Limestone College	50.27	45.00	38.08	38.08
Alma Elementary	15.24	15.24	9.66	9.66
B.D. Lee Elementary	5.22	5.22	4.19	4.19
Draytonville Elementary	18.76	18.76	17.41	17.41
Ewing Middle	13.38	13.38	12.66	12.66
Gaffney Christian Academy	5.22	5.22	4.19	4.19
Gaffney High	10.81	10.81	8.49	8.49
Gaffney Middle	12.66	12.66	11.81	11.81
Granard Middle	11.42	11.42	8.99	8.99
Grassy Pond Elementary	21.54	21.54	18.70	18.70
Heritage Christian School	17.37	17.37	11.19	11.19
Luther Vaughn Elementary	5.74	5.74	5.13	5.13
Mary Bramlett Elementary	12.65	12.65	7.83	7.83
CLEVELAND COUNTY				
Grover Elementary	47.84	45.00	43.46	40.00
YORK COUNTY				
Hickory Grove-Sharon Elementary	60.00	45.00	53.86	40.00

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

Attachment 2 to RAI 13.03-031

Markup of the Affected Portion of ETE Report (Rev. 1), Section 8, Tables 8-5A and B, "School Evacuation Time Estimates"

Table 8-5A. School Evacuation Time Estimates - Good Weather								
School	Driver Mobilization Time (min)	Loading Time (min)	Dist. to EPZ Boundary (mi.)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bndry to R.C. (mi.)	Travel Time EPZ Bdry to RC (min)	ETE to R.C. (hr:min)
Cherokee County Schools								
Blacksburg Middle	90	15	~~8.4~~ 6.7	~~24~~ 9	~~**2:10**~~ **1:55**	~~14.2~~ 15.3	~~19~~ 21	~~**2:30**~~ **2:15**
Cherokee Technology Center	90	15	6.9	~~20~~ 30	~~**2:05**~~ **2:15**	15.8	22	~~**2:30**~~ **2:40**
Blacksburg Elementary	90	15	~~8.3~~ 6.6	~~24~~ 9	~~**2:10**~~ **1:55**	~~14.2~~ 15.3	~~19~~ 21	~~**2:30**~~ **2:15**
Blacksburg High	90	15	~~8.2~~ 6.7	~~24~~ 9	~~**2:10**~~ **1:55**	~~14.2~~ 15.3	~~19~~ 21	~~**2:30**~~ **2:15**
Blacksburg Primary	90	15	~~5.8~~ 4.1	~~17~~ 5	~~**2:05**~~ **1:50**	~~14.2~~ 15.3	~~19~~ 21	~~**2:25**~~ **2:15**
Corinth Elementary	90	15	6.4	~~19~~ 9	~~**2:05**~~ **1:55**	21.4	29	~~**2:35**~~ **2:25**
Limestone-Central Elementary	90	15	4.3	~~13~~ 20	~~**2:00**~~ **2:05**	21.7	29	~~**2:30**~~ **2:35**
Limestone College	90	15	4.9	7	**1:55**	15.8	22	**2:15**
Alma Elementary	90	15	7.3	~~21~~ 29	~~**2:10**~~ **2:15**	15.8	22	~~**2:30**~~ **2:40**
B.D. Lee Elementary	90	15	4.2	~~12~~ 48	~~**2:00**~~ **2:35**	20.4	28	~~**2:25**~~ **3:05**
Draytonville Elementary	90	15	10.5	~~30~~ 34	~~**2:15**~~ **2:20**	15.8	22	~~**2:40**~~ **2:45**
Ewing Middle	90	15	6.8	~~20~~ 30	~~**2:05**~~ **2:15**	15.8	22	~~**2:30**~~ **2:40**
Gaffney Christian Academy	90	15	4.2	~~12~~ 48	~~**2:00**~~ **2:35**	20.4	28	~~**2:25**~~ **3:05**
Gaffney High	90	15	2.2	~~7~~ 12	~~**1:55**~~ **2:00**	20.4	28	~~**2:20**~~ **2:25**
Gaffney Middle	90	15	5.3	~~15~~ 25	~~**2:00**~~ **2:10**	15.8	22	~~**2:25**~~ **2:35**
Granard Middle	90	15	2.9	~~9~~ 15	~~**1:55**~~ **2:00**	20.4	28	~~**2:25**~~ **2:30**
Grassy Pond Elementary	90	15	0.4	~~2~~ 1	**1:50**	25.1	34	~~**2:25**~~ **2:20**
Heritage Christian School	90	15	9.2	~~27~~ 32	~~**2:15**~~ **2:20**	15.8	22	~~**2:35**~~ **2:40**
Luther Vaughan Elementary	90	15	4.8	~~14~~ 50	~~**2:00**~~ **2:35**	20.4	28	~~**2:30**~~ **3:05**
Mary Bramlett Elementary	90	15	5.8	~~17~~ 28	~~**2:05**~~ **2:15**	15.8	22	~~**2:25**~~ **2:35**
Cleveland County Schools								
Grover Elementary	30	15	~~1.5~~ 0.5	~~2~~ 1	**0:50**	~~9.2~~ 6.9	~~13~~ 10	**1:00**
York County Schools								
Hickory Grove-Sharon Elementary	30	15	0.2	1	**0:50**	14.3	20	**1:10**
				Average for EPZ:	~~**1:55**~~ **2:00**	**Average:**	**24**	~~**2:20**~~ **2:25**

Note: This table replaces Table 8-5A as provided in Attachment 2 of the December 9, 2008, response to RAI 13.03-031.

Table 8-5B. School Evacuation Time Estimates - Rain								
School	Driver Mobilization Time (min)	Loading Time (min)	Dist. to EPZ Boundary (mi.)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bndry to R.C. (mi.)	Travel Time EPZ Bdry to RC (min)	ETE to R.C. (hr:min)
Cherokee County Schools								
Blacksburg Middle	100	20	~~8.4~~ 6.7	~~25~~ 10	~~2:25~~ 2:10	~~14.2~~ 15.3	~~22~~ 23	~~2:50~~ 2:35
Cherokee Technology Center	100	20	6.9	~~21~~ 43	~~2:25~~ 2:45	15.8	24	~~2:45~~ 3:10
Blacksburg Elementary	100	20	~~8.3~~ 6.6	~~25~~ 10	~~2:25~~ 2:10	~~14.2~~ 15.3	~~22~~ 23	~~2:50~~ 2:35
Blacksburg High	100	20	~~8.2~~ 6.7	~~25~~ 10	~~2:25~~ 2:10	~~14.2~~ 15.3	~~22~~ 23	~~2:50~~ 2:35
Blacksburg Primary	100	20	~~5.8~~ 4.1	~~18~~ 6	~~2:20~~ 2:10	~~14.2~~ 15.3	~~22~~ 23	~~2:40~~ 2:30
Corinth Elementary	100	20	6.4	~~19~~ 15	~~2:20~~ 2:15	21.4	33	~~2:55~~ 2:50
Limestone-Central Elementary	100	20	4.3	~~13~~ 22	~~2:15~~ 2:25	21.7	33	~~2:50~~ 2:55
Limestone College	100	20	4.9	8	2:10	15.8	24	2:35
Alma Elementary	100	20	7.3	~~22~~ 45	~~2:25~~ 2:45	15.8	24	~~2:50~~ 3:10
B.D. Lee Elementary	100	20	4.2	~~13~~ 60	~~2:15~~ 3:00	20.4	31	~~2:45~~ 3:35
Draytonville Elementary	100	20	10.5	~~31~~ 36	~~2:35~~ 2:40	15.8	24	~~2:55~~ 3:00
Ewing Middle	100	20	6.8	~~20~~ 32	~~2:20~~ 2:35	15.8	24	~~2:45~~ 3:00
Gaffney Christian Academy	100	20	4.2	~~13~~ 60	~~2:15~~ 3:00	20.4	31	~~2:45~~ 3:35
Gaffney High	100	20	2.2	~~7~~ 16	~~2:10~~ 2:20	20.4	31	~~2:40~~ 2:50
Gaffney Middle	100	20	5.3	~~16~~ 27	~~2:20~~ 2:30	15.8	24	~~2:40~~ 2:55
Granard Middle	100	20	2.9	~~9~~ 19	~~2:10~~ 2:20	20.4	31	~~2:40~~ 2:50
Grassy Pond Elementary	100	20	0.4	~~2~~ 1	2:05	25.1	38	2:40
Heritage Christian School	100	20	9.2	~~28~~ 49	~~2:30~~ 2:50	15.8	24	~~2:55~~ 3:15
Luther Vaughan Elementary	100	20	4.8	~~15~~ 56	~~2:15~~ 3:00	20.4	31	~~2:50~~ 3:30
Mary Bramlett Elementary	100	20	5.8	~~18~~ 44	~~2:20~~ 2:45	15.8	24	~~2:45~~ 3:10
Cleveland County Schools								
Grover Elementary	35	20	~~1.5~~ 0.5	~~3~~ 1	1:00	~~9.2~~ 6.9	~~14~~ 11	~~1:15~~ 1:10
York County Schools								
Hickory Grove-Sharon Elementary	35	20	0.2	1	1:00	14.3	22	1:20
				Average for EPZ:	~~2:15~~ 2:20	**Average:**	26	~~2:40~~ 2:50

Note: This table replaces Table 8-5B as provided in Attachment 2 of the December 9, 2008, response to RAI 13.03-031.

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

Attachment 3 to RAI 13.03-031

Markup of the Affection Portion of ETE Report (Rev. 1), Section 8.4 as Modified by the Initial Response to RAI 13.03-031

Note: This markup reflects changes to Attachment 3 submitted in the initial response to RAI 13.03-031. The changes associated with this supplemental response are highlighted.

Evacuation Time Estimates for Transit Trips were developed using both good weather and adverse weather conditions. Figure 8-1 presents the chronology of events relevant to transit operations. The elapsed time for each activity will now be discussed with reference to Figure 8-1.

Activity: Mobilize Drivers (A→B→C)

Mobilization is the elapsed time from the Advisory to Evacuate until the time the buses arrive at the facility to be evacuated. It is assumed that for a rapidly escalating radiological emergency with no observable indication before the fact, drivers would likely require 90 minutes to be contacted, to travel to the depot, be briefed, and to travel to the transit-dependent facilities. Mobilization time is slightly longer – 100 minutes – when raining. The buses are kept at the school for Hickory Grove-Sharon Elementary in York County and Grover Elementary in Cleveland County, thus the mobilization time is only 30 minutes for these schools, 35 minutes when raining.

Activity: Board Passengers (C→D)

Fort Mill School District in York County conducted evacuation drills in 2006 and estimated bus loading times during the drills. The loading times ranged from 12 to 20 minutes with an average loading time of 15 minutes. Therefore, the bus loading time used for this study is 15 minutes, 20 minutes in rain. Transit dependent bus loading time is estimated at 30 minutes (40 minutes for rain) to account for the delay incurred in making multiple stops along routes to pick up passengers.

Activity: Travel to EPZ Boundary (D→E)

School Evacuation

The buses servicing the schools in Cleveland and York counties are ready to begin their evacuation trips at 45 minutes after the advisory to evacuate – 30 minutes mobilization time plus 15 minutes loading time. The buses servicing the schools in Cherokee County are ready to begin their evacuation trips at 105 minutes after the advisory to evacuate – 90 minutes mobilization time plus 15 minutes loading time. The most likely path (series of links traversed) through the analysis network to the EPZ boundary was selected for each school in the EPZ. The delay on each link over the appropriate 10-minute interval is output by DYNEV and was accessed for each of the links along the path. Data from 40 to 50 minutes after the advisory to evacuate were used for Cleveland and York counties and from 100 to 110 minutes for Cherokee County. The average speed along the path using these data generated by DNYEV was computed as follows:

$$Average\ Speed\left(\frac{mi.}{hr.}\right)=\left(\frac{\sum_{i=1}^{n} length\ of\ link\ i\ (mi)}{\sum_{i=1}^{n} Delay\ on\ link\ i\ (\min.)+\frac{length\ of\ link\ i\ (mi.)}{free\ flow\ speed\ on\ link\ i\left(\frac{mi.}{hr.}\right)}\times\frac{60\ \min.}{1\ hr.}}\right)\times\frac{60\ \min.}{1\ hr.}$$

~~The~~ table 8-8 ~~below~~shows the average speed computed (using this methodology) for the buses servicing each of the schools in the EPZ. The travel time to the EPZ boundary was computed for each school using the computed average speed and the distance to the EPZ boundary along the most likely route out of the EPZ. The travel time from the EPZ boundary to the Reception Center was computed assuming an average speed of 45 mph and 40 mph for good weather and rain, respectively. South Carolina State Law governs school buses to a maximum speed of 45 mph. Therefore, the 'Adjusted Bus Speed' in ~~the~~ Ttable 8-8~~below~~ reduces to 45 mph (40 mph for rain) those calculated bus speeds which exceed 45 mph.

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-032

NRC RAI:

ETE-32:

Special facilities are identified in Table 8-4, "Special Facility Transit Demand," and discussed in Section 8.3, "Special Facility Demand," and in Appendix E, "Special Facility Data," on an individual basis. Tables with names, address, direction from the Lee Station, distance in miles, and populations are also provided; a map is not provided. Include a map of special facilities within the EPZ.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 25, 2008 response to the NRC Request for Additional Information 13.03-032 (Reference 1).

As noted in the December 9, 2008 response to RAI 13.03-026 (Reference 2), five additional medical facilities were identified within the Lee Nuclear Station EPZ. The November 25, 2008, response to RAI 13.03-032 provided a new figure identified as Figure E-2, "Day Care Centers, Medical Facilities and Correctional Facilities within the WLA EPZ" which mapped the special facilities within the Lee Nuclear Station EPZ. The figure, as provided, did not include the five additional facilities identified in the response to RAI 13.03-026 (Reference 2). This supplemental response provides a revised Figure E-2, which includes the five additional facilities.

Lee Nuclear Station ETE Report (Rev 1) will be updated to include Figure E-2, "Day Care Centers, Medical Facilities and Correctional Facilities within the WLS EPZ", as provided in Attachment 1 to this supplemental response. Figure E-2 (Attachment 1) as provided in this supplemental response updates the Figure E-2 submitted in the initial response to this RAI provided in Duke Energy letter WLG2008.11-11, dated November 25, 2008.

The changes addressed in this supplemental response will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

References:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) WLG2008.11-11, dated November 25, 2008. (ADAMS Accession No. ML090690313)

2) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12-01, dated December 9, 2008. (ADAMS Accession No. ML083460112)

Associated Revision to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Appendix E of the Lee Nuclear Station ETE Report (Rev 1) to add the updated Figure E-2 as provided in Attachment 1.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachment:

1) New Figure E-2: Day Care Centers, Medical Facilities and Correctional Facilities within the WLS EPZ

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

Attachment 1 to RAI 13.03-032

New Figure E-2: Day Care Centers, Medical Facilities and Correctional Facilities within the WLS EPZ

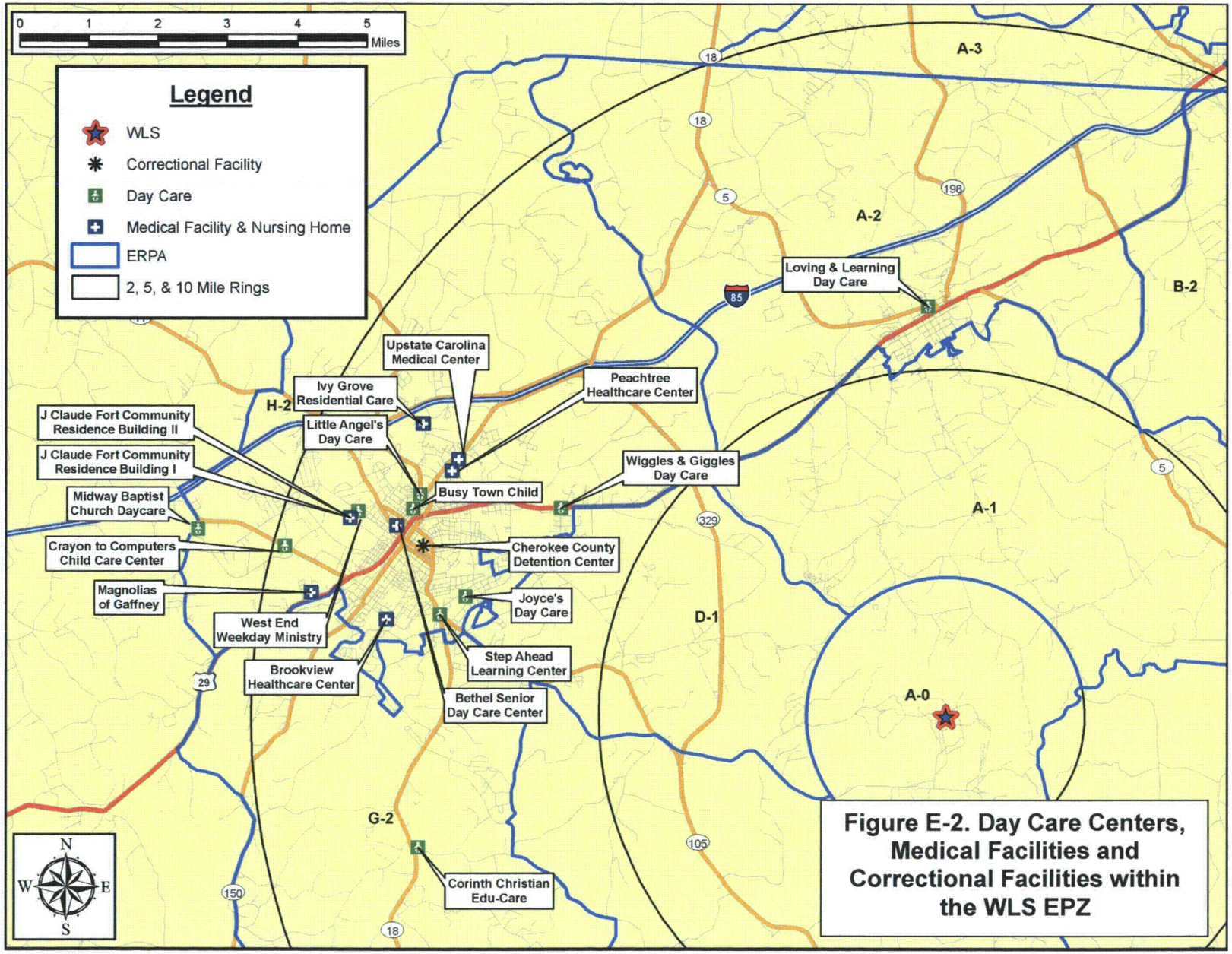

Figure E-2. Day Care Centers, Medical Facilities and Correctional Facilities within the WLS EPZ

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-033

NRC RAI:

ETE-33

Figures 7-3 through 7-6, "Areas of Traffic Congestion" as referenced in Section 7.3, "General Population Evacuation Time Estimates," are said to imply that evacuation is a continuous process; this is not obvious from the figures. Section 7.3 states that Figure 7.7, "Evacuation Time Estimates for WSL Summer, Midweek, Midday, Good Weather Evacuation of Region 03 (Entire EPZ)" indicates that there is a "long tail" in the rate at which traffic flows out of the indicated area; the idea may be correct but the figure does not show this. Provide additional explanation or a figure that does show the indicated information.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 25, 2008 response to the NRCs Request for Additional Information 13.03-033 (Reference 1). The previous response is revised as indicated below.

As discussed in the supplemental response to RAI 13.03-031 (Enclosure 10 of this letter), an error was discovered in the pre-processing software used to prepare the input to the PC-DYNEV model for Revision 1 of the ETE Report. The error in the pre-processing software has been corrected and all simulations have been re-run. As a result, the congestion patterns discussed in the November 25, 2008 response have changed.

The new congestion patterns are provided and discussed in the supplemental response to RAI 13.03-048 (Enclosure 19 of this letter). Figure 7-6 has been deleted as a result of the new simulation runs and Figure 7-7 has been renumbered as Figure 7-6, "Evacuation Time Estimates for WSL Summer, Midweek, Midday, Good Weather Evacuation of Region 03 (Entire EPZ)." (Attachment 1)

As shown in the new Figure 7-6, a "long tail" still exists for the evacuation. The slope of the curve is small during the first 30 minutes since much of the EPZ population has not yet mobilized. Between 30 minutes and 180 minutes, the slope is steeper as more people have completed their mobilization activities and have evacuated the region. Between 180 minutes and 250 minutes the slope of the plot decreases significantly as only those people who take significantly longer to mobilize remain. Ninety-five percent of the EPZ population evacuates during the first 190 minutes; however, the remaining 5% of the population requires an additional hour to evacuate. In summary, the "long tail" of the curve is that area between 180 and 250 minutes where the slope of the curve has decreased to the point of being nearly horizontal.

The following discussion addresses changes to the ETE Report that are the result of the error correction and the associated new simulation runs. This information is provided to allow for a review based on the changes that contribute to the revised Figure 7-6.

The new simulation runs resulted in multiple changes to the ETE for the general population. The following discussion summarizes the changes in the 50th, 90th, 95th and 100th percentile ETE that support the new figures:

- Table 7-1A – 50th percentile ETE: The significant changes (greater than 10 minutes) were primarily in Regions where Gaffney (ERPA H-2) evacuates (Regions R03, R20-R22). Those changes ranged from 10-to 20-minute decreases in ETE. All other changes in ETE are less than 10 minutes. Scenario 12 (construction) was re-run based on the change in Peak Construction Year from 2011 to 2016 (see supplemental response to RAI 13.03-014 (this letter)). Regions R01, R04, R06, R08 through R10 and R16 exhibited a 5-minute increase for Scenario 12 while Regions R03 and R20-R22 exhibited 15-minute decreases in ETE. For all other regions, the decreases in ETE resulting from the correction of the error in the input stream were offset by the increase in ETE resulting from the extrapolation of population an additional 5 years resulting in changes in ETE of 5 minutes or less.
- Table 7-1B – 90th percentile ETE: In Scenarios 1 through 11, the new simulation runs resulted in a decrease in ETE ranging from 5 to 50 minutes with the exception of Region R08 in Scenario 1 which resulted in a 10-minute increase in ETE. Scenario 12 (construction) was re-run based on the change in Peak Construction Year from 2011 to 2016. For Scenario 12, the new runs resulted in ETE increases of 5-15 minutes in Regions R01, R02, R04 through R10, and R12 through R19 and ETE decreases of 30-45 minutes in Regions R03 and R20 through R22.
- Table 7-1C – 95th percentile ETE: In Scenarios 1 through 11, the new simulation runs resulted in a decrease in ETE ranging from 10 to 55 minutes with the exception of Region R10 in Scenario 8 which resulted in a 10-minute increase. Scenario 12 (construction) was re-run based on the change in Peak Construction Year from 2011 to 2016. For Scenario 12, the changes resulted in ETE increases of 5-15 minutes in Regions R01, R02, and R04 through R16 and ETE decreases of 10-45 minutes in Regions R03 and R19 through R22.
- Table 7-1D – 100th percentile ETE: In Scenarios 1 through 11, the new simulation runs produced varied results with decreases in ETE ranging from 10 to 30 minutes and increases in ETE ranging from 5 to 10 minutes. Scenario 12 (construction) was re-run based on the change in Peak Construction Year from 2011 to 2016. For Scenario 12, the changes resulted in an ETE increase of 5 minutes in Region R16 and ETE decreases of 10-40 minutes in Regions R03 and R19 through R22.

Table 7-1A through 7-1D and other associated changes to Section 7, "General Population Evacuation Time Estimates (ETE)" will be revised as shown in Attachment 1 of this supplemental response. Table 7-1C and Table-1D are duplicated in the Executive Summary of the Lee Nuclear Station ETE Report and will also be revised as shown in Attachment 1 although markups specific to the Executive Summary section pages are not provided in this response. Associated changes to Appendix J, "Evacuation Time Estimates for All Evacuation Regions and Scenarios", will be revised as shown in Attachment 2 of this supplemental response.

The change in network average speed, used to compute ETE for the transit-dependent population and special needs residents, is addressed in the supplemental response to RAI 13.03-012 (Enclosure 3 of this letter).

Appendix I of the ETE Report documents the sensitivity studies. All sensitivity studies also were re-run as a result of the correction of the error in the input stream. Based on the results of the new simulation runs, the following changes were observed in the sensitivity studies:

- Trip Generation – The 100th percentile ETE reflect mobilization time for 3-hour, 4-hour and 5-hour trip generation times. In the Rev. 1 sensitivity studies, the 100th percentile ETE reflected mobilization time for a 5-hour trip generation time only.
- Shadow Evacuation – The 100th percentile ETE are unaffected by shadow evacuation. In the Rev. 1 sensitivity studies, ETE increased by 20 minutes for the 60% shadow evacuation. As discussed in the supplemental response to RAI 13.03-031 (Enclosure 10 of this letter), traffic congestion within Gaffney has been reduced as a result of the correction of the error in the input stream. As such, in the new simulation runs, the shadow evacuees in the areas north and west of Gaffney do not inhibit the evacuation of those people in Gaffney and the ETE are unaffected by shadow evacuation.
- Evacuating Vehicles per Household – The 100th percentile ETE are unaffected by the increase in evacuating vehicles per household. In the Rev. 1 sensitivity studies, the 100th percentile ETE for the 5-Mile Region (Region R02) and the Entire EPZ (Region R03) were significantly increased when increasing the number of evacuating vehicles per household. The error in the input stream resulted in many of the evacuating vehicles to use slower moving, lower capacity routes than Interstate 85 (I-85), which increased the ETE. Correcting this error resulted in more evacuating vehicles using I-85 and the ETE is unaffected by the presence of the additional evacuating vehicles.
- Gaffney High School Football – the 100th percentile ETE for Region R03 increased by 50 minutes based on the Rev. 1 runs versus a 10-minute increase based on the new simulation runs. As discussed above and in the supplemental response to RAI 13.03-031 (Enclosure 10 of this letter), the correction of the error in the input stream reduced congestion within Gaffney. As a result of the correction of the error in the input stream, there is less congestion within Gaffney, and the additional vehicles evacuating from the football game do not significantly impact ETE.

Appendix I of the ETE Report will be revised as shown in Attachment 3 of this response.

The changes described in this supplemental response and provided in the attachments will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) WLG2008.11-11, dated November 25, 2008. (ADAMS Accession No. ML090690313)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Section 7 of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 1.

Revise Appendix J of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 2.

Revise Appendix I of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 3.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

1) Markup of the Affected Portions of ETE Report (Rev. 1), Section 7, "General Population Evacuation Time Estimates (ETE)"
2) Markup of the Affected Portions to ETE Report (Rev. 1), Appendix J, "Evacuation Time Estimates for All Evacuation Regions and Scenarios"
3) Markup of the Affected Portions to ETE Report (Rev. 1), Appendix I, "Evacuation Sensitivity Studies"

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

Attachment 1 to RAI 13.03-033

Markup of the Affected Portions of ETE Report (Rev. 1), Section 7, "General Population Evacuation Time Estimates (ETE)"

7.3 Evacuation Rates

Evacuation is a continuous process, as implied by Figures 7-3 through 7-~~6~~.5. Another format for displaying the dynamics of evacuation is depicted in Figure 7-~~7~~.6. This plot indicates the rate at which traffic flows out of the indicated areas for the case of an evacuation of the full EPZ (Region R03) under the indicated conditions. Appendix J presents these plots for all Evacuation Scenarios for Region R03.

As indicated in Figure 7-~~7~~6, there is typically a long "tail" to these distributions. Vehicles evacuate an area slowly at the beginning, as people respond to the Advisory to Evacuate at different rates. Then traffic demand builds rapidly (slopes of curves increase). When the system becomes congested, traffic exits the EPZ at rates somewhat below capacity until some evacuation routes have cleared. As more routes clear, the aggregate rate of egress slows since many vehicles have already left the EPZ. Towards the end of the process, relatively few evacuation routes service the remaining demand.

This decline in aggregate flow rate, towards the end of the process, is characterized by these curves flattening and gradually becoming horizontal. Ideally, it would be desirable to fully saturate all evacuation routes equally so that all will service traffic near capacity levels and all will clear at the same time. For this ideal situation, all curves would retain the same slope until the end -- thus minimizing evacuation time. In the real world, this ideal is generally unattainable reflecting the variation in population density and in highway capacity over the EPZ.

7.4 Guidance on Using ETE Tables

Tables 7-1A through 7-1D present the ETE values for all 22 Evacuation Regions and all 12 Evacuation Scenarios. They are organized as follows:

Table	Contents
7-1A	ETE represents the elapsed time required for 50 percent of the population within a Region, to evacuate from that Region.
7-1B	ETE represents the elapsed time required for 90 percent of the population within a Region, to evacuate from that Region.
7-1C	ETE represents the elapsed time required for 95 percent of the population within a Region, to evacuate from that Region.
7-1D	ETE represents the elapsed time required for 100 percent of the population within a Region, to evacuate from that Region.

- Enter Table 7-2 and identify the applicable group of candidate Regions based on the distance that the selected Region extends from WLS. Select the Evacuation Region identifier in that row from the first column of the Table.

3. Determine the **ETE for the Scenario** identified in Step 1 and the Region identified in Step 2, as follows:
   - The columns of Table 7-1 are labeled with the Scenario numbers. Identify the proper column in the selected Table using the Scenario number determined in Step 1.
   - Identify the row in this table that provides ETE values for the Region identified in Step 2.
   - The unique data cell defined by the column and row so determined contains the desired value of ETE expressed in Hours:Minutes.

Example

It is desired to identify the ETE for the following conditions:

- Sunday, August 10th at 4:00 AM.
- It is raining.
- Wind direction is to the northeast (NE).
- Wind speed is such that the distance to be evacuated is judged to be 10 miles (to EPZ boundary).
- The desired ETE is that value needed to evacuate 95 percent of the population from within the impacted Region.

Table 7-1C is applicable because the 95th-percentile population is desired. Proceed as follows:

1. Identify the Scenario as summer, weekend, evening and raining. Entering Table 7-1C, it is seen that there is no match for these descriptors. However, the clarification given above assigns this combination of circumstances to Scenario 4.

2. Enter Table 7-2 and locate the Region described as "5-mile Ring and Downwind to EPZ Boundary" for wind direction toward the NE and read REGION R13 in the first column of that row.

3. Enter Table 7-1C to locate the data cell containing the value of ETE for Scenario 4 and Region R13. This data cell is in column (4) and in the row for Region R13; it contains the ETE value of **2:~~20~~10**.

Table 7-1A. Time To Clear The Indicated Area of 50 Percent of the Affected Population

	Summer		Summer		Summer		Winter			Winter		Winter		Summer
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend		Midweek Weekend		Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	Scenario:	(12)
	Midday		Midday		Evening		Midday			Midday		Evening		Midday
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Ice	Good Weather	Rain	Good Weather	Region Wind Toward:	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	0:55	0:55	0:50	0:50	0:50	R01 2-mile ring	0:55	0:55	0:55	0:50	0:50	0:50	R01 2-mile ring	~~1:45~~ 1:50
R02 5-mile ring	1:20	1:20	0:55	~~1:00~~ 0:55	0:55	R02 5-mile ring	1:20	1:20	~~1:25~~ 1:20	0:55	~~1:00~~ 0:55	0:55	R02 5-mile ring	1:35
R03 Entire EPZ	~~1:40~~ 1:25	~~1:45~~ 1:30	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R03 Entire EPZ	~~1:45~~ 1:25	~~1:45~~ 1:30	~~1:45~~ 1:35	~~1:25~~ 1:05	~~1:25~~ 1:10	~~1:15~~ 1:05	R03 Entire EPZ	~~1:45~~ 1:30
2-Mile Ring and Downwind to 5 Miles														
R04 N,NNE,NE	1:15	1:15	0:55	0:55	0:55	R04 N,NNE,NE	1:15	1:15	1:15	0:55	0:55	0:55	R04 N,NNE,NE	~~1:35~~ 1:40
R05 ENE,E	1:15	1:15	0:55	0:55	0:55	R05 ENE,E	1:15	1:15	1:15	0:55	0:55	0:55	R05 ENE,E	~~1:40~~ 1:35
R06 ESE	1:00	1:00	0:50	0:50	0:55	R06 ESE	1:00	1:00	1:00	0:50	0:50	0:55	R06 ESE	~~1:40~~ 1:45
R07 SE,SSE,S	1:10	1:10	0:55	0:55	0:55	R07 SE,SSE,S	1:10	1:10	1:10	0:55	0:55	0:55	R07 SE,SSE,S	1:45
R08 SSW,SW	~~1:10~~ 1:05	1:10	0:55	0:55	0:55	R08 SSW,SW	~~1:10~~ 1:05	1:10	1:10	0:55	0:55	0:55	R08 SSW,SW	~~1:45~~ 1:50
R09 WSW,W,WNW	1:15	1:15	0:55	~~1:00~~ 0:55	0:55	R09 WSW,W,WNW	1:15	1:15	~~1:20~~ 1:15	0:55	~~1:00~~ 0:55	0:55	R09 WSW,W,WNW	~~1:35~~ 1:40
R10 NW,NNW	1:20	1:20	0:55	0:55	0:55	R10 NW,NNW	1:20	1:20	1:20	0:55	0:55	0:55	R10 NW,NNW	~~1:30~~ 1:35
5-Mile Ring and Downwind to EPZ Boundary														
R11 N	1:20	1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R11 N	1:20	1:20	~~1:25~~ 1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R11 N	1:25
R12 NNE	1:20	1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R12 NNE	1:20	1:20	~~1:25~~ 1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R12 NNE	1:25
R13 NE	1:20	1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R13 NE	1:20	1:20	~~1:25~~ 1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R13 NE	1:25
R14 ENE,E	1:20	1:20	~~1:00~~ 0:55	1:00	~~1:00~~ 0:55	R14 ENE,E	1:20	~~1:25~~ 1:20	1:25	~~1:00~~ 0:55	~~1:00~~ 0:55	~~1:00~~ 0:55	R14 ENE,E	1:30
R15 ESE	1:20	1:20	~~1:00~~ 0:55	~~1:00~~ 0:55	0:55	R15 ESE	1:20	1:20	1:25	~~1:00~~ 0:55	~~1:00~~ 0:55	0:55	R15 ESE	1:30
R16 SE	1:20	1:20	0:55	~~1:00~~ 0:55	0:55	R16 SE	1:20	1:20	1:25	0:55	~~1:00~~ 0:55	0:55	R16 SE	~~1:30~~ 1:35
R17 SSE	1:25	1:25	1:00	~~1:05~~ 1:00	1:00	R17 SSE	1:25	1:25	~~1:30~~ 1:25	1:00	~~1:05~~ 1:00	1:00	R17 SSE	~~1:35~~ 1:30
R18 S	1:25	1:25	1:00	~~1:05~~ 1:00	1:00	R18 S	1:25	1:25	~~1:30~~ 1:25	1:00	~~1:05~~ 1:00	1:00	R18 S	1:35
R19 SSW,SW	~~1:25~~ 1:20	~~1:25~~ 1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R19 SSW,SW	~~1:25~~ 1:20	~~1:25~~ 1:20	~~1:30~~ 1:25	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R19 SSW,SW	~~1:35~~ 1:30
R20 WSW	~~1:40~~ 1:25	~~1:45~~ 1:30	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R20 WSW	~~1:45~~ 1:25	~~1:45~~ 1:30	~~1:45~~ 1:35	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R20 WSW	~~1:45~~ 1:30
R21 W,WNW	~~1:40~~ 1:25	~~1:40~~ 1:30	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R21 W,WNW	~~1:40~~ 1:25	~~1:45~~ 1:30	~~1:45~~ 1:35	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R21 W,WNW	~~1:45~~ 1:30
R22 NW,NNW	~~1:40~~ 1:25	~~1:40~~ 1:30	~~1:25~~ 1:05	~~1:25~~ 1:10	~~1:15~~ 1:05	R22 NW,NNW	~~1:40~~ 1:25	~~1:40~~ 1:30	~~1:45~~ 1:35	~~1:20~~ 1:05	~~1:25~~ 1:10	~~1:15~~ 1:05	R22 NW,NNW	~~1:45~~ 1:30

Table 7-1B. Time To Clear The Indicated Area of 90 Percent of the Affected Population

	Summer		Summer		Summer		Winter			Winter		Winter		Summer
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend		Midweek Weekend		Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	Scenario:	(12)
Region Wind Toward:	Midday		Midday		Evening	Region Wind Toward:	Midday			Midday		Evening	Region Wind Toward:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Ice	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	1:50	1:50	1:30	1:30	1:50	R01 2-mile ring	1:50	1:50	1:50	1:30	1:30	1:50	R01 2-mile ring	~~3:00~~ 3:15
R02 5-mile ring	2:30	2:30	1:50	1:50	1:50	R02 5-mile ring	2:30	2:30	2:30	1:50	1:50	1:50	R02 5-mile ring	~~3:00~~ 3:10
R03 Entire EPZ	~~3:25~~ 2:35	~~3:25~~ 2:45	~~2:55~~ 2:10	~~3:00~~ 2:20	~~2:30~~ 2:05	R03 Entire EPZ	~~3:25~~ 2:40	~~3:30~~ 2:45	~~3:35~~ 3:00	~~2:50~~ 2:10	~~2:50~~ 2:20	~~2:30~~ 2:05	R03 Entire EPZ	~~3:35~~ 2:50
2-Mile Ring and Downwind to 5 Miles														
R04 N,NNE,NE	2:25	2:30	1:50	1:50	1:50	R04 N,NNE,NE	2:25	2:30	2:30	1:50	1:50	1:50	R04 N,NNE,NE	~~3:00~~ 3:10
R05 ENE,E	2:30	2:30	1:50	1:50	1:50	R05 ENE,E	2:30	2:30	2:30	1:50	1:50	1:50	R05 ENE,E	~~3:00~~ 3:05
R06 ESE	2:00	2:00	1:40	1:40	1:50	R06 ESE	2:00	2:00	2:00	1:40	1:40	1:50	R06 ESE	~~3:00~~ 3:15
R07 SE,SSE,S	2:20	2:20	~~1:50~~ 1:40	1:50	1:50	R07 SE,SSE,S	2:20	2:20	2:20	~~1:50~~ 1:40	1:50	1:50	R07 SE,SSE,S	~~3:05~~ 3:15
R08 SSW,SW	~~2:10~~ 2:20	2:20	~~1:50~~ 1:40	1:50	1:50	R08 SSW,SW	~~2:10~~ 2:20	~~2:10~~ 2:20	2:20	~~1:50~~ 1:40	1:50	1:50	R08 SSW,SW	~~3:05~~ 3:20
R09 WSW,W,WNW	2:30	2:30	1:50	1:50	1:50	R09 WSW,W,WNW	2:30	2:30	2:30	1:50	1:50	1:50	R09 WSW,W,WNW	~~3:05~~ 3:15
R10 NW,NNW	2:30	2:30	1:50	1:50	1:50	R10 NW,NNW	2:30	2:30	2:30	1:50	1:50	1:50	R10 NW,NNW	~~3:00~~ 3:05
5-Mile Ring and Downwind to EPZ Boundary														
R11 N	2:30	2:30	~~2:05~~ 1:50	~~2:05~~ 1:50	~~2:00~~ 1:50	R11 N	2:30	2:30	~~2:40~~ 2:30	~~2:05~~ 1:50	~~2:05~~ 1:50	~~2:00~~ 1:50	R11 N	~~2:45~~ 2:50
R12 NNE	2:30	2:30	~~2:05~~ 1:50	~~2:10~~ 1:50	~~2:00~~ 1:50	R12 NNE	2:30	2:30	~~2:40~~ 2:30	~~2:05~~ 1:50	~~2:05~~ 1:50	~~2:00~~ 1:50	R12 NNE	~~2:45~~ 2:50
R13 NE	2:30	2:30	~~2:10~~ 1:50	~~2:10~~ 1:50	~~2:00~~ 1:50	R13 NE	2:30	2:30	~~2:40~~ 2:30	~~2:05~~ 1:50	~~2:05~~ 1:50	~~2:00~~ 1:50	R13 NE	~~2:45~~ 2:50
R14 ENE,E	2:30	2:30	~~2:00~~ 1:50	~~2:00~~ 1:50	~~1:55~~ 1:50	R14 ENE,E	2:30	2:30	2:30	~~2:00~~ 1:50	~~2:00~~ 1:50	1:50	R14 ENE,E	~~2:50~~ 3:00
R15 ESE	2:30	2:30	~~2:00~~ 1:50	~~2:00~~ 1:50	1:50	R15 ESE	2:30	2:30	2:30	~~2:00~~ 1:50	~~2:00~~ 1:50	1:50	R15 ESE	~~2:55~~ 3:00
R16 SE	2:30	2:30	1:50	1:50	1:50	R16 SE	2:30	2:30	2:30	1:50	1:50	1:50	R16 SE	~~2:55~~ 3:05
R17 SSE	~~2:40~~ 2:35	2:40	~~2:00~~ 1:50	~~2:00~~ 1:50	~~2:00~~ 1:50	R17 SSE	~~2:40~~ 2:35	2:40	2:40	~~2:00~~ 1:50	~~2:00~~ 1:50	~~2:00~~ 1:50	R17 SSE	~~3:10~~ 3:00
R18 S	~~2:40~~ 2:30	~~2:40~~ 2:35	~~2:00~~ 1:50	~~2:00~~ 1:50	~~2:00~~ 1:50	R18 S	~~2:40~~ 2:30	~~2:40~~ 2:35	2:40	~~2:00~~ 1:50	~~2:00~~ 1:50	~~2:00~~ 1:50	R18 S	~~3:10~~ 3:05
R19 SSW,SW	~~2:40~~ 2:30	~~2:45~~ 2:30	~~2:20~~ 2:00	~~2:20~~ 2:00	~~2:15~~ 2:00	R19 SSW,SW	~~2:40~~ 2:30	~~2:45~~ 2:30	~~2:50~~ 2:40	~~2:20~~ 2:00	~~2:20~~ 2:00	~~2:15~~ 2:00	R19 SSW,SW	~~3:10~~ 3:00
R20 WSW	~~3:25~~ 2:35	~~3:25~~ 2:45	~~2:55~~ 2:10	~~3:00~~ 2:20	~~2:30~~ 2:05	R20 WSW	~~3:25~~ 2:35	~~3:30~~ 2:45	~~3:35~~ 3:00	~~2:50~~ 2:10	~~2:50~~ 2:20	~~2:30~~ 2:05	R20 WSW	~~3:35~~ 2:50
R21 W,WNW	~~3:25~~ 2:35	~~3:25~~ 2:45	~~2:55~~ 2:10	~~3:00~~ 2:20	~~2:30~~ 2:00	R21 W,WNW	~~3:25~~ 2:35	~~3:30~~ 2:45	~~3:30~~ 3:00	~~2:50~~ 2:10	~~2:50~~ 2:20	~~2:30~~ 2:00	R21 W,WNW	~~3:25~~ 2:50
R22 NW,NNW	~~3:15~~ 2:35	~~3:20~~ 2:45	~~2:50~~ 2:10	~~2:50~~ 2:15	~~2:25~~ 2:00	R22 NW,NNW	~~3:20~~ 2:35	~~3:20~~ 2:45	~~3:25~~ 2:55	~~2:45~~ 2:10	~~2:45~~ 2:10	~~2:25~~ 2:00	R22 NW,NNW	~~3:20~~ 2:50

Table 7-1C. Time To Clear The Indicated Area of 95 Percent of the Affected Population

	Summer		Summer		Summer		Winter			Winter		Winter		Summer
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend		Midweek Weekend		Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	Scenario:	(12)
Region Wind Toward:	Midday		Midday		Evening	Region Wind Toward:	Midday			Midday		Evening	Region Wind Toward:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Ice	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	2:30	2:30	1:50	1:50	2:10	R01 2-mile ring	2:20	2:30	2:30	1:50	1:50	2:10	R01 2-mile ring	~~3:10~~ 3:25
R02 5-mile ring	~~3:10~~ 3:00	~~3:10~~ 3:00	2:10	2:10	2:10	R02 5-mile ring	~~3:10~~ 3:00	~~3:10~~ 3:00	3:10	2:10	2:10	2:10	R02 5-mile ring	~~3:15~~ 3:25
R03 Entire EPZ	~~3:40~~ 3:10	~~3:40~~ 3:10	~~3:15~~ 2:30	~~3:20~~ 2:35	~~2:50~~ 2:20	R03 Entire EPZ	~~3:45~~ 3:10	~~3:45~~ 3:10	~~3:50~~ 3:20	~~3:10~~ 2:25	~~3:10~~ 2:30	~~2:50~~ 2:20	R03 Entire EPZ	~~3:55~~ 3:10
2-Mile Ring and Downwind to 5 Miles														
R04 N,NNE,NE	3:00	3:00	2:10	2:10	2:10	R04 N,NNE,NE	3:00	3:00	3:00	2:10	2:10	2:10	R04 N,NNE,NE	~~3:10~~ 3:25
R05 ENE,E	3:00	3:00	2:10	2:10	2:10	R05 ENE,E	3:00	3:00	3:00	2:10	2:10	2:10	R05 ENE,E	~~3:10~~ 3:25
R06 ESE	2:40	2:40	2:00	2:00	2:10	R06 ESE	2:40	2:40	2:40	2:00	2:00	2:10	R06 ESE	~~3:10~~ 3:25
R07 SE,SSE,S	2:50	2:50	~~2:10~~ 2:00	~~2:10~~ 2:00	2:10	R07 SE,SSE,S	2:50	2:50	2:50	~~2:10~~ 2:00	~~2:10~~ 2:00	2:10	R07 SE,SSE,S	~~3:15~~ 3:30
R08 SSW,SW	2:50	2:50	~~2:10~~ 2:00	~~2:10~~ 2:00	2:10	R08 SSW,SW	2:50	2:50	2:50	~~2:10~~ 2:00	~~2:10~~ 2:00	2:10	R08 SSW,SW	~~3:15~~ 3:30
R09 WSW,W,WNW	3:00	3:00	2:10	2:10	2:10	R09 WSW,W,WNW	3:00	3:00	3:00	2:10	2:10	2:10	R09 WSW,W,WNW	~~3:15~~ 3:30
R10 NW,NNW	3:00	3:00	2:10	2:10	2:10	R10 NW,NNW	3:00	3:00	~~3:00~~ 3:10	2:10	2:10	2:10	R10 NW,NNW	~~3:10~~ 3:25
5-Mile Ring and Downwind to EPZ Boundary														
R11 N	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R11 N	~~3:10~~ 3:00	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R11 N	~~3:10~~ 3:20
R12 NNE	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R12 NNE	~~3:10~~ 3:00	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R12 NNE	~~3:10~~ 3:20
R13 NE	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R13 NE	~~3:10~~ 3:00	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R13 NE	~~3:10~~ 3:20
R14 ENE,E	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:10	R14 ENE,E	3:10	3:10	3:10	2:10	2:10	2:10	R14 ENE,E	~~3:10~~ 3:20
R15 ESE	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:10	R15 ESE	3:10	3:10	3:10	2:10	2:10	2:10	R15 ESE	~~3:15~~ 3:20
R16 SE	3:10	3:10	2:10	2:10	2:10	R16 SE	3:10	3:10	3:10	2:10	2:10	2:10	R16 SE	~~3:15~~ 3:25
R17 SSE	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:20	R17 SSE	3:10	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:20	R17 SSE	3:30
R18 S	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:20	R18 S	3:10	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:20	R18 S	3:30
R19 SSW,SW	3:10	3:10	~~2:30~~ 2:20	~~2:40~~ 2:20	~~2:30~~ 2:20	R19 SSW,SW	3:10	3:10	3:10	~~2:30~~ 2:20	~~2:40~~ 2:20	~~2:30~~ 2:20	R19 SSW,SW	~~3:30~~ 3:20
R20 WSW	~~3:40~~ 2:50	~~3:40~~ 3:05	~~3:15~~ 2:30	~~3:20~~ 2:35	~~2:50~~ 2:20	R20 WSW	~~3:45~~ 3:00	~~3:45~~ 3:05	~~3:50~~ 3:20	~~3:10~~ 2:25	~~3:10~~ 2:30	~~2:50~~ 2:20	R20 WSW	~~3:55~~ 3:10
R21 W,WNW	~~3:40~~ 2:50	~~3:40~~ 3:05	~~3:10~~ 2:30	~~3:20~~ 2:35	~~2:50~~ 2:10	R21 W,WNW	~~3:45~~ 2:50	~~3:45~~ 3:05	~~3:50~~ 3:20	~~3:10~~ 2:20	~~3:10~~ 2:30	~~2:50~~ 2:20	R21 W,WNW	~~3:45~~ 3:10
R22 NW,NNW	~~3:35~~ 2:50	~~3:40~~ 3:10	~~3:10~~ 2:30	~~3:10~~ 2:30	~~2:40~~ 2:10	R22 NW,NNW	~~3:40~~ 3:00	~~3:40~~ 3:10	~~3:45~~ 3:20	~~3:00~~ 2:20	~~3:00~~ 2:30	~~2:40~~ 2:20	R22 NW,NNW	~~3:40~~ 3:10

Table 7-1D. Time To Clear The Indicated Area of 100 Percent of the Affected Population

	Summer		Summer		Summer		Winter			Winter		Winter		Summer
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend		Midweek Weekend		Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	Scenario:	(12)
	Midday		Midday		Evening		Midday			Midday		Evening		Midday
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Ice	Good Weather	Rain	Good Weather	Region Wind Toward:	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	4:00	4:00	3:00	3:00	3:00	R01 2-mile ring	4:00	4:00	4:00	3:00	3:00	3:00	R01 2-mile ring	4:00
R02 5-mile ring	4:05	4:05	3:20	3:30	~~3:30~~ 3:20	R02 5-mile ring	4:05	4:05	4:10	3:20	3:30	~~3:30~~ 3:20	R02 5-mile ring	4:05
R03 Entire EPZ	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:20~~ 4:00	~~4:20~~ 4:00	~~4:10~~ 4:00	R03 Entire EPZ	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:40~~ 4:20	4:00	4:00	~~4:10~~ 4:00	R03 Entire EPZ	~~4:50~~ 4:10
2-Mile Ring and Downwind to 5 Miles														
R04 N,NNE,NE	4:00	4:00	3:20	3:20	3:20	R04 N,NNE,NE	4:00	4:00	4:10	3:20	3:20	3:20	R04 N,NNE,NE	4:00
R05 ENE,E	4:00	4:00	3:20	3:20	3:20	R05 ENE,E	4:00	~~4:00~~ 4:05	4:10	3:20	3:20	3:20	R05 ENE,E	4:00
R06 ESE	4:00	4:00	3:00	3:00	~~3:10~~ 3:00	R06 ESE	4:00	4:00	4:00	3:00	3:00	3:00	R06 ESE	4:00
R07 SE,SSE,S	4:00	4:00	3:00	3:00	3:00	R07 SE,SSE,S	4:00	~~4:10~~ 4:00	4:10	3:00	3:00	3:00	R07 SE,SSE,S	4:00
R08 SSW,SW	4:00	4:00	3:00	3:00	3:00	R08 SSW,SW	4:00	~~4:10~~ 4:00	4:10	3:00	3:00	3:00	R08 SSW,SW	4:00
R09 WSW,W,WNW	4:00	4:00	3:20	3:30	~~3:30~~ 3:20	R09 WSW,W,WNW	4:00	~~4:10~~ 4:00	4:10	3:20	3:30	~~3:30~~ 3:20	R09 WSW,W,WNW	4:00
R10 NW,NNW	4:00	4:00	3:20	3:20	~~3:30~~ 3:20	R10 NW,NNW	4:00	4:00	4:10	3:20	3:20	~~3:30~~ 3:20	R10 NW,NNW	4:00
5-Mile Ring and Downwind to EPZ Boundary														
R11 N	4:10	4:10	4:00	4:00	4:00	R11 N	4:10	4:10	4:10	~~4:00~~ 3:50	4:00	4:00	R11 N	4:10
R12 NNE	4:10	4:10	4:00	4:00	4:00	R12 NNE	4:10	4:10	~~4:10~~ 4:20	~~4:00~~ 3:50	4:00	4:00	R12 NNE	4:10
R13 NE	4:10	4:10	4:00	4:00	4:00	R13 NE	4:10	4:10	~~4:10~~ 4:20	~~4:00~~ 3:50	4:00	4:00	R13 NE	4:10
R14 ENE,E	4:10	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R14 ENE,E	4:10	4:10	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R14 ENE,E	4:10
R15 ESE	4:10	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R15 ESE	4:10	4:10	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R15 ESE	4:10
R16 SE	4:05	4:05	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R16 SE	4:05	4:05	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R16 SE	~~4:05~~ 4:10
R17 SSE	4:10	4:10	3:50	~~3:50~~ 4:00	3:50	R17 SSE	4:10	~~4:20~~ 4:10	4:20	3:50	~~3:50~~ 4:00	3:50	R17 SSE	4:10
R18 S	4:10	4:10	3:50	~~3:50~~ 4:00	3:50	R18 S	4:10	~~4:20~~ 4:10	4:20	3:50	~~3:50~~ 4:00	3:50	R18 S	4:10
R19 SSW,SW	4:10	4:10	4:00	4:00	4:00	R19 SSW,SW	4:10	4:10	4:20	4:00	4:00	4:00	R19 SSW,SW	~~4:20~~ 4:10
R20 WSW	4:10	~~4:20~~ 4:10	~~4:20~~ 4:00	~~4:20~~ 4:00	~~4:10~~ 4:00	R20 WSW	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:40~~ 4:20	4:00	4:00	~~4:10~~ 4:00	R20 WSW	~~4:50~~ 4:10
R21 W,WNW	4:10	~~4:20~~ 4:10	~~4:20~~ 4:00	~~4:20~~ 4:00	4:00	R21 W,WNW	4:20 4:10	~~4:20~~ 4:10	~~4:40~~ 4:10	4:00	4:00	4:00	R21 W,WNW	~~4:40~~ 4:10
R22 NW,NNW	4:10	~~4:20~~ 4:10	~~4:20~~ 4:00	~~4:20~~ 4:00	4:00	R22 NW,NNW	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:30~~ 4:20	4:00	4:00	4:00	R22 NW,NNW	~~4:20~~ 4:10

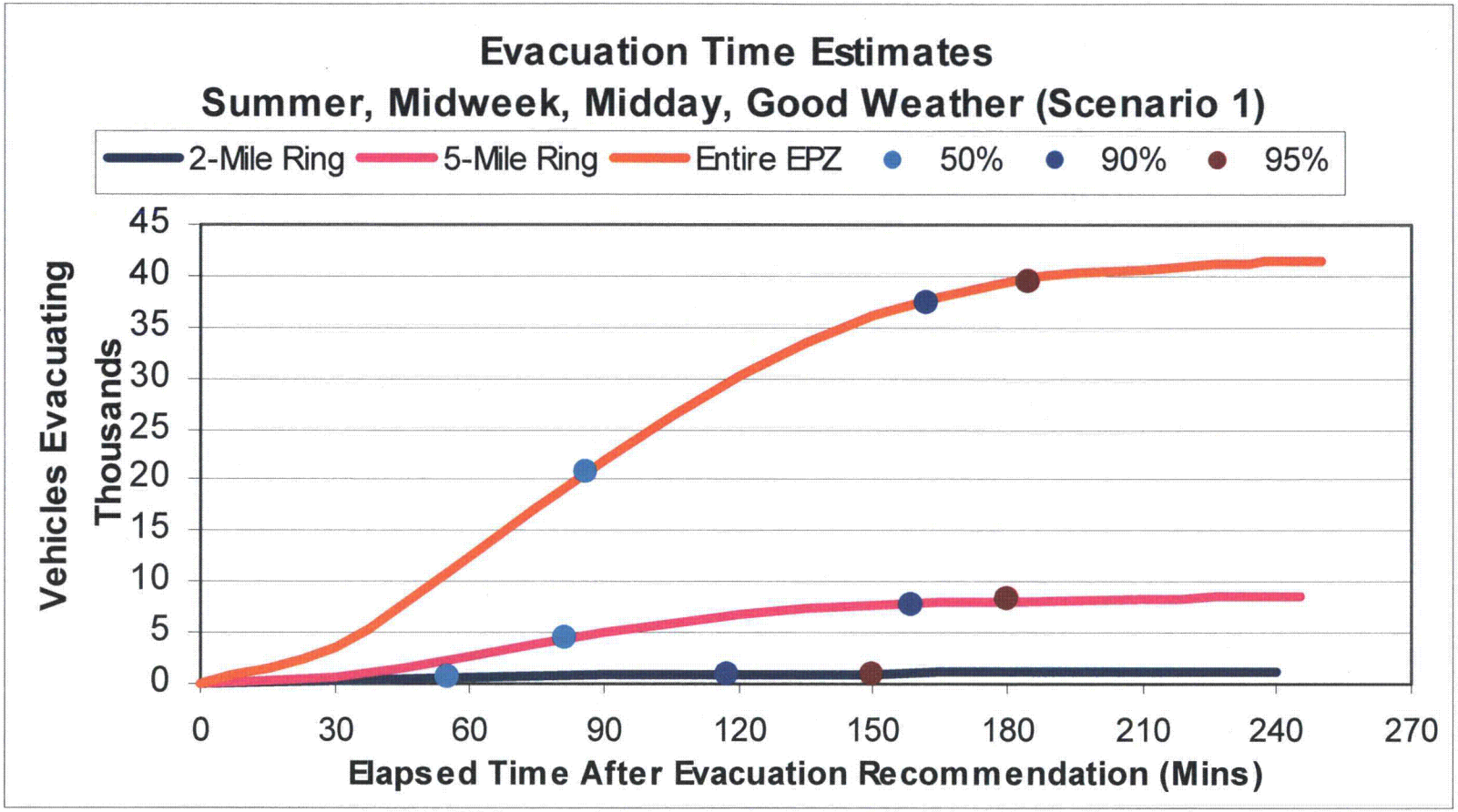

Figure 7-67. Evacuation Time Estimates for WLS Summer, Midweek, Midday, Good Weather Evacuation of Region R03 (Entire EPZ)

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

Attachment 2 to RAI 13.03-033

Markup of the Affected Portions to ETE Report (Rev. 1), Appendix J, "Evacuation Time Estimates for All Evacuation Regions and Scenarios"

- The unique data cell defined by the column and row so determined contains the desired value of ETE expressed in Hours:Minutes.

Example

It is desired to identify the ETE for the following conditions:

- Sunday, August 10th at 4:00 AM.
- It is raining.
- Wind direction is to the northeast (NE).
- Wind speed is such that the distance to be evacuated is judged to be 10 miles (to EPZ boundary).
- The desired ETE is that value needed to evacuate 95 percent of the population from within the impacted Region.

Table J-1C is applicable because the 95th-percentile population is desired. Proceed as follows:

1. Identify the Scenario as summer, weekend, evening and raining. Entering Table J-1C, it is seen that there is no match for these descriptors. However, the clarification given above assigns this combination of circumstances to Scenario 4.

2. Enter Table J-2 and locate the Region described as "Evacuate 5 mile ring and downwind to EPZ boundary" for wind direction to the NE and read REGION R13 in the first column of that row.

Enter Table J-1C to locate the data cell containing the value of ETE for Scenario 4 and Region R13. This data cell is in column (4) and in the row for Region R13; it contains the ETE value of **2:~~20~~10**.

Table J-1A. Time To Clear The Indicated Area of 50 Percent of the Affected Population

	Summer		Summer		Summer		Winter			Winter		Winter		Summer
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend		Midweek Weekend		Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	Scenario:	(12)
	Midday		Midday		Evening		Midday			Midday		Evening		Midday
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Ice	Good Weather	Rain	Good Weather	Region Wind Toward:	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	0:55	0:55	0:50	0:50	0:50	R01 2-mile ring	0:55	0:55	0:55	0:50	0:50	0:50	R01 2-mile ring	~~1:45~~ 1:50
R02 5-mile ring	1:20	1:20	0:55	~~1:00~~ 0:55	0:55	R02 5-mile ring	1:20	1:20	~~1:25~~ 1:20	0:55	~~1:00~~ 0:55	0:55	R02 5-mile ring	1:35
R03 Entire EPZ	~~1:40~~ 1:25	~~1:45~~ 1:30	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R03 Entire EPZ	~~1:45~~ 1:25	~~1:45~~ 1:30	~~1:45~~ 1:35	~~1:25~~ 1:05	~~1:25~~ 1:10	~~1:15~~ 1:05	R03 Entire EPZ	~~1:45~~ 1:30
2-Mile Ring and Downwind to 5 Miles														
R04 N,NNE,NE	1:15	1:15	0:55	0:55	0:55	R04 N,NNE,NE	1:15	1:15	1:15	0:55	0:55	0:55	R04 N,NNE,NE	~~1:35~~ 1:40
R05 ENE,E	1:15	1:15	0:55	0:55	0:55	R05 ENE,E	1:15	1:15	1:15	0:55	0:55	0:55	R05 ENE,E	~~1:40~~ 1:35
R06 ESE	1:00	1:00	0:50	0:50	0:55	R06 ESE	1:00	1:00	1:00	0:50	0:50	0:55	R06 ESE	~~1:40~~ 1:45
R07 SE,SSE,S	1:10	1:10	0:55	0:55	0:55	R07 SE,SSE,S	1:10	1:10	1:10	0:55	0:55	0:55	R07 SE,SSE,S	1:45
R08 SSW,SW	~~1:10~~ 1:05	1:10	0:55	0:55	0:55	R08 SSW,SW	~~1:10~~ 1:05	1:10	1:10	0:55	0:55	0:55	R08 SSW,SW	~~1:45~~ 1:50
R09 WSW,W,WNW	1:15	1:15	0:55	~~1:00~~ 0:55	0:55	R09 WSW,W,WNW	1:15	1:15	~~1:20~~ 1:15	0:55	~~1:00~~ 0:55	0:55	R09 WSW,W,WNW	~~1:35~~ 1:40
R10 NW,NNW	1:20	1:20	0:55	0:55	0:55	R10 NW,NNW	1:20	1:20	1:20	0:55	0:55	0:55	R10 NW,NNW	~~1:30~~ 1:35
5-Mile Ring and Downwind to EPZ Boundary														
R11 N	1:20	1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R11 N	1:20	1:20	~~1:25~~ 1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R11 N	1:25
R12 NNE	1:20	1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R12 NNE	1:20	1:20	~~1:25~~ 1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R12 NNE	1:25
R13 NE	1:20	1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R13 NE	1:20	1:20	~~1:25~~ 1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R13 NE	1:25
R14 ENE,E	1:20	1:20	~~1:00~~ 0:55	1:00	~~1:00~~ 0:55	R14 ENE,E	1:20	~~1:25~~ 1:20	1:25	~~1:00~~ 0:55	~~1:00~~ 0:55	~~1:00~~ 0:55	R14 ENE,E	1:30
R15 ESE	1:20	1:20	~~1:00~~ 0:55	~~1:00~~ 0:55	0:55	R15 ESE	1:20	1:20	1:25	~~1:00~~ 0:55	~~1:00~~ 0:55	0:55	R15 ESE	1:30
R16 SE	1:20	1:20	0:55	~~1:00~~ 0:55	0:55	R16 SE	1:20	1:20	1:25	0:55	~~1:00~~ 0:55	0:55	R16 SE	~~1:30~~ 1:35
R17 SSE	1:25	1:25	1:00	~~1:05~~ 1:00	1:00	R17 SSE	1:25	1:25	~~1:30~~ 1:25	1:00	~~1:05~~ 1:00	1:00	R17 SSE	~~1:35~~ 1:30
R18 S	1:25	1:25	1:00	~~1:05~~ 1:00	1:00	R18 S	1:25	1:25	~~1:30~~ 1:25	1:00	~~1:05~~ 1:00	1:00	R18 S	1:35
R19 SSW,SW	~~1:25~~ 1:20	~~1:25~~ 1:20	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R19 SSW,SW	~~1:25~~ 1:20	~~1:25~~ 1:20	~~1:30~~ 1:25	~~1:05~~ 1:00	~~1:05~~ 1:00	~~1:05~~ 1:00	R19 SSW,SW	~~1:35~~ 1:30
R20 WSW	~~1:40~~ 1:25	~~1:45~~ 1:30	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R20 WSW	~~1:45~~ 1:25	~~1:45~~ 1:30	~~1:45~~ 1:35	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R20 WSW	~~1:45~~ 1:30
R21 W,WNW	~~1:40~~ 1:25	~~1:40~~ 1:30	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R21 W,WNW	~~1:40~~ 1:25	~~1:45~~ 1:30	~~1:45~~ 1:35	~~1:25~~ 1:10	~~1:25~~ 1:10	~~1:15~~ 1:05	R21 W,WNW	~~1:45~~ 1:30
R22 NW,NNW	~~1:40~~ 1:25	~~1:40~~ 1:30	~~1:25~~ 1:05	~~1:25~~ 1:10	~~1:15~~ 1:05	R22 NW,NNW	~~1:40~~ 1:25	~~1:40~~ 1:30	~~1:45~~ 1:35	~~1:20~~ 1:05	~~1:25~~ 1:10	~~1:15~~ 1:05	R22 NW,NNW	~~1:45~~ 1:30

Table J-1B. Time To Clear The Indicated Area of 90 Percent of the Affected Population

	Summer		Summer		Summer		Winter			Winter		Winter		Summer
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend		Midweek Weekend		Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	Scenario:	(12)
	Midday		Midday		Evening		Midday			Midday		Evening		Midday
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Ice	Good Weather	Rain	Good Weather	Region Wind Toward:	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	1:50	1:50	1:30	1:30	1:50	R01 2-mile ring	1:50	1:50	1:50	1:30	1:30	1:50	R01 2-mile ring	~~3:00~~ 3:15
R02 5-mile ring	2:30	2:30	1:50	1:50	1:50	R02 5-mile ring	2:30	2:30	2:30	1:50	1:50	1:50	R02 5-mile ring	~~3:00~~ 3:10
R03 Entire EPZ	~~3:25~~ 2:35	~~3:25~~ 2:45	~~2:55~~ 2:10	~~3:00~~ 2:20	~~2:30~~ 2:05	R03 Entire EPZ	~~3:25~~ 2:40	~~3:30~~ 2:45	~~3:35~~ 3:00	~~2:50~~ 2:10	~~2:50~~ 2:20	~~2:30~~ 2:05	R03 Entire EPZ	~~3:35~~ 2:50
2-Mile Ring and Downwind to 5 Miles														
R04 N,NNE,NE	2:25	2:30	1:50	1:50	1:50	R04 N,NNE,NE	2:25	2:30	2:30	1:50	1:50	1:50	R04 N,NNE,NE	~~3:00~~ 3:10
R05 ENE,E	2:30	2:30	1:50	1:50	1:50	R05 ENE,E	2:30	2:30	2:30	1:50	1:50	1:50	R05 ENE,E	~~3:00~~ 3:05
R06 ESE	2:00	2:00	1:40	1:40	1:50	R06 ESE	2:00	2:00	2:00	1:40	1:40	1:50	R06 ESE	~~3:00~~ 3:15
R07 SE,SSE,S	2:20	2:20	~~1:50~~ 1:40	1:50	1:50	R07 SE,SSE,S	2:20	2:20	2:20	~~1:50~~ 1:40	1:50	1:50	R07 SE,SSE,S	~~3:05~~ 3:15
R08 SSW,SW	~~2:10~~ 2:20	2:20	~~1:50~~ 1:40	1:50	1:50	R08 SSW,SW	~~2:10~~ 2:20	~~2:10~~ 2:20	2:20	~~1:50~~ 1:40	1:50	1:50	R08 SSW,SW	~~3:05~~ 3:20
R09 WSW,W,WNW	2:30	2:30	1:50	1:50	1:50	R09 WSW,W,WNW	2:30	2:30	2:30	1:50	1:50	1:50	R09 WSW,W,WNW	~~3:05~~ 3:15
R10 NW,NNW	2:30	2:30	1:50	1:50	1:50	R10 NW,NNW	2:30	2:30	2:30	1:50	1:50	1:50	R10 NW,NNW	~~3:00~~ 3:05
5-Mile Ring and Downwind to EPZ Boundary														
R11 N	2:30	2:30	~~2:05~~ 1:50	~~2:05~~ 1:50	~~2:00~~ 1:50	R11 N	2:30	2:30	~~2:40~~ 2:30	~~2:05~~ 1:50	~~2:05~~ 1:50	~~2:00~~ 1:50	R11 N	~~2:45~~ 2:50
R12 NNE	2:30	2:30	~~2:05~~ 1:50	~~2:10~~ 1:50	~~2:00~~ 1:50	R12 NNE	2:30	2:30	~~2:40~~ 2:30	~~2:05~~ 1:50	~~2:05~~ 1:50	~~2:00~~ 1:50	R12 NNE	~~2:45~~ 2:50
R13 NE	2:30	2:30	~~2:10~~ 1:50	~~2:10~~ 1:50	~~2:00~~ 1:50	R13 NE	2:30	2:30	~~2:40~~ 2:30	~~2:05~~ 1:50	~~2:05~~ 1:50	~~2:00~~ 1:50	R13 NE	~~2:45~~ 2:50
R14 ENE,E	2:30	2:30	~~2:00~~ 1:50	~~2:00~~ 1:50	~~1:55~~ 1:50	R14 ENE,E	2:30	2:30	2:30	~~2:00~~ 1:50	~~2:00~~ 1:50	1:50	R14 ENE,E	~~2:50~~ 3:00
R15 ESE	2:30	2:30	~~2:00~~ 1:50	~~2:00~~ 1:50	1:50	R15 ESE	2:30	2:30	2:30	~~2:00~~ 1:50	~~2:00~~ 1:50	1:50	R15 ESE	~~2:55~~ 3:00
R16 SE	2:30	2:30	1:50	1:50	1:50	R16 SE	2:30	2:30	2:30	1:50	1:50	1:50	R16 SE	~~2:55~~ 3:05
R17 SSE	~~2:40~~ 2:35	2:40	~~2:00~~ 1:50	~~2:00~~ 1:50	~~2:00~~ 1:50	R17 SSE	~~2:40~~ 2:35	2:40	2:40	~~2:00~~ 1:50	~~2:00~~ 1:50	~~2:00~~ 1:50	R17 SSE	~~3:10~~ 3:00
R18 S	~~2:40~~ 2:30	~~2:40~~ 2:35	~~2:00~~ 1:50	~~2:00~~ 1:50	~~2:00~~ 1:50	R18 S	~~2:40~~ 2:30	~~2:40~~ 2:35	2:40	~~2:00~~ 1:50	~~2:00~~ 1:50	~~2:00~~ 1:50	R18 S	~~3:10~~ 3:05
R19 SSW,SW	~~2:40~~ 2:30	~~2:45~~ 2:30	~~2:20~~ 2:00	~~2:20~~ 2:00	~~2:15~~ 2:00	R19 SSW,SW	~~2:40~~ 2:30	~~2:45~~ 2:30	~~2:50~~ 2:40	~~2:20~~ 2:00	~~2:20~~ 2:00	~~2:15~~ 2:00	R19 SSW,SW	~~3:10~~ 3:00
R20 WSW	~~3:25~~ 2:35	~~3:25~~ 2:45	~~2:55~~ 2:10	~~3:00~~ 2:20	~~2:30~~ 2:05	R20 WSW	~~3:25~~ 2:35	~~3:30~~ 2:45	~~3:35~~ 3:00	~~2:50~~ 2:10	~~2:50~~ 2:20	~~2:30~~ 2:05	R20 WSW	~~3:35~~ 2:50
R21 W,WNW	~~3:25~~ 2:35	~~3:25~~ 2:45	~~2:55~~ 2:10	~~3:00~~ 2:20	~~2:30~~ 2:00	R21 W,WNW	~~3:25~~ 2:35	~~3:30~~ 2:45	~~3:30~~ 3:00	~~2:50~~ 2:10	~~2:50~~ 2:20	~~2:30~~ 2:00	R21 W,WNW	~~3:25~~ 2:50
R22 NW,NNW	~~3:15~~ 2:35	~~3:20~~ 2:45	~~2:50~~ 2:10	~~2:50~~ 2:15	~~2:25~~ 2:00	R22 NW,NNW	~~3:20~~ 2:35	~~3:20~~ 2:45	~~3:25~~ 2:55	~~2:45~~ 2:10	~~2:45~~ 2:10	~~2:25~~ 2:00	R22 NW,NNW	~~3:20~~ 2:50

Table J-1C. Time To Clear The Indicated Area of 95 Percent of the Affected Population

	Summer		Summer		Summer		Winter			Winter		Winter		Summer
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend		Midweek Weekend		Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	Scenario:	(12)
	Midday		Midday		Evening		Midday			Midday		Evening		Midday
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Ice	Good Weather	Rain	Good Weather	Region Wind Toward:	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	2:30	2:30	1:50	1:50	2:10	R01 2-mile ring	2:20	2:30	2:30	1:50	1:50	2:10	R01 2-mile ring	~~3:10~~ 3:25
R02 5-mile ring	~~3:10~~ 3:00	~~3:10~~ 3:00	2:10	2:10	2:10	R02 5-mile ring	~~3:10~~ 3:00	~~3:10~~ 3:00	3:10	2:10	2:10	2:10	R02 5-mile ring	~~3:15~~ 3:25
R03 Entire EPZ	~~3:40~~ 3:10	~~3:40~~ 3:10	~~3:15~~ 2:30	~~3:20~~ 2:35	~~2:50~~ 2:20	R03 Entire EPZ	~~3:45~~ 3:10	~~3:45~~ 3:10	~~3:50~~ 3:20	~~3:10~~ 2:25	~~3:10~~ 2:30	~~2:50~~ 2:20	R03 Entire EPZ	~~3:55~~ 3:10
2-Mile Ring and Downwind to 5 Miles														
R04 N,NNE,NE	3:00	3:00	2:10	2:10	2:10	R04 N,NNE,NE	3:00	3:00	3:00	2:10	2:10	2:10	R04 N,NNE,NE	~~3:10~~ 3:25
R05 ENE,E	3:00	3:00	2:10	2:10	2:10	R05 ENE,E	3:00	3:00	3:00	2:10	2:10	2:10	R05 ENE,E	~~3:10~~ 3:25
R06 ESE	2:40	2:40	2:00	2:00	2:10	R06 ESE	2:40	2:40	2:40	2:00	2:00	2:10	R06 ESE	~~3:10~~ 3:25
R07 SE,SSE,S	2:50	2:50	~~2:10~~ 2:00	~~2:10~~ 2:00	2:10	R07 SE,SSE,S	2:50	2:50	2:50	~~2:10~~ 2:00	~~2:10~~ 2:00	2:10	R07 SE,SSE,S	~~3:15~~ 3:30
R08 SSW,SW	2:50	2:50	~~2:10~~ 2:00	~~2:10~~ 2:00	2:10	R08 SSW,SW	2:50	2:50	2:50	~~2:10~~ 2:00	~~2:10~~ 2:00	2:10	R08 SSW,SW	~~3:15~~ 3:30
R09 WSW,W,WNW	3:00	3:00	2:10	2:10	2:10	R09 WSW,W,WNW	3:00	3:00	3:00	2:10	2:10	2:10	R09 WSW,W,WNW	~~3:15~~ 3:30
R10 NW,NNW	3:00	3:00	2:10	2:10	2:10	R10 NW,NNW	3:00	3:00	~~3:00~~ 3:10	2:10	2:10	2:10	R10 NW,NNW	~~3:10~~ 3:25
5-Mile Ring and Downwind to EPZ Boundary														
R11 N	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R11 N	~~3:10~~ 3:00	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R11 N	~~3:10~~ 3:20
R12 NNE	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R12 NNE	~~3:10~~ 3:00	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R12 NNE	~~3:10~~ 3:20
R13 NE	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R13 NE	~~3:10~~ 3:00	~~3:10~~ 3:00	~~3:10~~ 3:00	~~2:20~~ 2:10	~~2:20~~ 2:10	~~2:20~~ 2:10	R13 NE	~~3:10~~ 3:20
R14 ENE,E	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:10	R14 ENE,E	3:10	3:10	3:10	2:10	2:10	2:10	R14 ENE,E	~~3:10~~ 3:20
R15 ESE	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:10	R15 ESE	3:10	3:10	3:10	2:10	2:10	2:10	R15 ESE	~~3:15~~ 3:20
R16 SE	3:10	3:10	2:10	2:10	2:10	R16 SE	3:10	3:10	3:10	2:10	2:10	2:10	R16 SE	~~3:15~~ 3:25
R17 SSE	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:20	R17 SSE	3:10	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:20	R17 SSE	3:30
R18 S	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:20	R18 S	3:10	3:10	3:10	~~2:20~~ 2:10	~~2:20~~ 2:10	2:20	R18 S	3:30
R19 SSW,SW	3:10	3:10	~~2:30~~ 2:20	~~2:40~~ 2:20	~~2:30~~ 2:20	R19 SSW,SW	3:10	3:10	3:10	~~2:30~~ 2:20	~~2:40~~ 2:20	~~2:30~~ 2:20	R19 SSW,SW	~~3:30~~ 3:20
R20 WSW	~~3:40~~ 2:50	~~3:40~~ 3:05	~~3:15~~ 2:30	~~3:20~~ 2:35	~~2:50~~ 2:20	R20 WSW	~~3:45~~ 3:00	~~3:45~~ 3:05	~~3:50~~ 3:20	~~3:10~~ 2:25	~~3:10~~ 2:30	~~2:50~~ 2:20	R20 WSW	~~3:55~~ 3:10
R21 W,WNW	~~3:40~~ 2:50	~~3:40~~ 3:05	~~3:10~~ 2:30	~~3:20~~ 2:35	~~2:50~~ 2:10	R21 W,WNW	~~3:45~~ 2:50	~~3:45~~ 3:05	~~3:50~~ 3:20	~~3:10~~ 2:20	~~3:10~~ 2:30	~~2:50~~ 2:20	R21 W,WNW	~~3:45~~ 3:10
R22 NW,NNW	~~3:35~~ 2:50	~~3:40~~ 3:10	~~3:10~~ 2:30	~~3:10~~ 2:30	~~2:40~~ 2:10	R22 NW,NNW	~~3:40~~ 3:00	~~3:40~~ 3:10	~~3:45~~ 3:20	~~3:00~~ 2:20	~~3:00~~ 2:30	~~2:40~~ 2:20	R22 NW,NNW	~~3:40~~ 3:10

Table J-1D. Time To Clear The Indicated Area of 100 Percent of the Affected Population

	Summer		Summer		Summer		Winter			Winter		Winter		Summer
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend		Midweek Weekend		Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	Scenario:	(12)
Region Wind Toward:	Midday		Midday		Evening	Region Wind Toward:	Midday			Midday		Evening	Region Wind Toward:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Ice	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	4:00	4:00	3:00	3:00	3:00	R01 2-mile ring	4:00	4:00	4:00	3:00	3:00	3:00	R01 2-mile ring	4:00
R02 5-mile ring	4:05	4:05	3:20	3:30	~~3:30~~ 3:20	R02 5-mile ring	4:05	4:05	4:10	3:20	3:30	~~3:30~~ 3:20	R02 5-mile ring	4:05
R03 Entire EPZ	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:20~~ 4:00	~~4:20~~ 4:00	~~4:10~~ 4:00	R03 Entire EPZ	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:40~~ 4:20	4:00	4:00	~~4:10~~ 4:00	R03 Entire EPZ	~~4:50~~ 4:10
2-Mile Ring and Downwind to 5 Miles														
R04 N,NNE,NE	4:00	4:00	3:20	3:20	3:20	R04 N,NNE,NE	4:00	4:00	4:10	3:20	3:20	3:20	R04 N,NNE,NE	4:00
R05 ENE,E	4:00	4:00	3:20	3:20	3:20	R05 ENE,E	4:00	~~4:00~~ 4:05	4:10	3:20	3:20	3:20	R05 ENE,E	4:00
R06 ESE	4:00	4:00	3:00	3:00	~~3:10~~ 3:00	R06 ESE	4:00	4:00	4:00	3:00	3:00	3:00	R06 ESE	4:00
R07 SE,SSE,S	4:00	4:00	3:00	3:00	3:00	R07 SE,SSE,S	4:00	~~4:10~~ 4:00	4:10	3:00	3:00	3:00	R07 SE,SSE,S	4:00
R08 SSW,SW	4:00	4:00	3:00	3:00	3:00	R08 SSW,SW	4:00	~~4:10~~ 4:00	4:10	3:00	3:00	3:00	R08 SSW,SW	4:00
R09 WSW,W,WNW	4:00	4:00	3:20	3:30	~~3:30~~ 3:20	R09 WSW,W,WNW	4:00	~~4:10~~ 4:00	4:10	3:20	3:30	~~3:30~~ 3:20	R09 WSW,W,WNW	4:00
R10 NW,NNW	4:00	4:00	3:20	3:20	~~3:30~~ 3:20	R10 NW,NNW	4:00	4:00	4:10	3:20	3:20	~~3:30~~ 3:20	R10 NW,NNW	4:00
5-Mile Ring and Downwind to EPZ Boundary														
R11 N	4:10	4:10	4:00	4:00	4:00	R11 N	4:10	4:10	4:10	~~4:00~~ 3:50	4:00	4:00	R11 N	4:10
R12 NNE	4:10	4:10	4:00	4:00	4:00	R12 NNE	4:10	4:10	~~4:10~~ 4:20	~~4:00~~ 3:50	4:00	4:00	R12 NNE	4:10
R13 NE	4:10	4:10	4:00	4:00	4:00	R13 NE	4:10	4:10	~~4:10~~ 4:20	~~4:00~~ 3:50	4:00	4:00	R13 NE	4:10
R14 ENE,E	4:10	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R14 ENE,E	4:10	4:10	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R14 ENE,E	4:10
R15 ESE	4:10	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R15 ESE	4:10	4:10	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R15 ESE	4:10
R16 SE	4:05	4:05	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R16 SE	4:05	4:05	4:10	~~3:30~~ 3:40	3:40	~~3:30~~ 3:40	R16 SE	~~4:05~~ 4:10
R17 SSE	4:10	4:10	3:50	~~3:50~~ 4:00	3:50	R17 SSE	4:10	~~4:20~~ 4:10	4:20	3:50	~~3:50~~ 4:00	3:50	R17 SSE	4:10
R18 S	4:10	4:10	3:50	~~3:50~~ 4:00	3:50	R18 S	4:10	~~4:20~~ 4:10	4:20	3:50	~~3:50~~ 4:00	3:50	R18 S	4:10
R19 SSW,SW	4:10	4:10	4:00	4:00	4:00	R19 SSW,SW	4:10	4:10	4:20	4:00	4:00	4:00	R19 SSW,SW	~~4:20~~ 4:10
R20 WSW	4:10	~~4:20~~ 4:10	~~4:20~~ 4:00	~~4:20~~ 4:00	~~4:10~~ 4:00	R20 WSW	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:40~~ 4:20	4:00	4:00	~~4:10~~ 4:00	R20 WSW	~~4:50~~ 4:10
R21 W,WNW	4:10	~~4:20~~ 4:10	~~4:20~~ 4:00	~~4:20~~ 4:00	4:00	R21 W,WNW	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:40~~ 4:10	4:00	4:00	4:00	R21 W,WNW	~~4:40~~ 4:10
R22 NW,NNW	4:10	~~4:20~~ 4:10	~~4:20~~ 4:00	~~4:20~~ 4:00	4:00	R22 NW,NNW	~~4:20~~ 4:10	~~4:20~~ 4:10	~~4:30~~ 4:20	4:00	4:00	4:00	R22 NW,NNW	~~4:20~~ 4:10

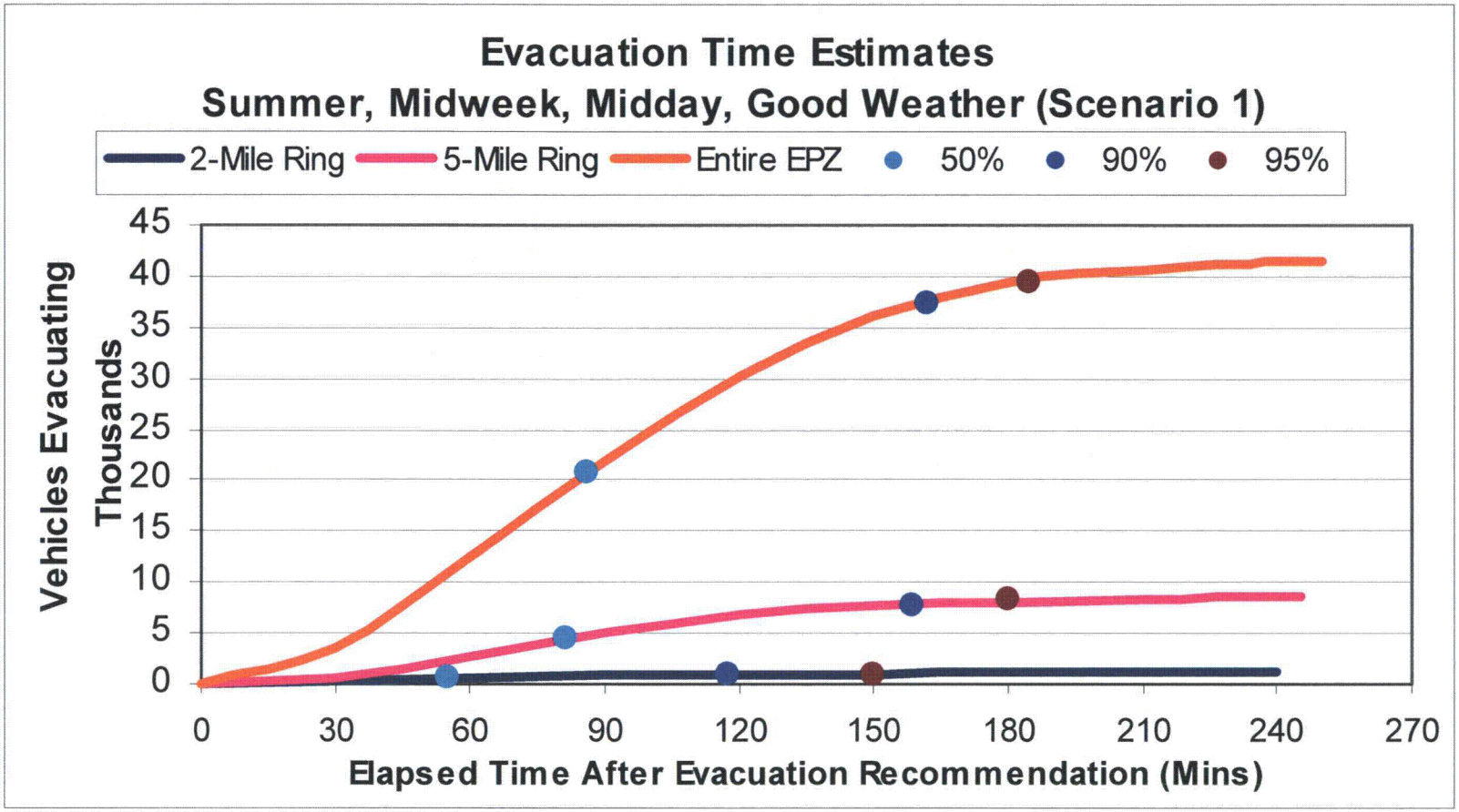

Figure J-1. Evacuation Time Estimates – Scenario 1 for Region R03 (Entire EPZ)

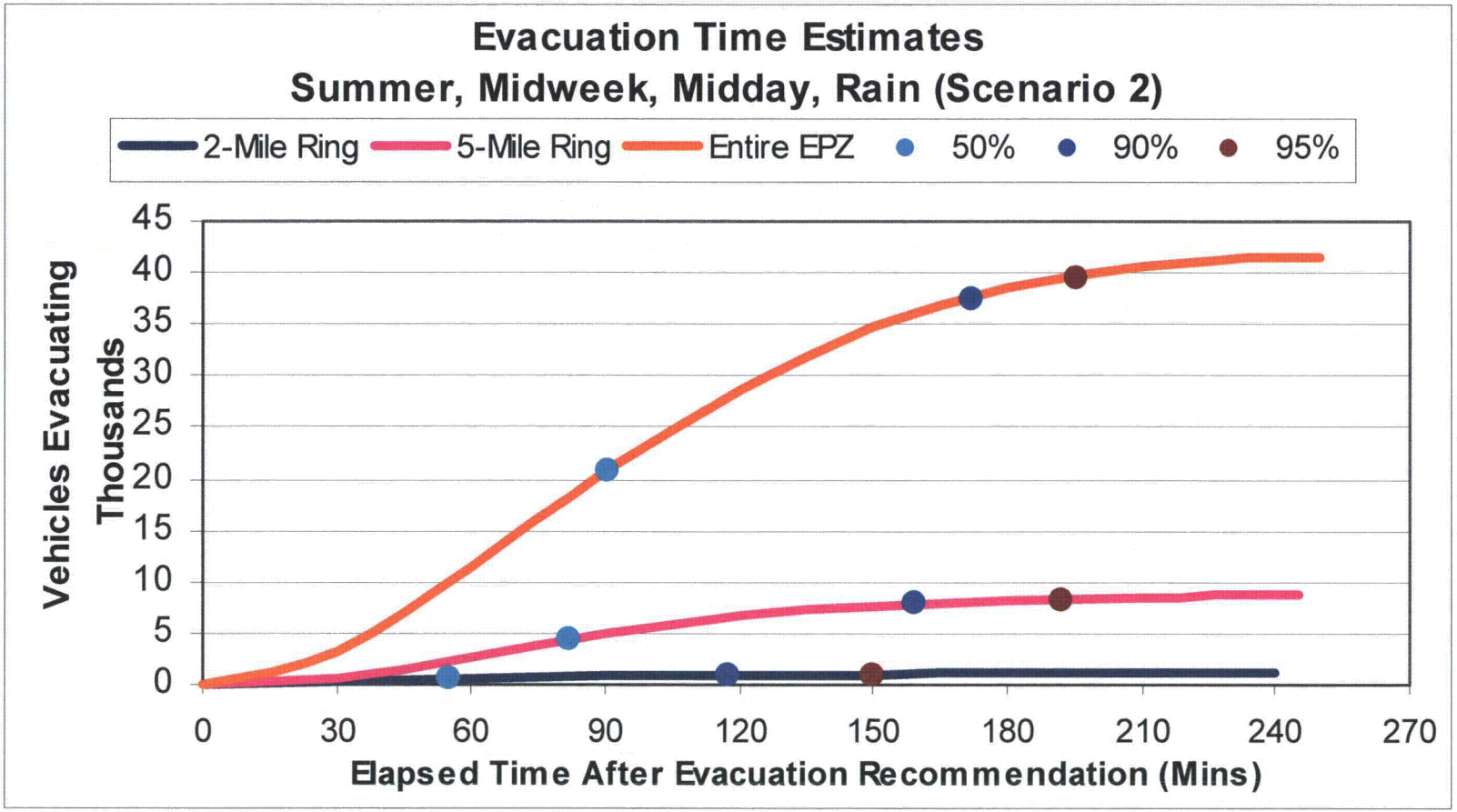

Figure J-2. Evacuation Time Estimates – Scenario 2 for Region R03 (Entire EPZ)

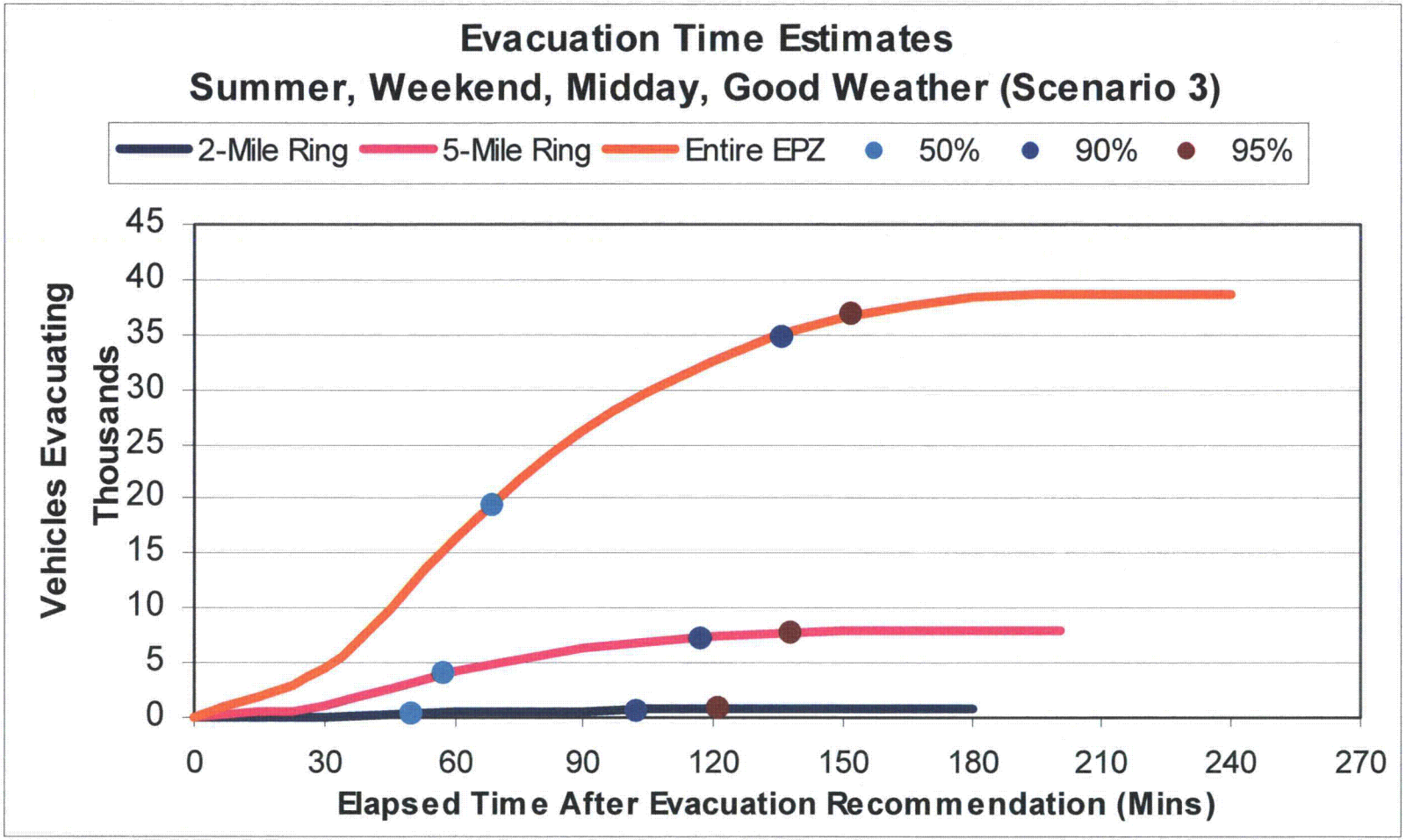

Figure J-3. Evacuation Time Estimates – Scenario 3 for Region R03 (Entire EPZ)

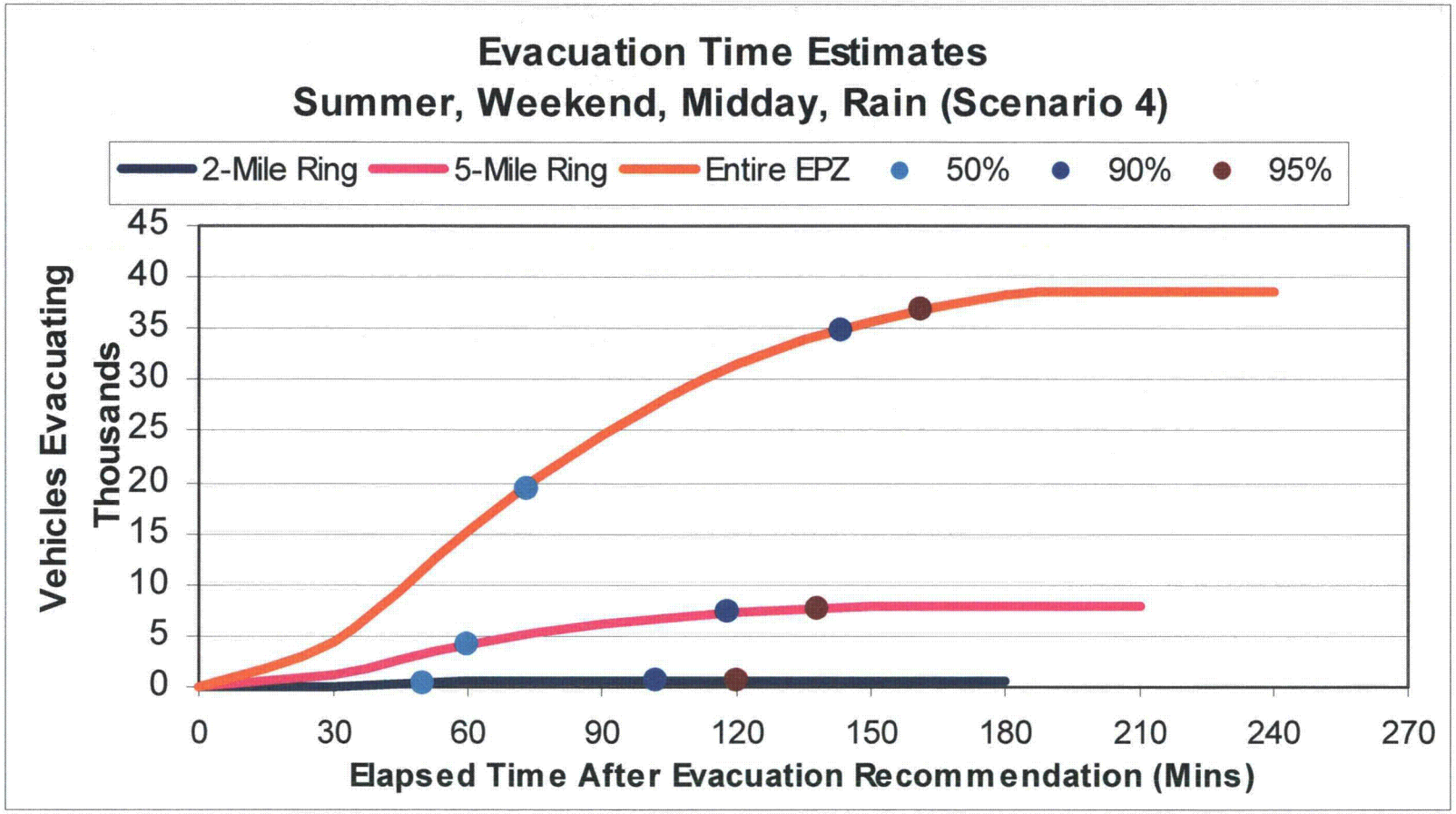

Figure J-4. Evacuation Time Estimates – Scenario 4 for Region R03 (Entire EPZ)

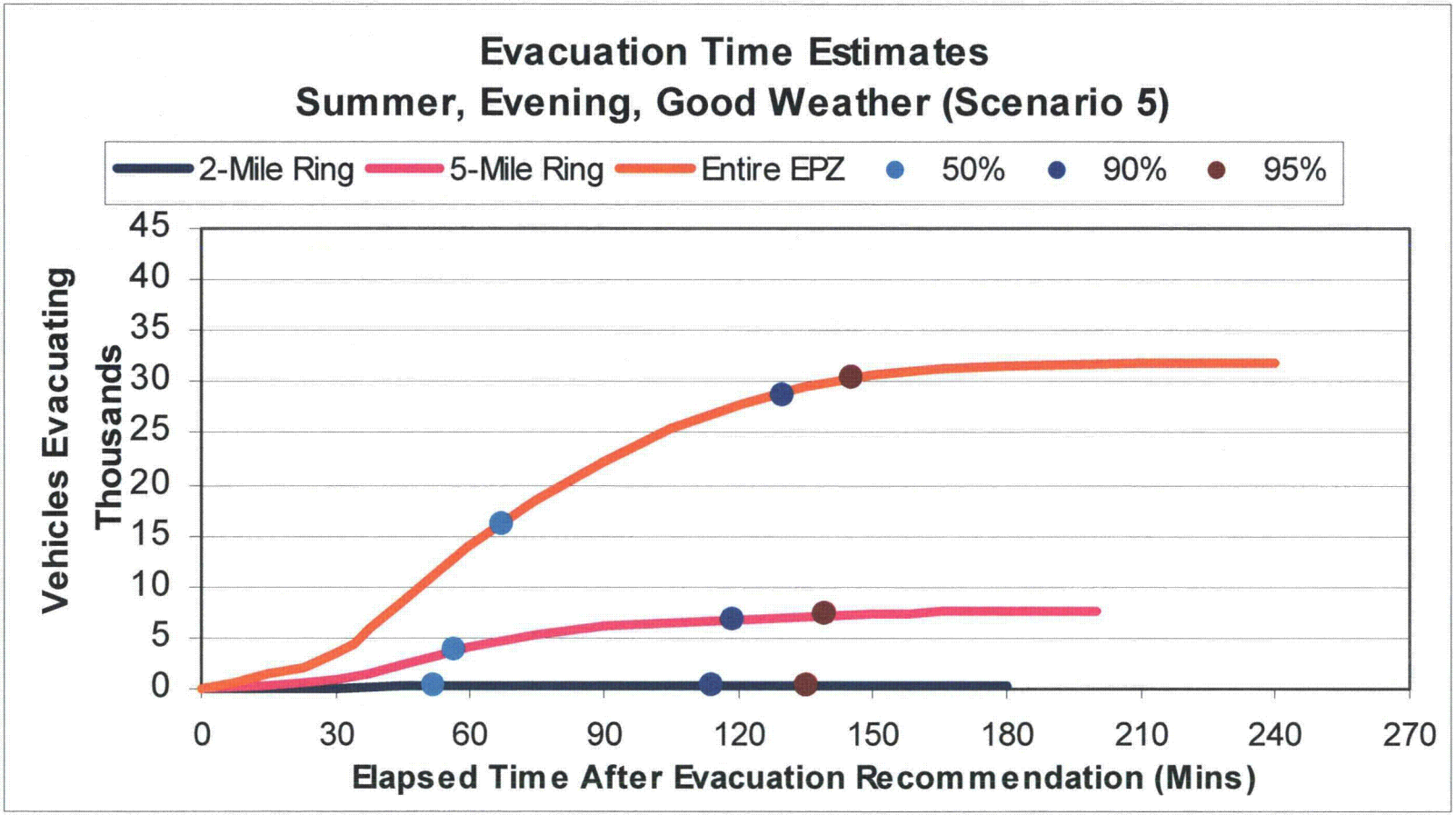

Figure J-5. Evacuation Time Estimates – Scenario 5 for Region R03 (Entire EPZ)

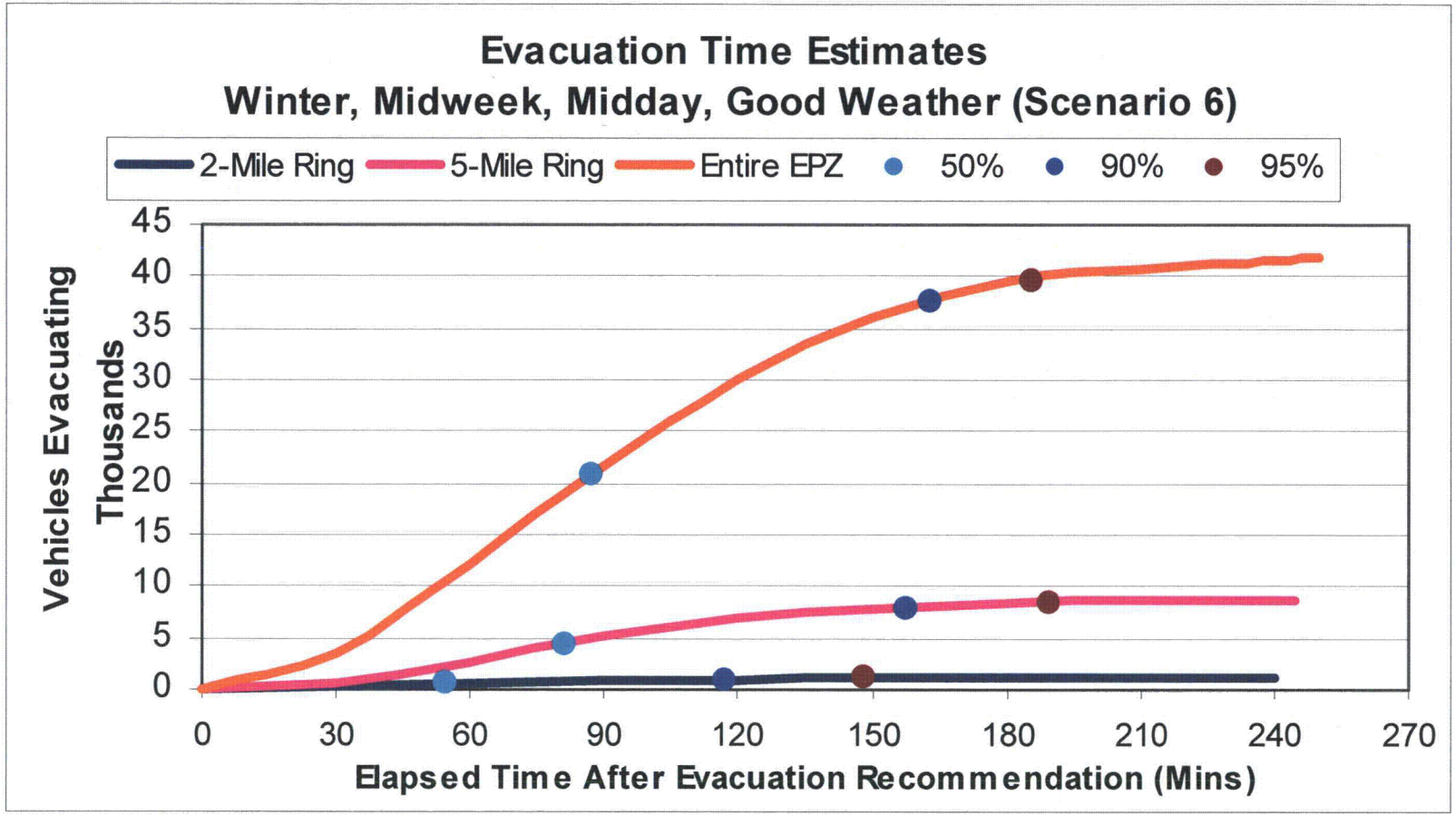

Figure J-6. Evacuation Time Estimates – Scenario 6 for Region R03 (Entire EPZ)

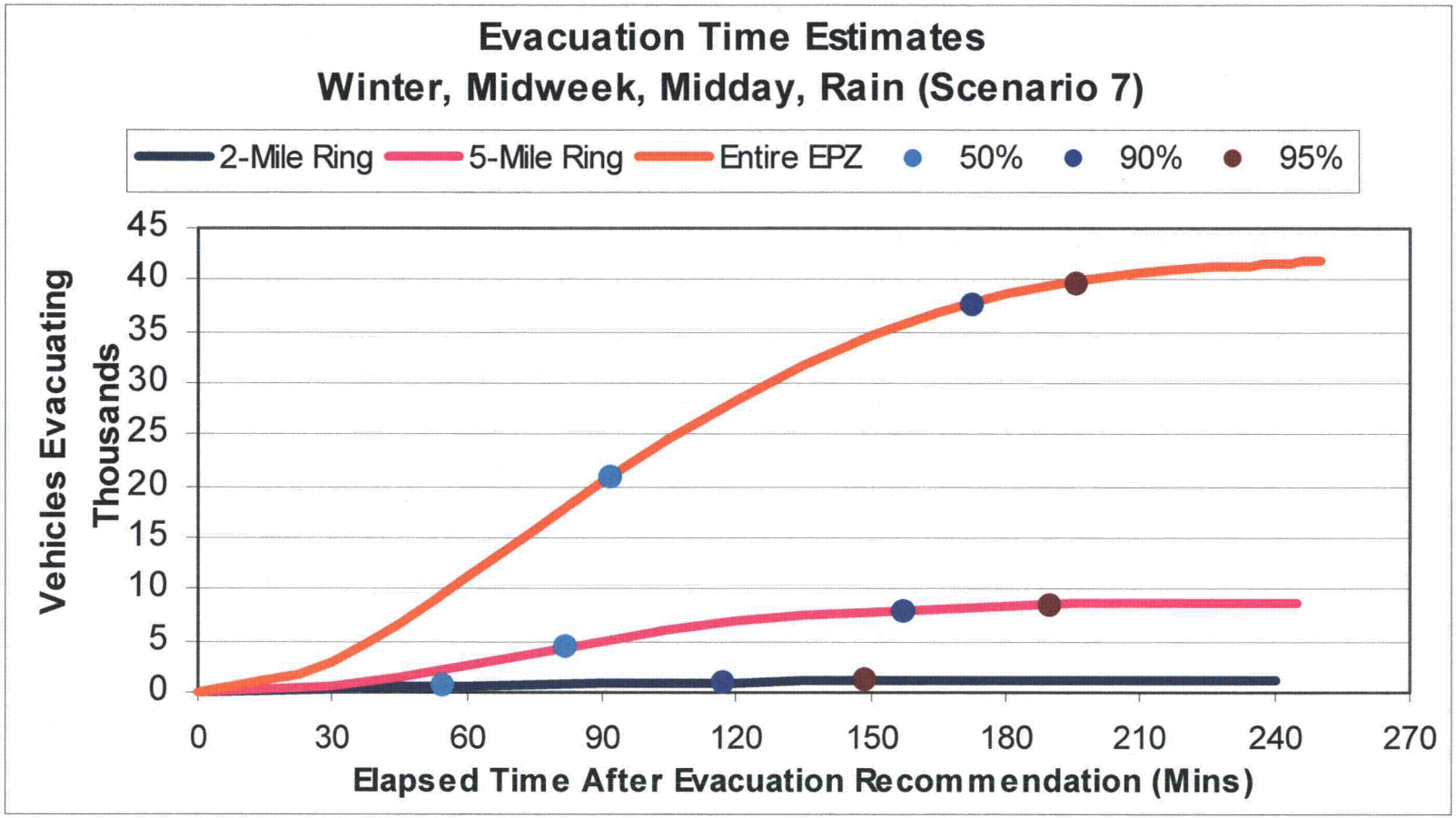

Figure J-7. Evacuation Time Estimates – Scenario 7 for Region R03 (Entire EPZ)

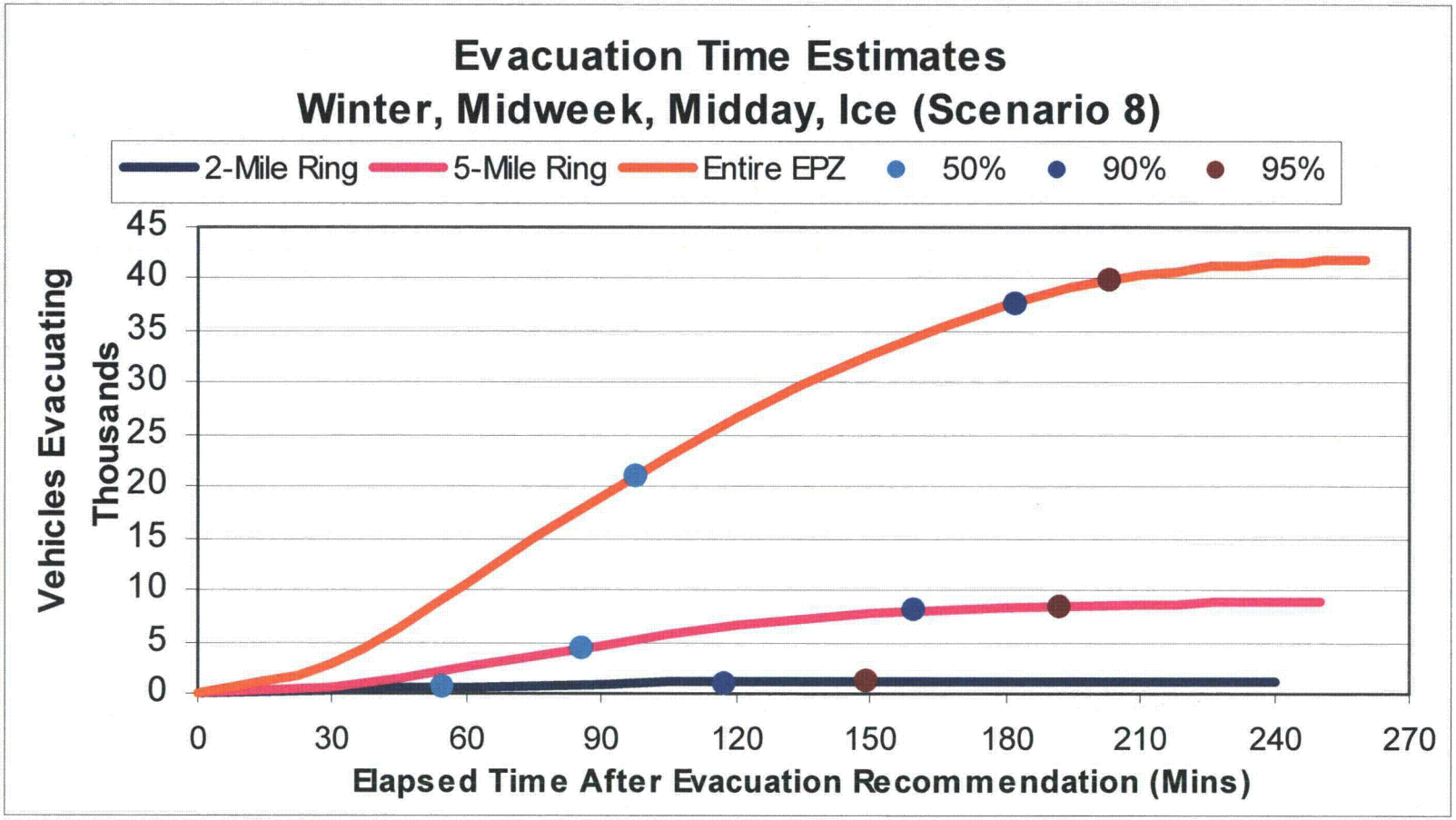

Figure J-8. Evacuation Time Estimates – Scenario 8 for Region R03 (Entire EPZ)

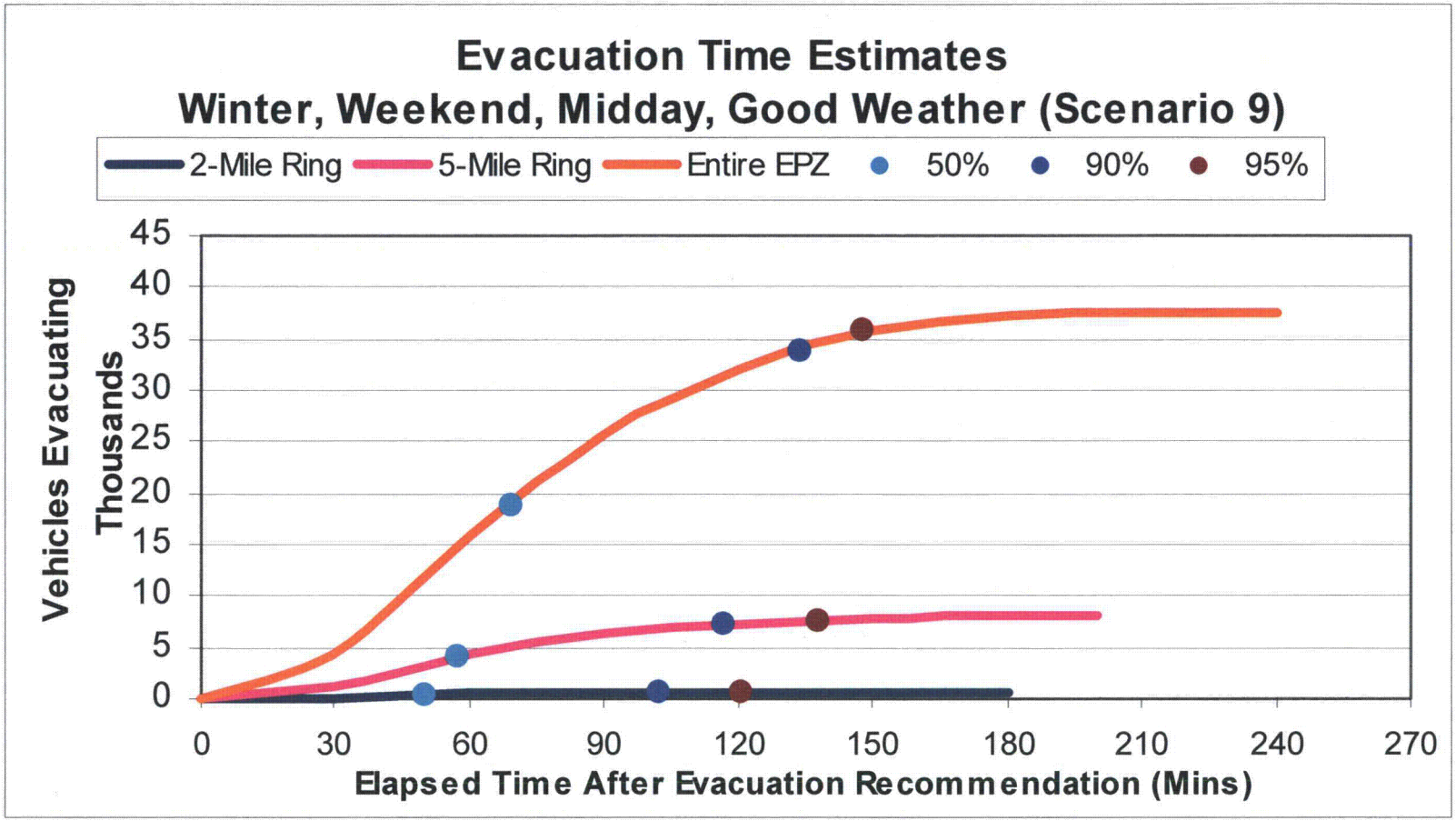

Figure J-9. Evacuation Time Estimates – Scenario 9 for Region R03 (Entire EPZ)

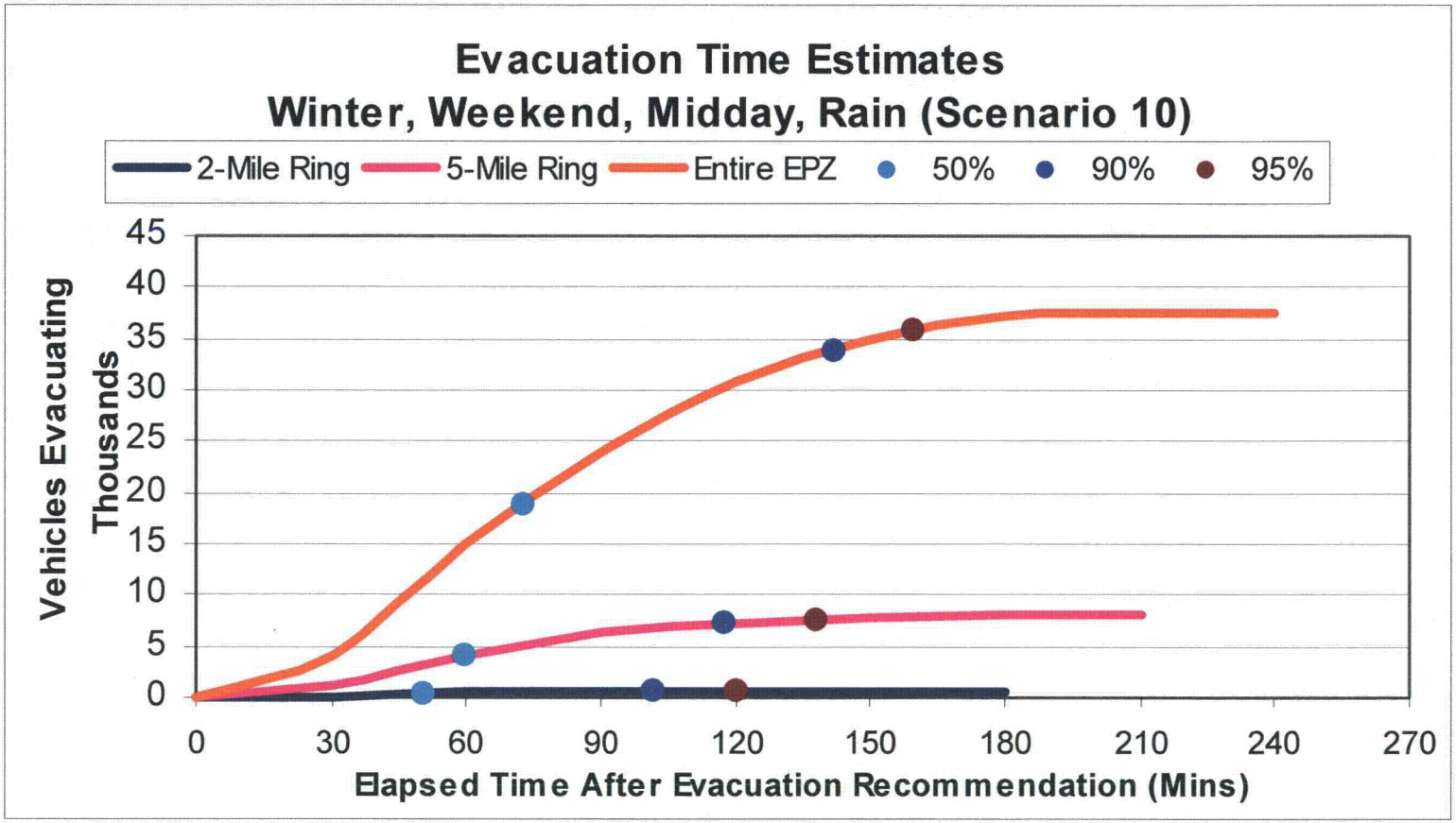

Figure J-10. Evacuation Time Estimates – Scenario 10 for Region R03 (Entire EPZ)

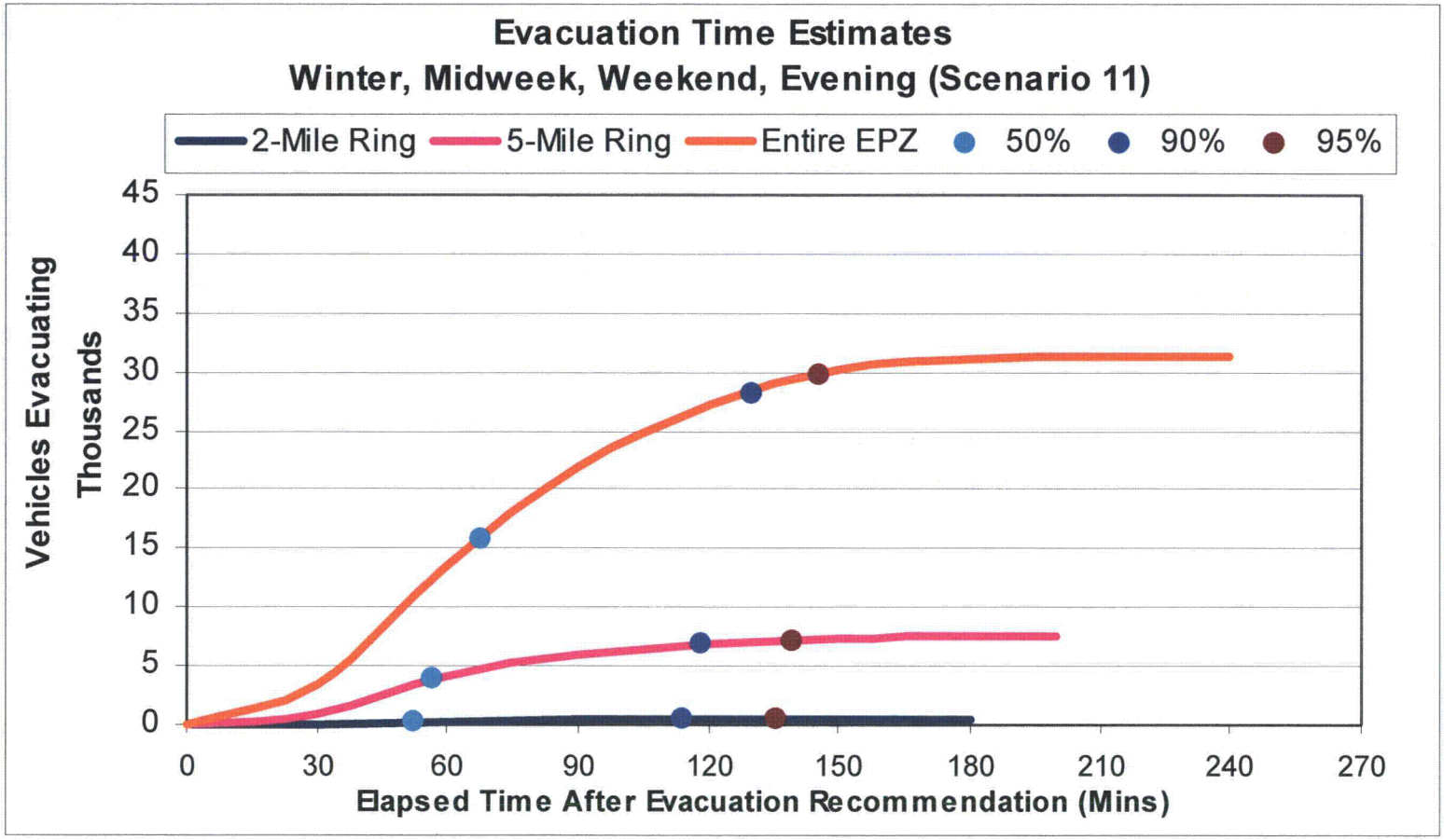

Figure J-11. Evacuation Time Estimates – Scenario 11 for Region R03 (Entire EPZ)

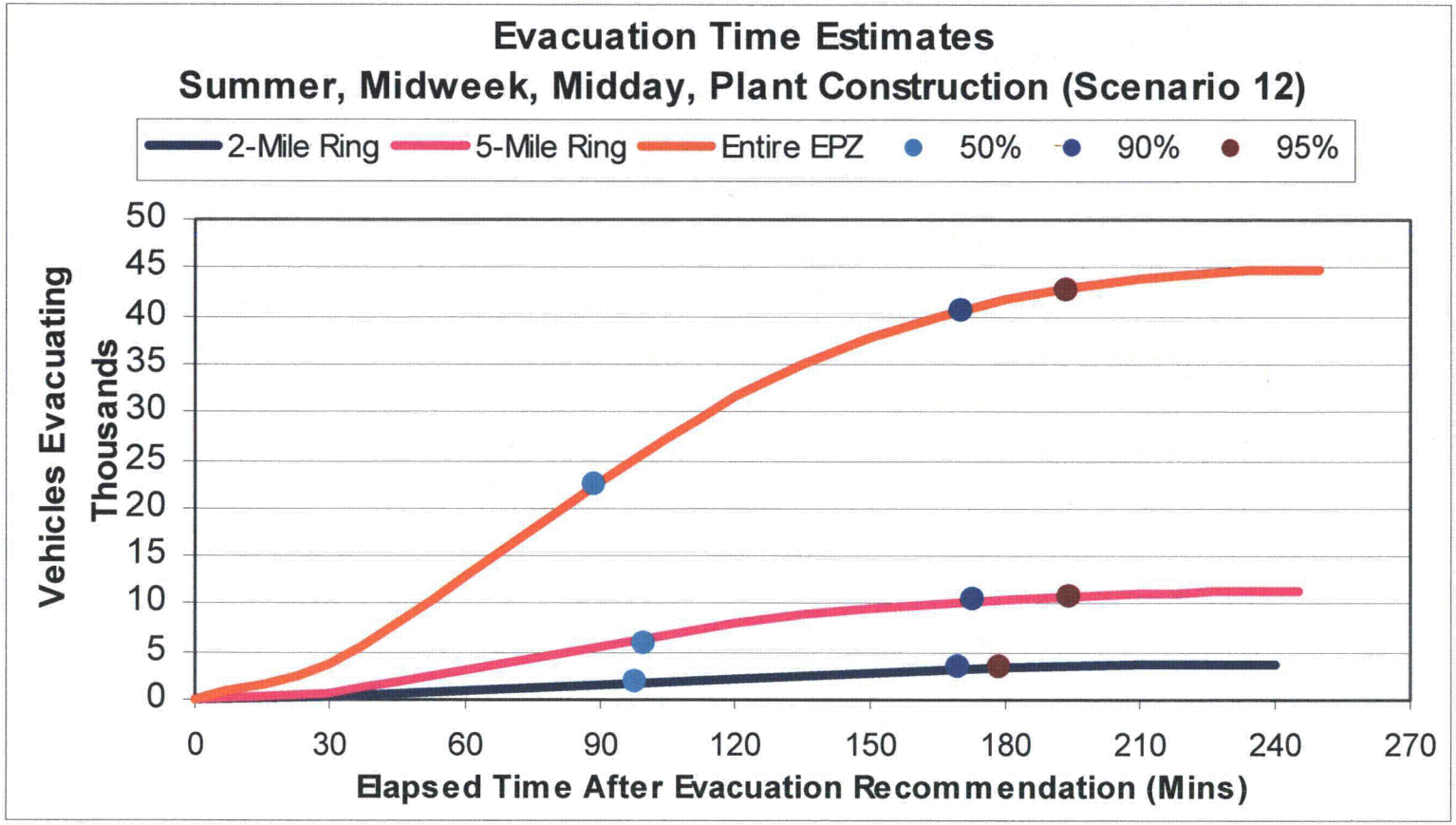

Figure J-12. Evacuation Time Estimates – Scenario 12 for Region R3 (Entire EPZ)

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

Attachment 3 to RAI 13.03-033

Markup of the Affected Portions to ETE Report (Rev. 1), Appendix I, "Evacuation Sensitivity Studies"

APPENDIX I: EVACUATION SENSITIVITY STUDIES

A sensitivity study was performed to determine whether changes in the estimated trip generation time have an effect upon the evacuation time estimate for the entire EPZ. The case considered was Scenario 1, Region 3; a summer, midweek, midday, good weather evacuation for the entire EPZ. Table I-1 presents the results of this study.

Table I-1. Evacuation Time Estimates for Trip Generation Sensitivity Study

Trip Generation Period	Evacuation Time Estimate		
	2-Mile Region	5-Mile Region	Entire EPZ
3 Hours	3:00	3:10	~~4:10~~3:20
4 Hours (Base)	4:00	4:05	~~4:20~~4:10
5 Hours	5:00	5:05	5:10

The results confirm the importance of accurately estimating the trip generation times. The evacuation time estimates closely mirror the values for the time the last evacuation trip is generated, ~~except~~ for most cases. The ETE for the entire EPZ for a 3 hour trip generation extends slightly beyond the trip generation period. As indicated in Section 7.2, congestion persists within Gaffney until 3 hours and 15 minutes after the Advisory to Evacuate, which explains the sensitivity of the ETE for the entire EPZ with a 3 hour trip generation. ~~This is due to significant traffic congestion in Gaffney during an evacuation, which persists for 4 hours, as indicated in Section 7.~~ The results for the 5 hour trip generation indicate that programs to educate the public and encourage them toward faster responses for a radiological emergency can enhance county emergency planning programs.

A sensitivity study was conducted to determine the effects on Evacuation Time Estimates (ETE) of changes in the percentage of people who decide to relocate from the Shadow Region. The movement of people in the shadow region has the potential to impede vehicles evacuating from an Evacuation Region within the EPZ. As discussed on page 7-1, it is estimated that 35,768 people reside in the Shadow Evacuation Region and that they will evacuate in 19,653 vehicles.

Table I-2 presents the evacuation time estimates for each of these cases. The ETE for ~~the 2 mile and 5 mile~~ all Regions do not change as the percentage of people who decide to relocate from areas within the shadow region increases from 15% to 60%. The ~~Entire EPZ, however, does change as the percentage of shadow evacuees varies. The ETE for the Entire EPZ increases by 20 minutes as the percent of shadow evacuees changes from 30% to 60%. The roads within~~ Shadow Region is sparsely populated and ~~leading out of Gaffney are highly congested during an evacuation. The~~the additional shadow ~~vehicles outside of Gaffney further delay~~evacuees do not inhibit those ~~trying to evacuate~~ people evacuating from within the EPZ.

Table I-2. Evacuation Time Estimates for Shadow Sensitivity Study

Shadow Data			Evacuation Region		
Percent Shadow Evacuation	**Number of Shadow Residents**	**Number of Shadow Resident Vehicles**	**2-Mile Region (R01)**	**5-Mile Region (R02)**	**Entire EPZ (R03)**
15	5,365	2,948	4:00	4:05	4:10
30 (Base)	10,730	5,896	4:00	4:05	~~4:20~~4:10
60	21,460	11,792	4:00	4:05	~~4:40~~4:10

Note: The above change includes text revised in the November 20, 2008 response to NRC questions 13.03-014.

A sensitivity study was conducted to determine the effects on ETE of changes in the average number of evacuating vehicles per household. The value used as a base condition (1.44 evacuating vehicles per household) was obtained from the responses to the telephone survey of EPZ resident households. This number represents the average of all responses.

York County expressed concern that its residents would use all available vehicles during an evacuation. The average vehicle ownership for the EPZ is 2.08 vehicles per household (Appendix F). This number was used for this sensitivity study to measure the effect on ETE of EPZ residents using all available vehicles during an evacuation. Scenario 1, Region 3 is also used for this study.

Table I-3 presents the evacuation time estimates for each of these cases. The ETE is unchanged for the 2-Mile Region as the vehicle utilization increases from 1.44 vehicles per household to 2.08 vehicles per household. The total vehicles evacuated for the Entire EPZ increases by approximately 30%. This significant increase in evacuating vehicles ~~further compounds the congestion within Gaffney and results in an increase in the ETE of 1 hour, 5 minutes for the 5 Mile Region, and 1 hour, 10 minutes for the Entire EPZ~~does not affect ETE.

Table I-3. Evacuation Time Estimates for Evacuating Vehicles per Household Sensitivity Study

Evacuating Vehicles per Household	Total Vehicles Evacuated	Evacuation Region		
		2-Mile Region (R01)	5-Mile Region (R02)	Entire EPZ (R03)
1.44	42,312	4:00	4:05	~~4:20~~4:10
2.08	54,381	4:00	~~5:10~~4:05	~~5:30~~4:10

Two additional sensitivity studies were performed to measure the effect on ETE for Special Events that cause an increase in the total vehicle demand within the EPZ – The Revolutionary War Reenactment at Kings Mountain National Military Park and a Gaffney High School football game.

The Revolutionary War Reenactment at Kings Mountain National Military Park takes place each year in October. Actors dressed in Revolutionary War uniforms recreate battle scenes on the site of the actual Kings Mountain battle. York County Office of Emergency Management (OEM) estimates that 1,000 transients attend the reenactment each year. We assume 2 people per vehicle resulting in an additional 500 vehicles in the evacuation traffic stream. Although the reenactment takes place in October after the summer has ended, we use a summer, weekend scenario as the basis for this study. This scenario was chosen because Kings Mountain State Park has its peak transient attendance on weekends during the summer. Vehicles evacuating from the national portion of the park may be delayed by those evacuating the state portion of the park. Table I-5 indicates that the ETE is not affected by the additional transients present for the reenactment.

The Gaffney High School football team plays its games at William K. Brumbach Stadium ("The Reservation"), which is actually located at the Gaffney Middle School. Games are typically on Friday evenings. Based on information provided by Cherokee County OEM, attendance at the games is typically 5,000 or more people, with as many as 13,000 people attending the more popular games. We assume 13,000 fans, 50% of which are EPZ residents. We further assume that there are 2 fans per vehicle. Thus, there are 6,500 non-EPZ residents attending the game, evacuating in 2,167 vehicles. Fans park in the parking lot at the middle school, along Chandler Drive south of the school and on the other roads within the area; the vehicles for the football game were loaded on to the analysis network accordingly. A winter (school in session) weekend/evening scenario with good weather (Scenario 11) was used for this study. The resident with commuters trip generation (Table 5-8) was used for permanent residents in ERPA H-2 in this study to account for the additional mobilization time needed for those attending the game to travel from the school back home and then prepare for the evacuation trip. Table I-5 indicates that the ETE increases by ~~50~~ 10 minutes for the entire EPZ, while the 2 mile and 5 mile regions are not affected.

Table I-5. Evacuation Time Estimates for Special Events Sensitivity Study				
Event	Total Vehicles Evacuated	Evacuation Region		
		2-Mile Region (R01)	5-Mile Region (R02)	Entire EPZ (R03)
Summer, Weekend, Good Weather (Scenario 3)				
Revolutionary War Reenactment	39,870	3:00	3:20	~~4:20~~4:00
Base	39,370	3:00	3:20	~~4:20~~4:00
Winter, Weekend/Evening, Good Weather (Scenario 11)				
Gaffney High School Football Game	34,141	3:00	~~3:30~~3:20	~~5:00~~4:10
Base	31,961	3:00	~~3:30~~3:20	~~4:10~~4:00

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-035

NRC RAI:

ETE-35:

Section 9, "Traffic Management Strategy," explains the importance of establishing traffic control in a prioritized manner; a Traffic Management Strategy is included in the plan in Section 9. The implementation of this strategy including access control points and traffic control points are included in Appendix G, "Traffic Management Plan". It is not clear how these strategies affect the ETEs or if they are even used in the calculation of evacuation estimates. Assumption #7 in Section 2.3, "Study Assumptions," states the traffic control points are resources and area dependent, but no overall effect is given. Explain any effect on the ETE if traffic control is not placed in the prioritized manner.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's December 9, 2008 response to the NRCs Request for Additional Information 13.03-035 (Reference 1).

As noted in the supplemental response to RAI 13.03-033 (Enclosure 12 of this letter) all simulations were re-run (including the sensitivity studies documented in Appendix I of the ETE Report) as a result of a data input error correction. The seventh paragraph of the December 9, 2008 response to this RAI indicated that the worst case scenario (50-50 signal cycle split; 50% green time for competing traffic streams) adds 20 minutes to the ETE for an evacuation of the full EPZ, while a 75-25 signal cycle split adds 10 minutes to the ETE for an evacuation of the full EPZ. However, the results of the new simulation runs (see Attachment 1 to the response to RAI 13.03-009 (Enclosure 2 of this letter)) indicate that the ETE for an evacuation of the full EPZ are unaffected by changes in signal timing.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12. 01, dated December 9, 2008. (ADAMS Accession No. ML083460112)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

None

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

None

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-036

NRC RAI:

ETE-36:

The existing node network on Figure 1-2, "Lee Link-Node Analysis Network," is significantly different than the evacuation network in Figure 10-2 thru 10-5, "Evacuation Route Map for Quadrants of the EPZ". It is not clear how the evacuation map was used in developing the nodal network, or vice versa. Also, the congestion patterns shown in Section 7, "General Population Evacuation Time Estimates," Figures 7-3 through 7-6, "Areas of Traffic Congestion 1-4 Hours after Advisory to Evacuate," indicate that traffic is backed up on roads that are not part of the indicated Evacuation Routes. Explain the connection between the Evacuation Routes and the node network.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 25, 2008 response to the NRCs Request for Additional Information 13.03-036 (Reference 1).

As discussed in the supplemental response to RAI 13.03-048 (Enclosure 19 of this letter), congestion in the EPZ has decreased as a result of the new simulation runs. Congestion within the EPZ clears by 3 hours and 15 minutes after the advisory to evacuate in the new simulation runs versus 4 hours and 15 minutes as indicated in the ETE Report (Rev. 1). Figure 7-6 in Rev. 1 of the ETE Report showed congestion patterns at 4 hours after the advisory to evacuate. Given that congestion clears before 4 hours in the new simulation runs, this figure is no longer needed and will be deleted in Revision 2 of the Lee Nuclear Station ETE Report. As a result, congestion patterns will be shown only in Figures 7-3 through 7-5. The former Figure 7-7 will be renumbered as Figure 7-6. These associated revisions to the ETE Report are provided in the supplemental response to RAI 13.03-048 (Enclosure 19 of this letter).

The November 25, 2008 response to this RAI references Figures 7-3 through 7-6, which are now revised to Figures 7-3 through 7-5. The link-node analysis network shown in the revised Figures 7-3 through 7-5 exactly matches that shown in Figure 1-2 and in the newly added figures to Appendix K of the ETE Report provided in the supplemental response to RAI 13.03-038 (Enclosure 16 of this letter)).

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) WLG2008.11-11, dated November 25, 2008. (ADAMS Accession No. ML090690313)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

None

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

None

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-037

NRC RAI:

ETE-37:

Section 10, Evacuation Routes," indicates that the evacuation routes should contain a component related to "routing of evacuees from the EPZ boundary to reception centers." The routes in Figures 10-2 through 10-5, "Evacuation Route Maps," end immediately outside of the EPZ 10-mile ring. It is not apparent that the evaluation considered traffic backup as far as the proposed reception centers in Spartanburg, Shelby, Gastonia, and Rock Hill. Would funneling of traffic, at least to the city limits if the exact Relocation Center sites are not known, impact the ETE?

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 25, 2008 response to the NRCs Request for Additional Information 13.03-037 (Reference 1).

As noted in the supplemental response to RAI 13.03-031 (Enclosure 10 of this letter) all simulations were re-run (including the sensitivity studies documented in Appendix I of the ETE Report) as a result of a data input error correction. The final paragraph of the November 25, 2008 response to this RAI indicated that doubling the percent of shadow evacuees from 30% to 60% adds 20 minutes to the ETE for an evacuation of the full EPZ. However, the results of the new simulation runs indicate that the ETE for an evacuation of the full EPZ are unaffected by changes in the percentage of shadow evacuees. (Supplemental Response to RAI 13.03-033 (Enclosure 12 of this letter))

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

None

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) WLG2008.11-11, dated November 25, 2008. (ADAMS Accession No. ML090690313)

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

None

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-038

NRC RAI:

ETE-38

Provide a legible map that includes the nodes identified on Figure 1-2, "Lee Link-Node Analysis Network," and in Appendix K, "Evacuation Roadway Network Characteristics." The nodes must be annotated to support the review. A larger scale is necessary. Provide a roadway map that includes the sector and quadrant boundaries.

Duke Energy Supplemental Response:

This response supplements Duke Energy's November 24, 2008 response to the NRCs Request for Additional Information 13.03-038 (Reference 1).

In response to RAI 13.03-038 (Reference 1) Duke Energy provided Figure 1-2, "Lee Link-Node Analysis Network", in electronic format to support the review of the Lee Nuclear Station ETE Report (Rev 1). This supplemental response provides the same information (Attachment 1) in the form of 27 figures (1 overview and 26 detailed segments) that will be added to Appendix K in Revision 2 of the Lee Nuclear Station ETE Report. In addition, Section 1 of the Lee Nuclear Station ETE Report (Rev 1) will be revised to add text to the subsection titled "Developing the Evacuation Times Estimates" describing the application of the material as described in Attachment 2.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) Ltr # WLG2008.11-13, dated November 24, 2008 (ADAMS Accession No. ML083450547)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Appendix K of the Lee Nuclear Station ETE Report (Rev 1) to add the new material as provided in Attachment 1.

Revise Section 1, subsection titled "Developing the Evacuation Times Estimates" as provided in Attachment 2.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

1) Markup of the Affected Portion of ETE Report (Rev. 1) Appendix K, "Evacuation Roadway Network Characteristics"
2) Markup of the Affected Portion of ETE Report (Rev. 1) Section 1, Subsection titled "Developing the Evacuation Times Estimates"

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

Attachment 1 to RAI 13.03-038

Markup of Affected Portions of ETE Report (Rev. 1) Appendix K, "Evacuation Roadway Network Characteristics"

APPENDIX K: EVACUATION ROADWAY NETWORK CHARACTERISTCS

A computerized link-node analysis network was constructed to model the roadway network within the study area, as shown in Figure 1-2. Figure K-1 provides an overview of the link-node analysis network. The figure has been divided up into 26 more detailed figures (Figures K-2 through K-27) which show each of the links and nodes in the network.

Table K-1 lists the characteristics of each roadway section modeled in the ETE analysis. Each link is identified by its upstream and downstream node numbers, which can be cross-referenced to Figures K-1 through K-27

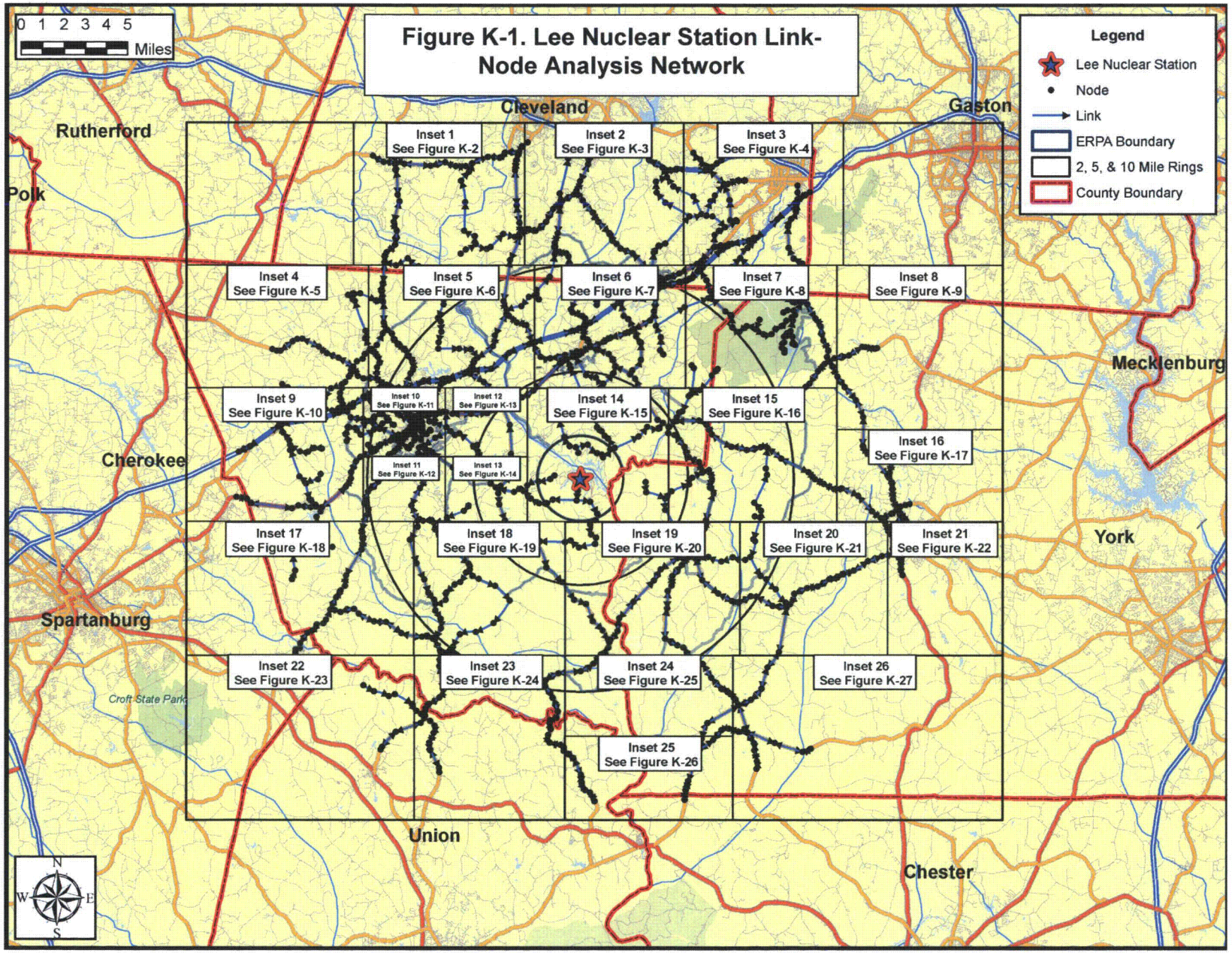
Figure K-1. Lee Nuclear Station Link-Node Analysis Network
0 1 2 3 4 5 Miles
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
Cleveland
Gaston
Rutherford
Polk
Cherokee
Spartanburg
Union
Chester
York
Mecklenburg
Croft State Park
Inset 1 See Figure K-2
Inset 2 See Figure K-3
Inset 3 See Figure K-4
Inset 4 See Figure K-5
Inset 5 See Figure K-6
Inset 6 See Figure K-7
Inset 7 See Figure K-8
Inset 8 See Figure K-9
Inset 9 See Figure K-10
Inset 10 See Figure K-11
Inset 11 See Figure K-12
Inset 12 See Figure K-13
Inset 13 See Figure K-14
Inset 14 See Figure K-15
Inset 15 See Figure K-16
Inset 16 See Figure K-17
Inset 17 See Figure K-18
Inset 18 See Figure K-19
Inset 19 See Figure K-20
Inset 20 See Figure K-21
Inset 21 See Figure K-22
Inset 22 See Figure K-23
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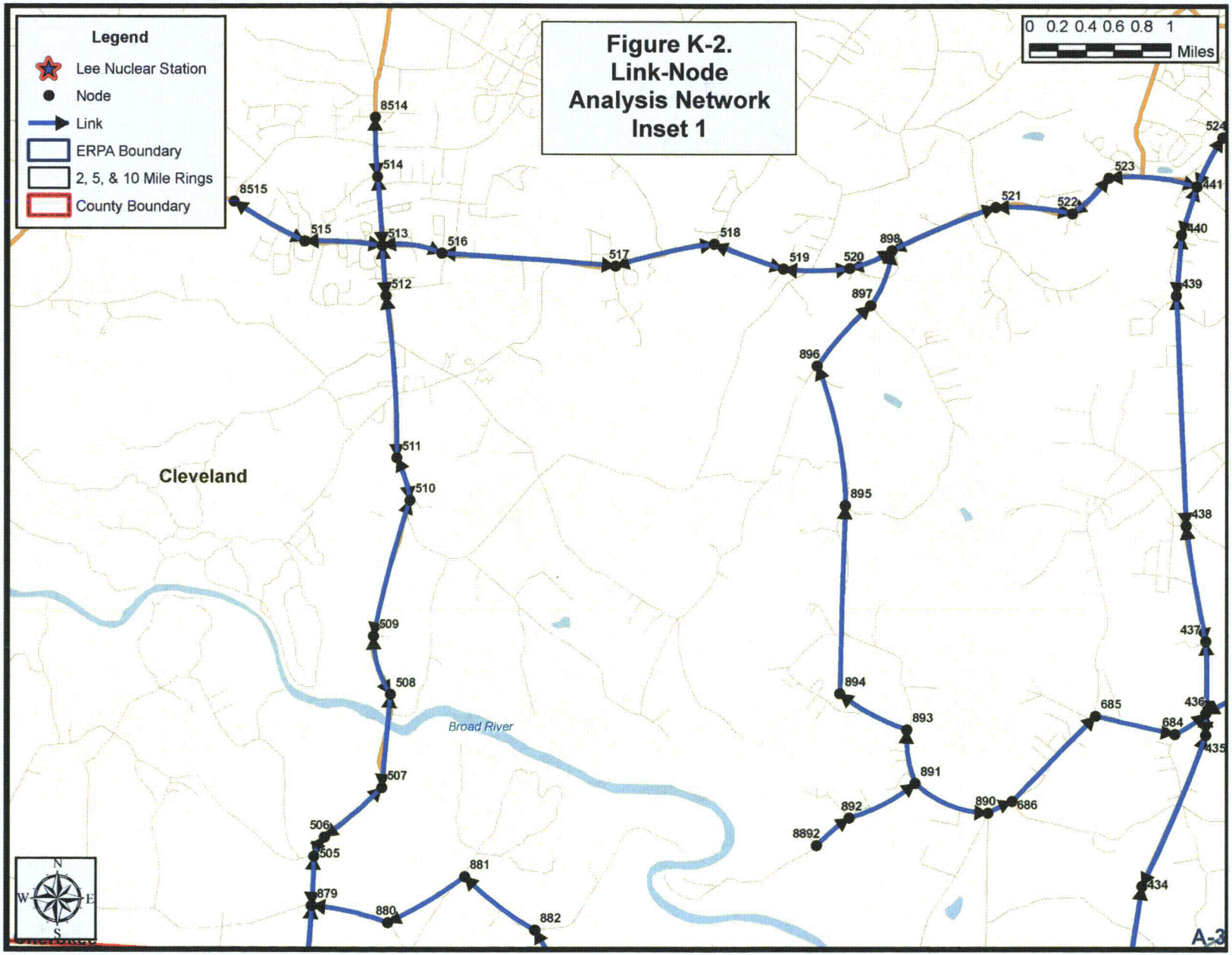
Inset 25 See Figure K-26
Inset 26 See Figure K-27
N
W
E
S


Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
Figure K-2.
Link-Node
Analysis Network
Inset 1
0 0.2 0.4 0.6 0.8 1
Miles
Cleveland
Broad River
8514
514
8515
515
513
516
517
518
519
520
898
521
522
523
524
441
440
439
512
897
896
511
510
895
438
509
437
508
894
893
685
436
684
435
507
891
892
890
686
8892
506
505
881
879
880
882
434
N
W
E
S

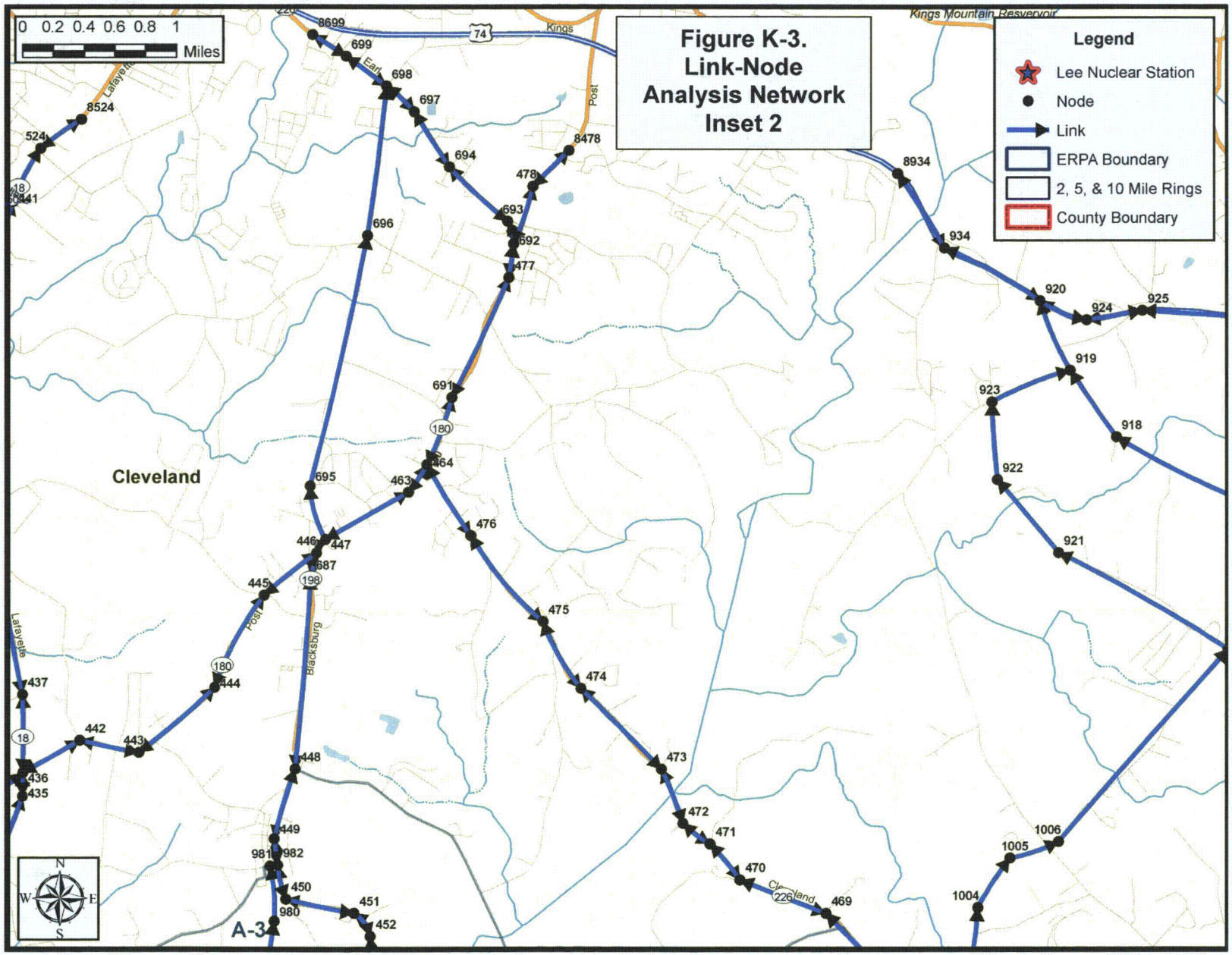


Figure K-3.
Link-Node
Analysis Network
Inset 2
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
0 0.2 0.4 0.6 0.8 1
Miles
Cleveland
Kings Mountain Resevroir
A-3
8699
699
698
697
694
8478
478
693
692
477
696
8524
524
8934
934
920
924
925
919
923
918
922
921
691
180
695
463
464
476
446
447
687
445
198
475
474
473
472
471
470
469
1004
1005
1006
437
442
443
444
436
435
448
449
981
982
450
451
452
980
74
Kings
Post
Earl
Lafayette
Blacksburg

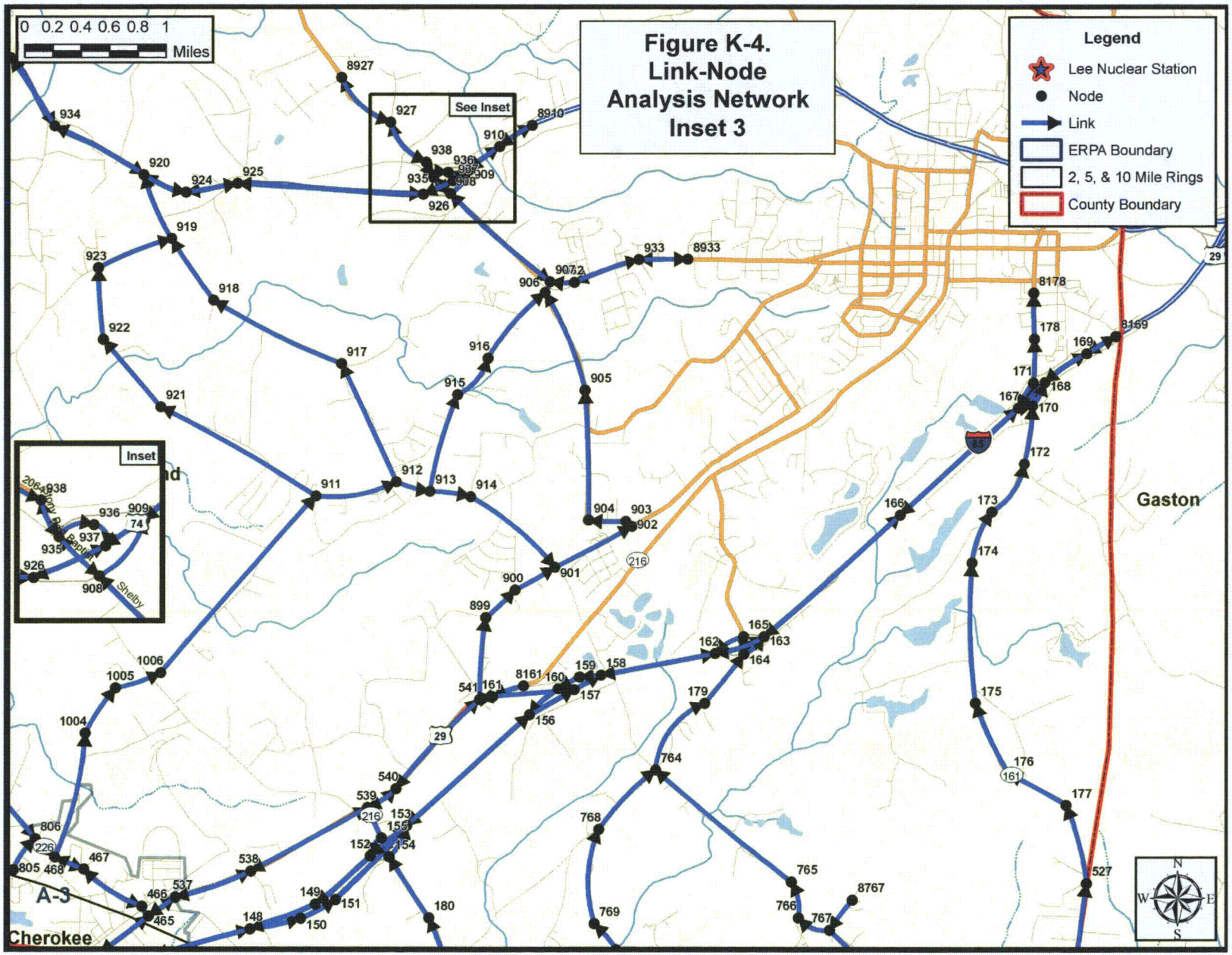


Figure K-4.
Link-Node
Analysis Network
Inset 3
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
0 0.2 0.4 0.6 0.8 1
Miles
See Inset
Inset
Gaston
Cherokee
A-3
Shelby
8927
927
8910
910
938
936
909
935
908
926
934
920
924
925
919
923
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922
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915
905
906
9072
933
8933
911
912
913
914
904
903
902
901
900
899
216
74
29
1006
1005
1004
806
226
467
805
468
466
465
537
538
539
540
541
161
8161
160
159
158
157
156
153
155
154
152
149
151
148
150
180
162
165
163
164
166
179
764
768
769
765
766
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161
177
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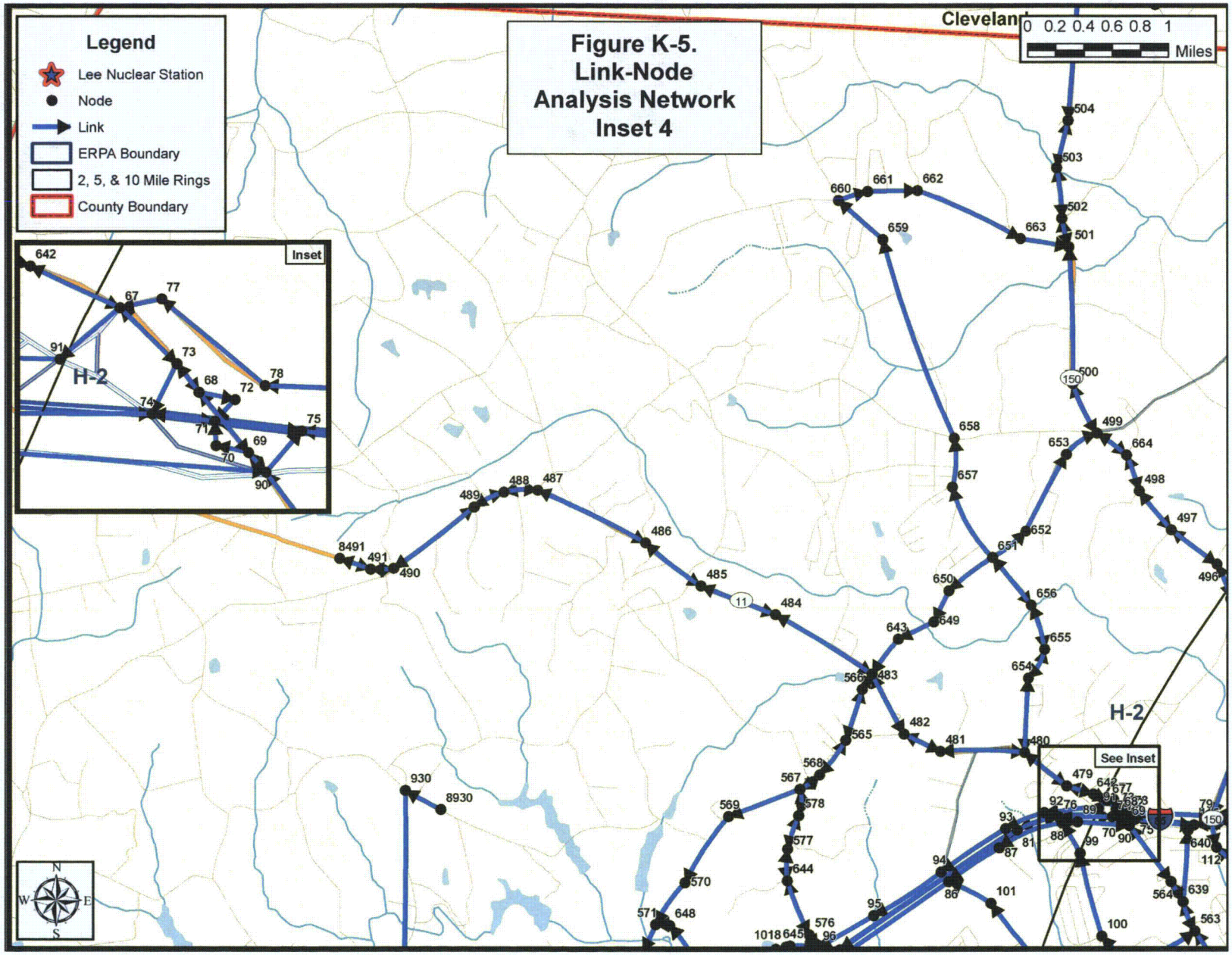


Figure K-5.
Link-Node
Analysis Network
Inset 4
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
0 0.2 0.4 0.6 0.8 1
Miles
Inset
H-2
See Inset
N
S
E
W

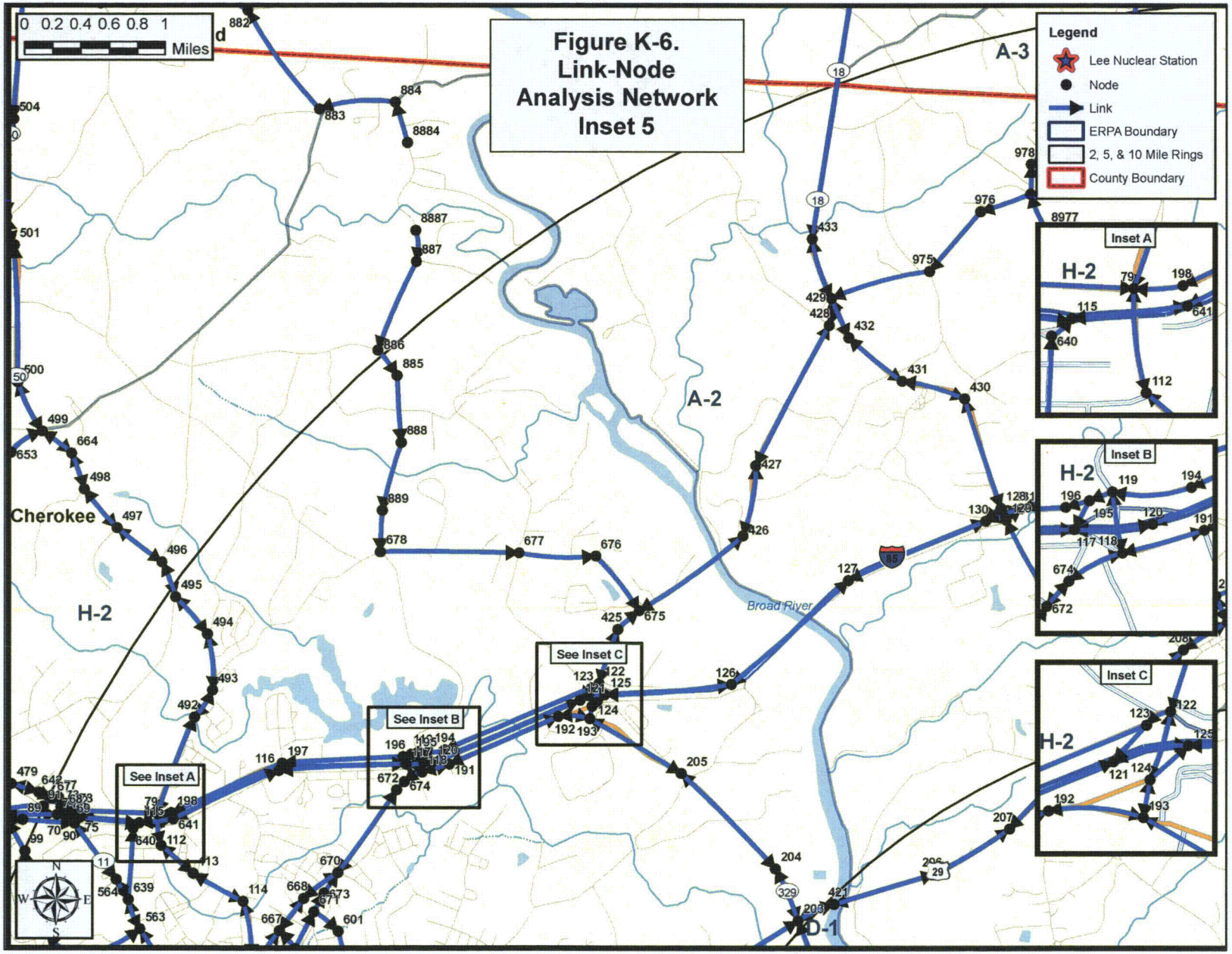
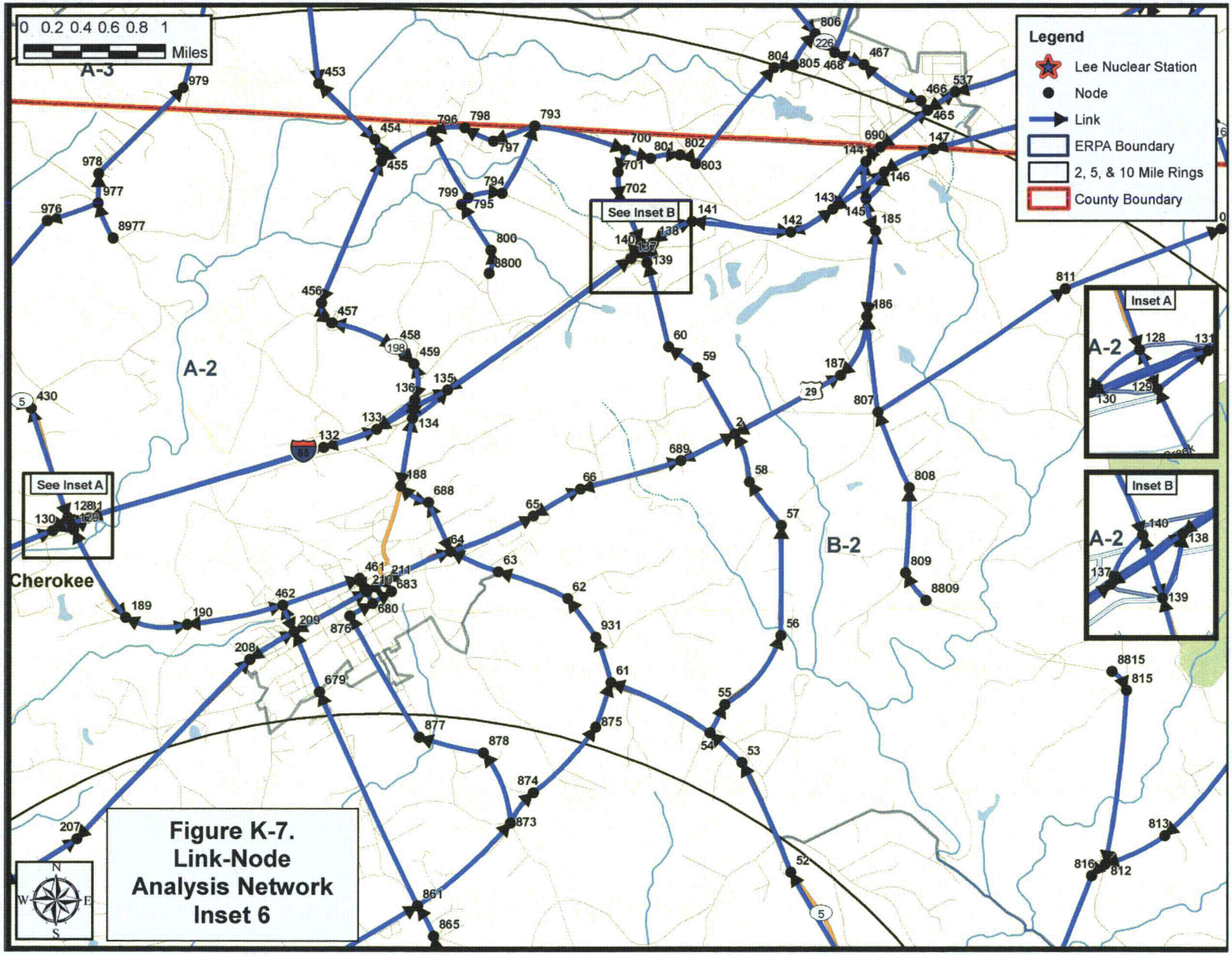


Figure K-6.
Link-Node
Analysis Network
Inset 5
0 0.2 0.4 0.6 0.8 1
Miles
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
Inset A
Inset B
Inset C
See Inset A
See Inset B
See Inset C
Cherokee
Broad River
A-2
A-3
H-2
D-1


0 0.2 0.4 0.6 0.8 1
Miles
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
See Inset A
See Inset B
Inset A
Inset B
A-2
A-3
B-2
Cherokee
Figure K-7.
Link-Node
Analysis Network
Inset 6

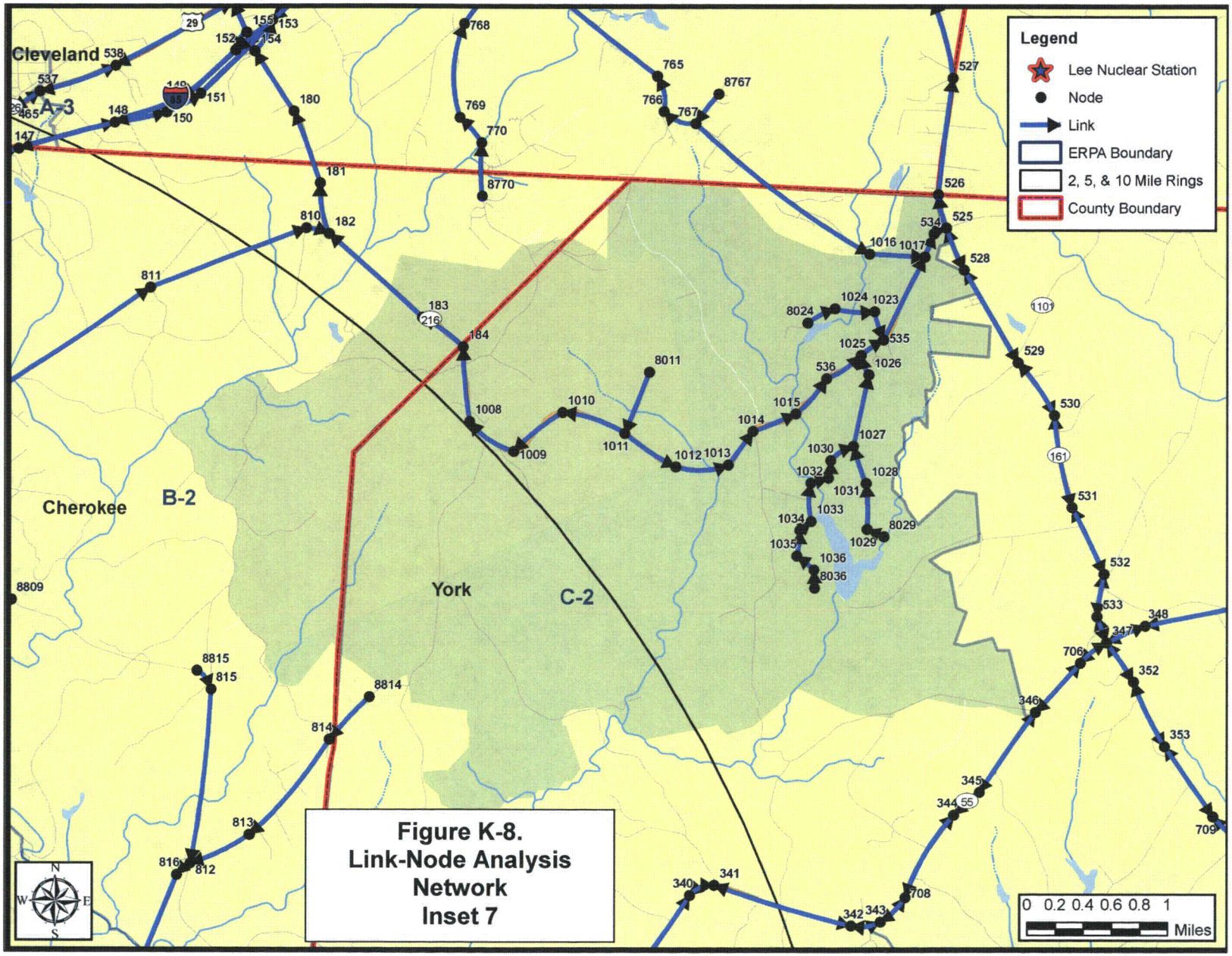


Figure K-8.
Link-Node Analysis
Network
Inset 7

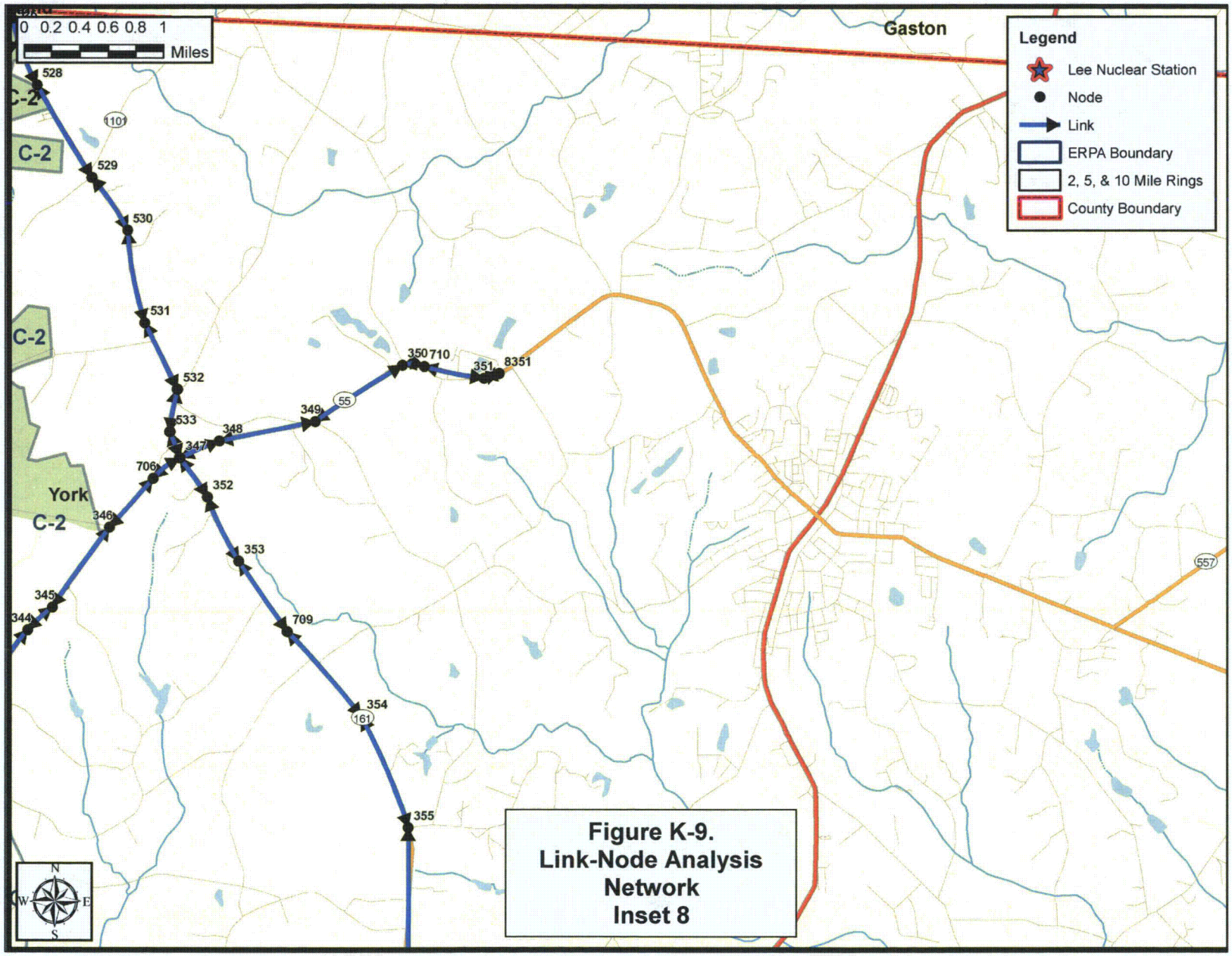


Figure K-9.
Link-Node Analysis
Network
Inset 8

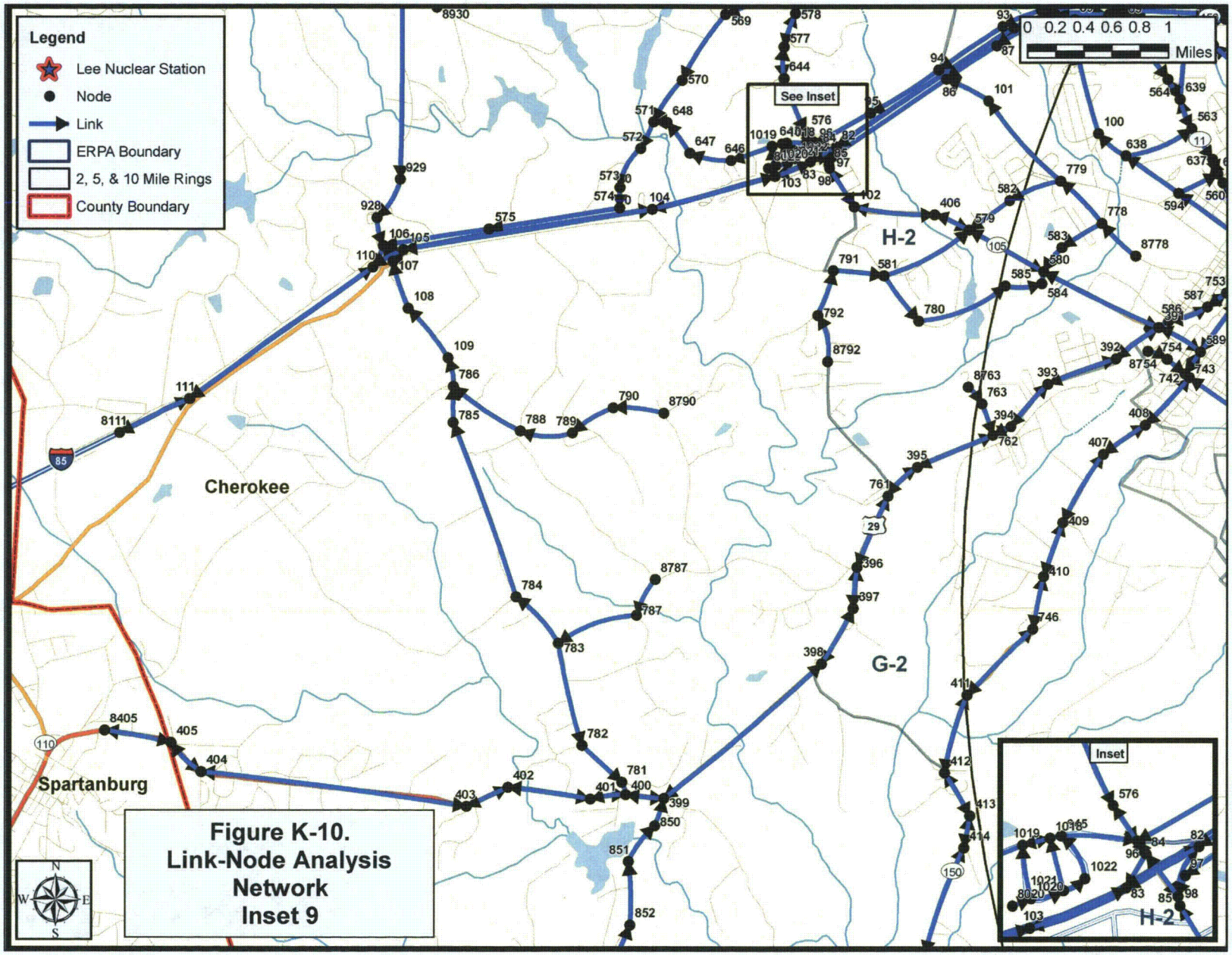


Figure K-10.
Link-Node Analysis Network
Inset 9

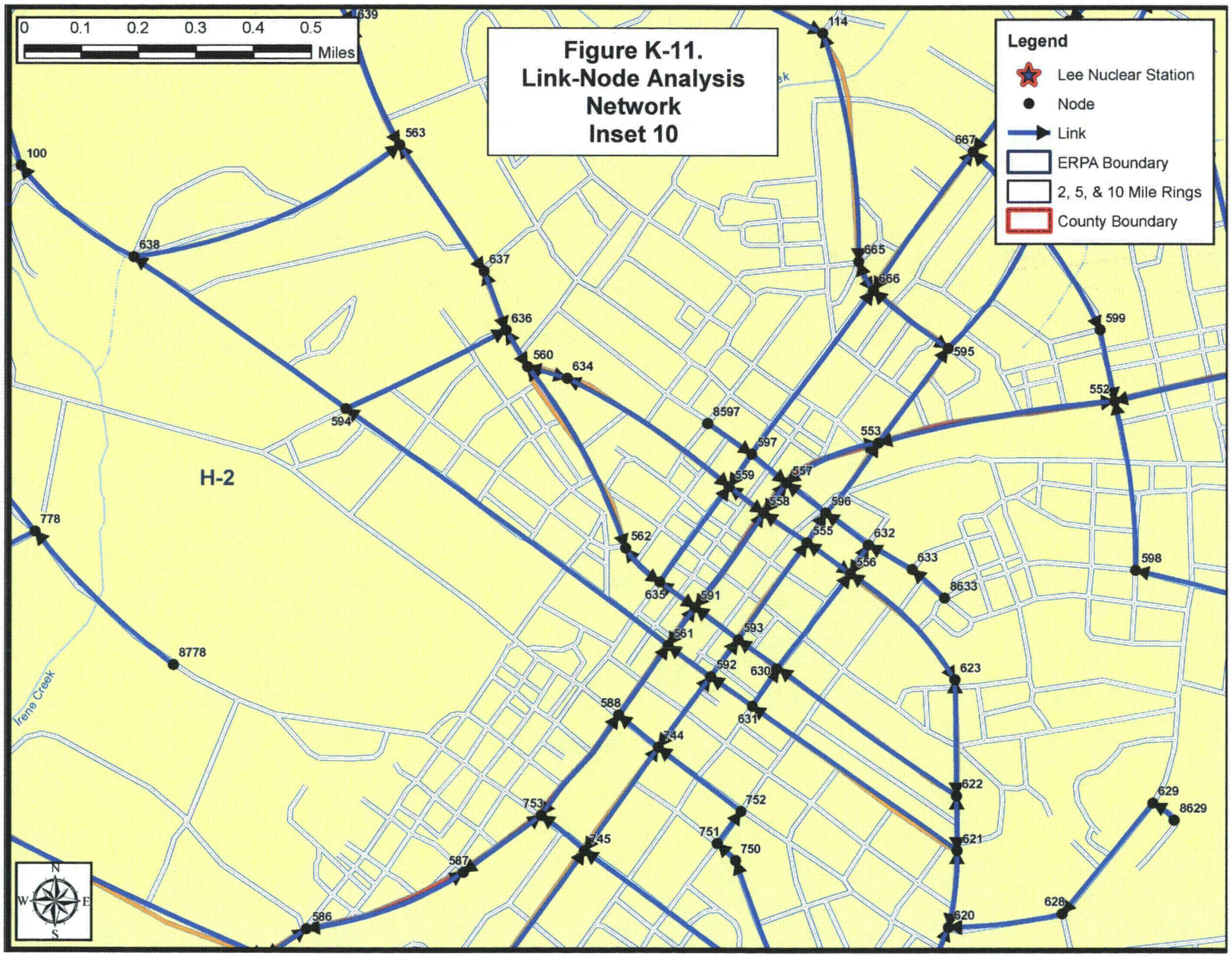


Figure K-11.
Link-Node Analysis
Network
Inset 10
0 0.1 0.2 0.3 0.4 0.5
Miles
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
H-2
Irene Creek
N
S
E
W
100
114
563
638
637
636
560
634
594
667
665
666
599
595
552
8597
597
553
559
557
558
596
555
632
556
633
598
8633
562
635
591
561
593
592
630
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745
621
587
586
628
620
778
8778

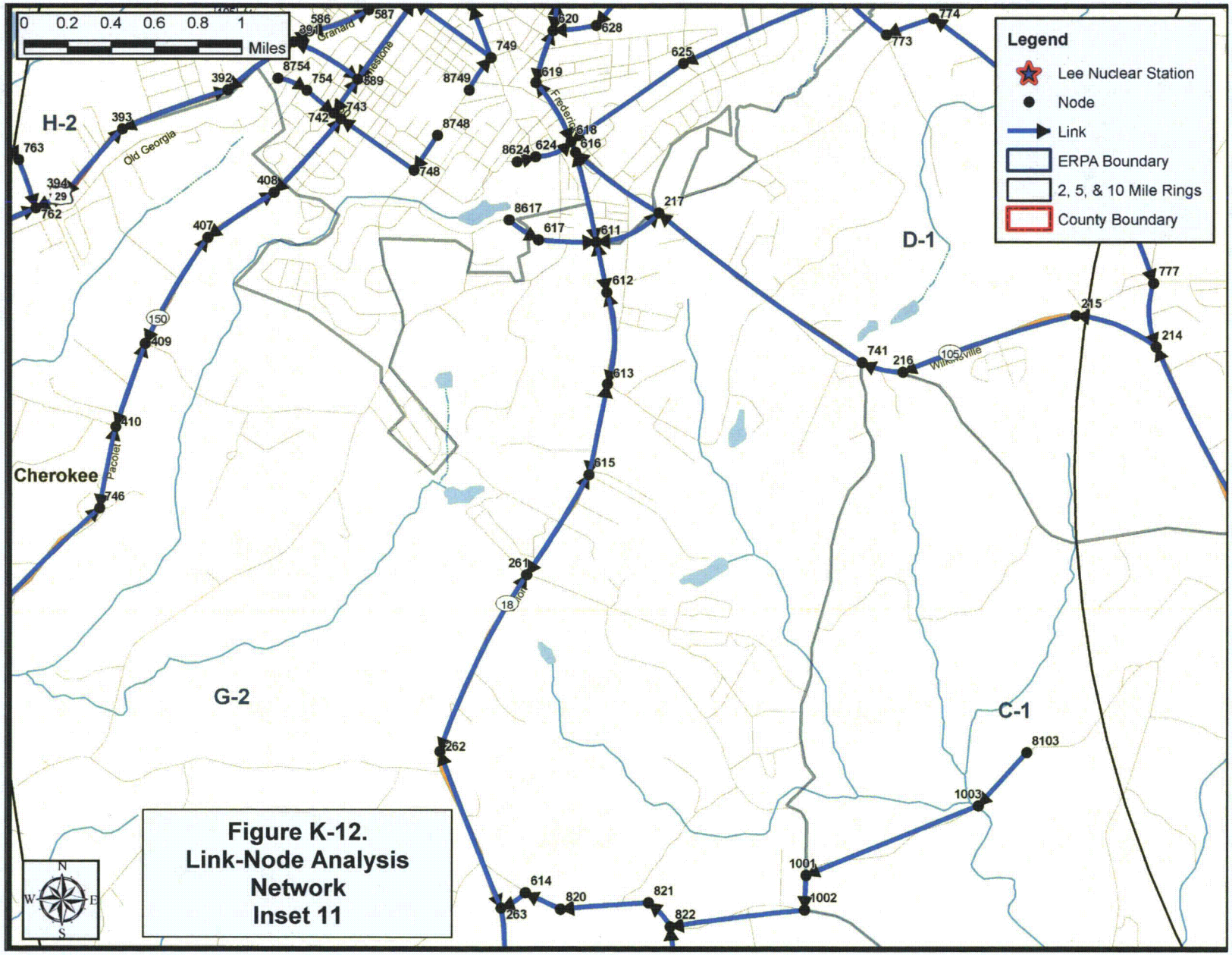

Figure K-12.
Link-Node Analysis Network
Inset 11

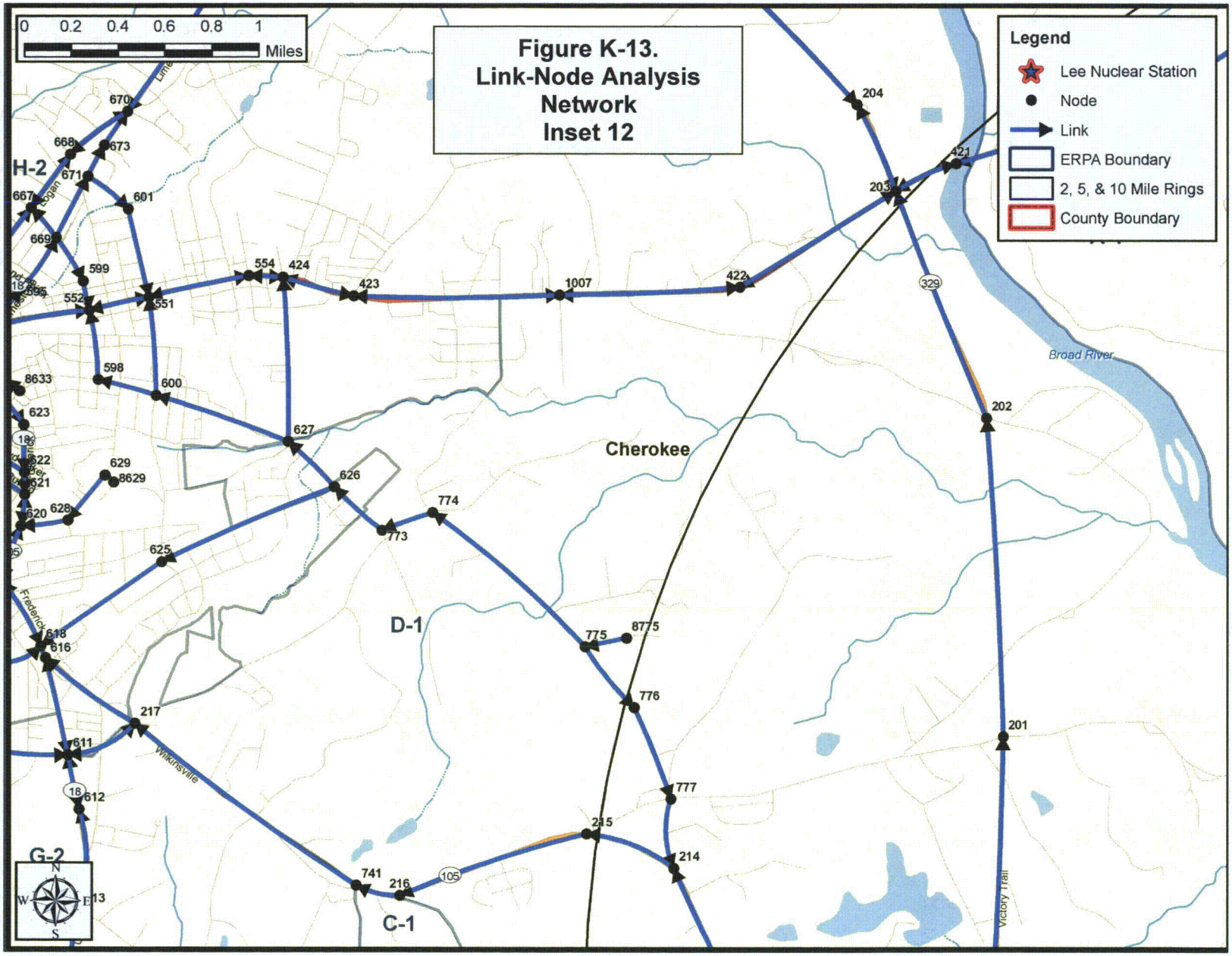
Figure K-13.
Link-Node Analysis
Network
Inset 12
0 0.2 0.4 0.6 0.8 1
Miles
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
H-2
D-1
C-1
G-2
Cherokee
Broad River
Wilkinsville
Victory Trail
670
668
673
671
667
601
669
599
554
424
423
1007
422
552
551
598
600
8633
623
627
629
8629
626
628
620
774
773
625
618
616
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776
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611
612
777
215
214
741
216
105
204
421
203
329
202
201

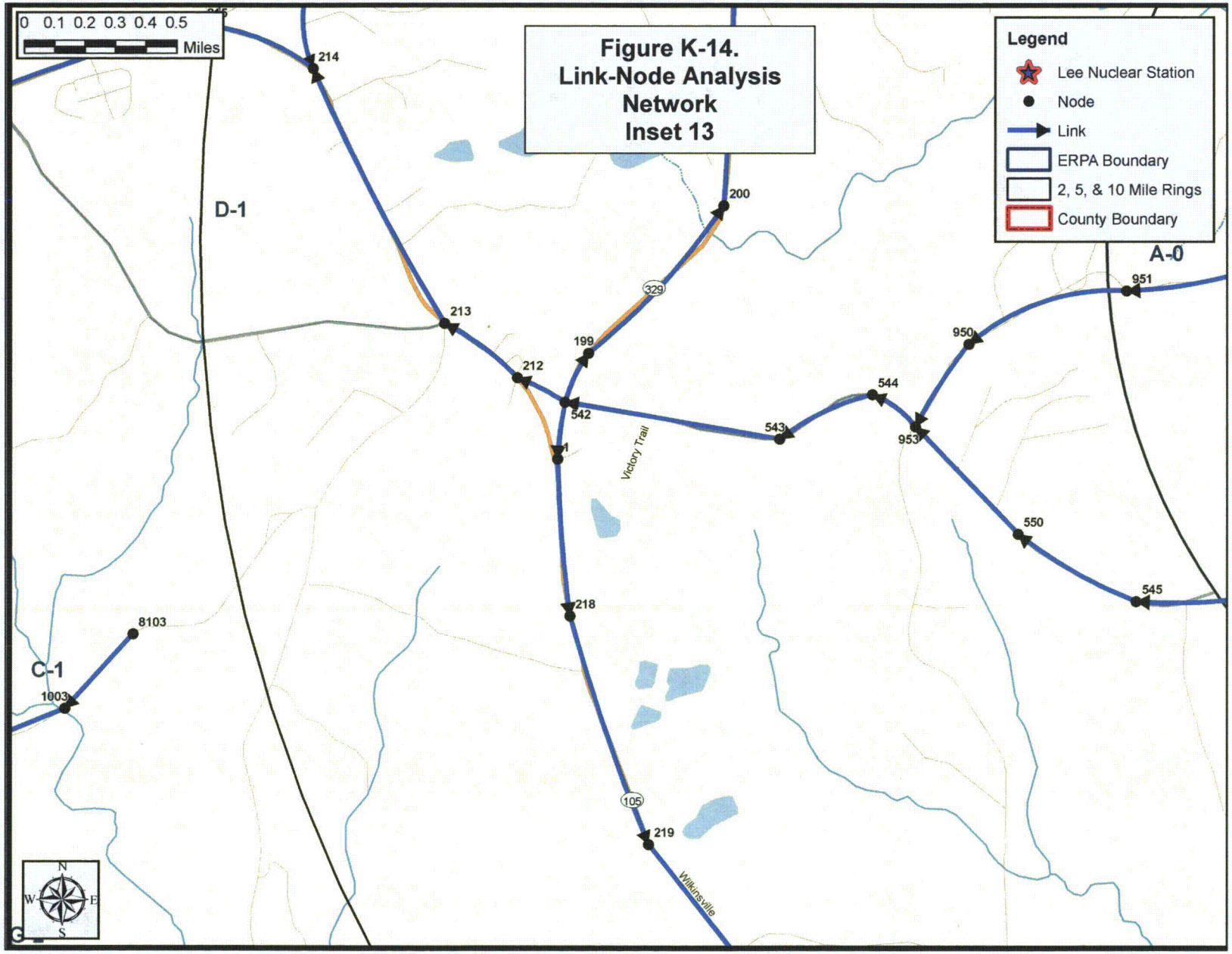
Figure K-14.
Link-Node Analysis
Network
Inset 13
0 0.1 0.2 0.3 0.4 0.5
Miles
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
D-1
A-0
C-1
214
213
212
200
199
329
542
543
544
950
951
953
550
545
218
219
105
8103
1003
Victory Trail
Wilkinsville
N
S
E
W

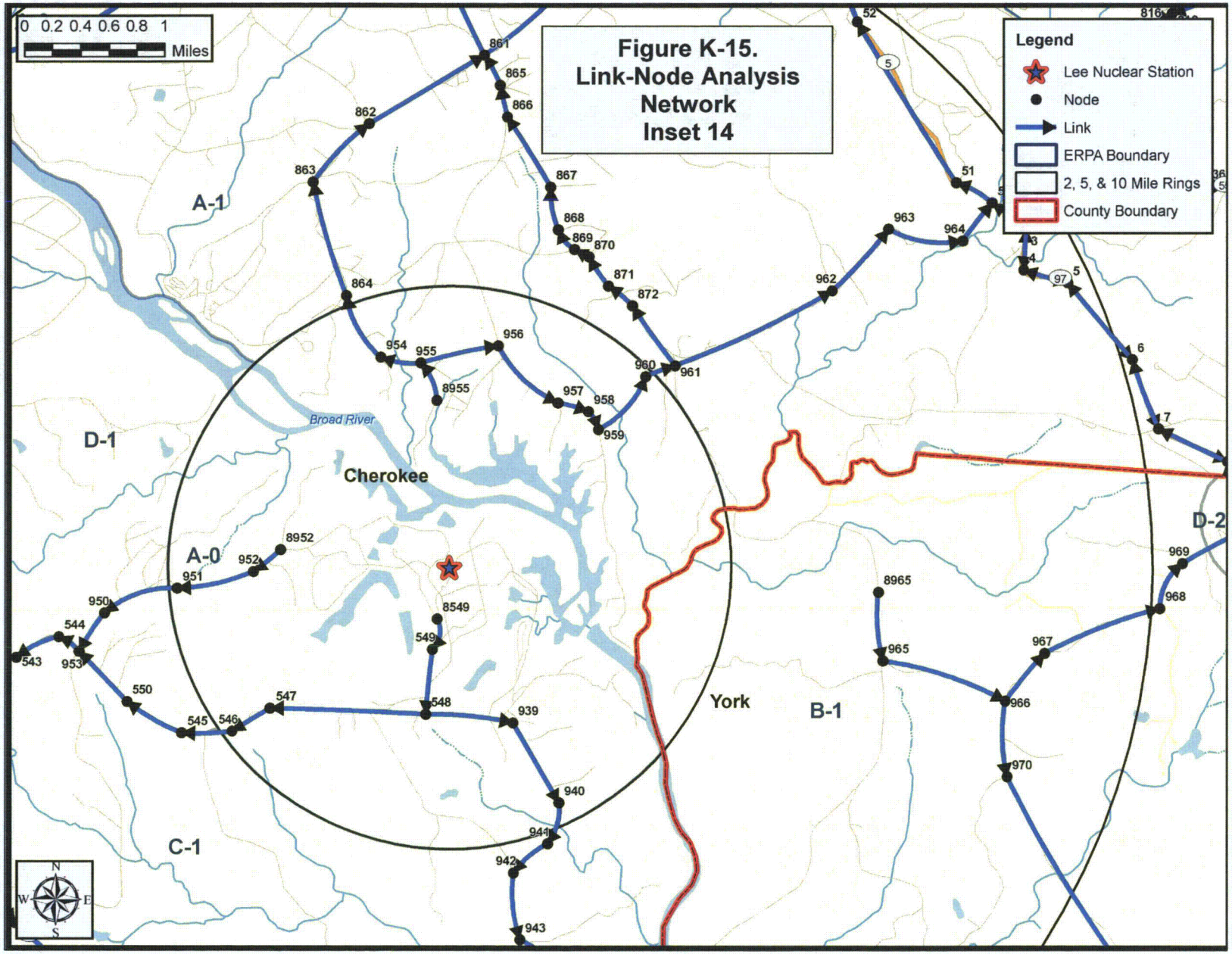
Figure K-15.
Link-Node Analysis
Network
Inset 14
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Miles
Legend
Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
A-1
D-1
A-0
B-1
C-1
D-2
Cherokee
York
Broad River
N
S
E
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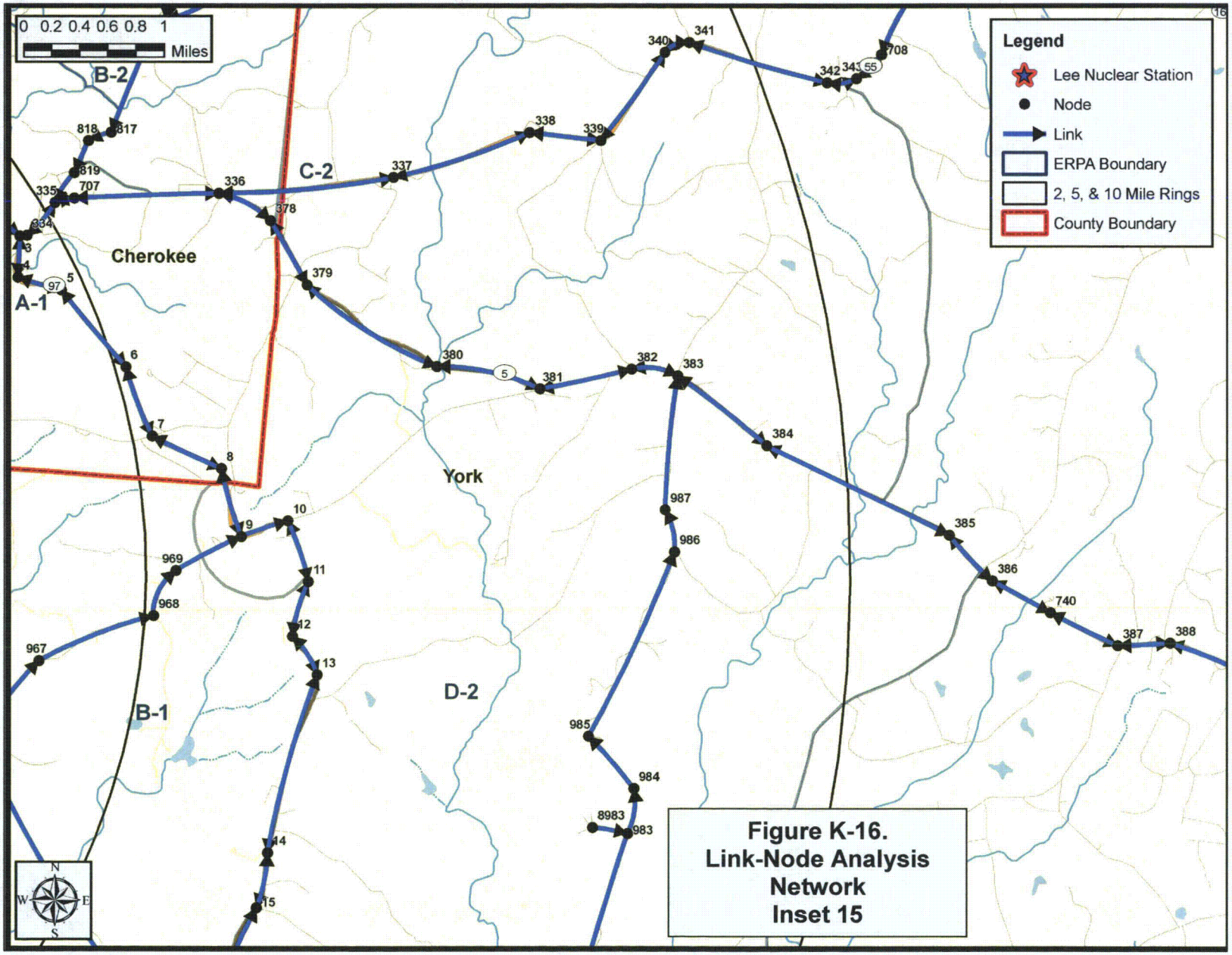

Figure K-16.
Link-Node Analysis Network
Inset 15

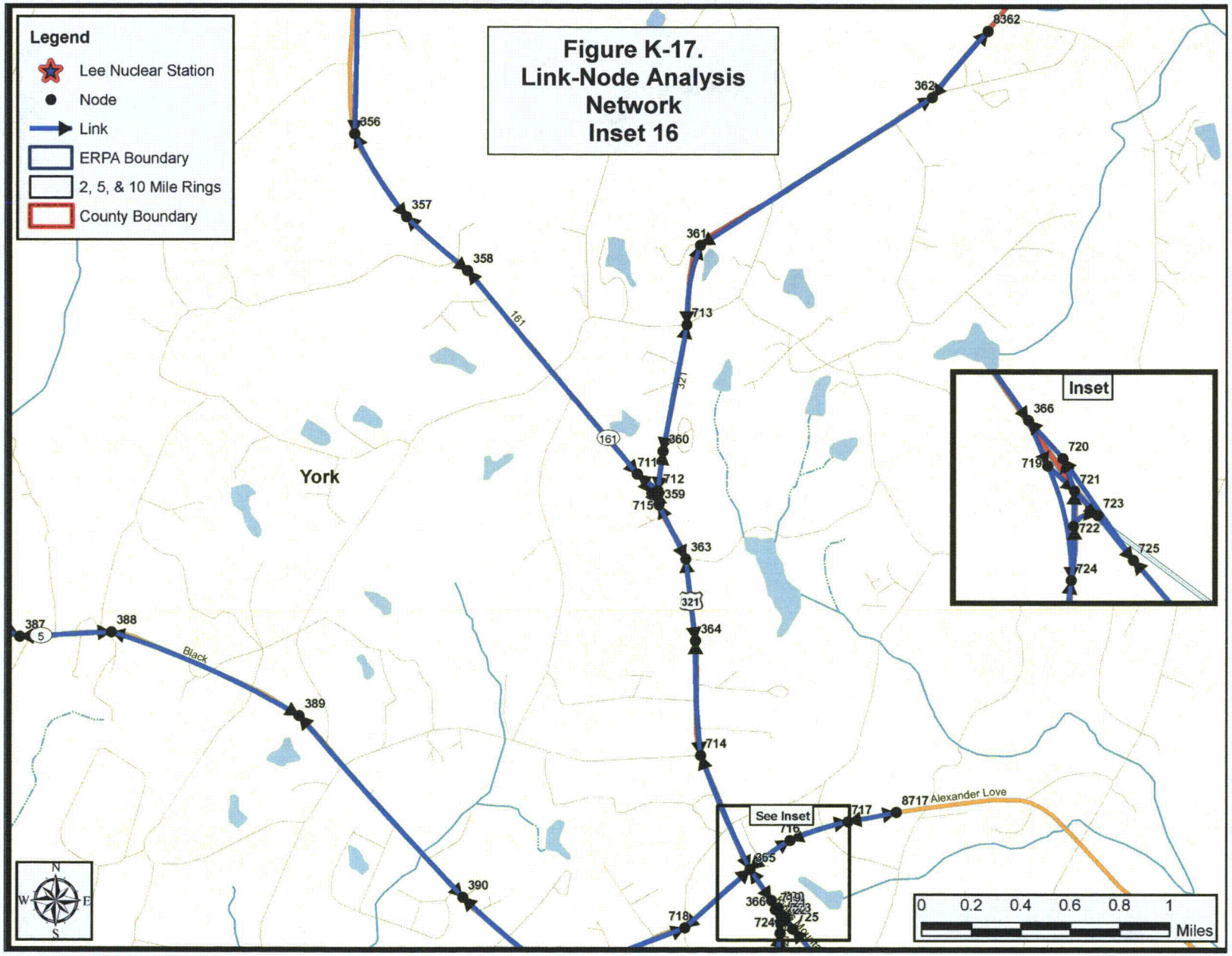
Figure K-17.
Link-Node Analysis
Network
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Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
York
Inset
See Inset
Alexander Love
Black
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Miles
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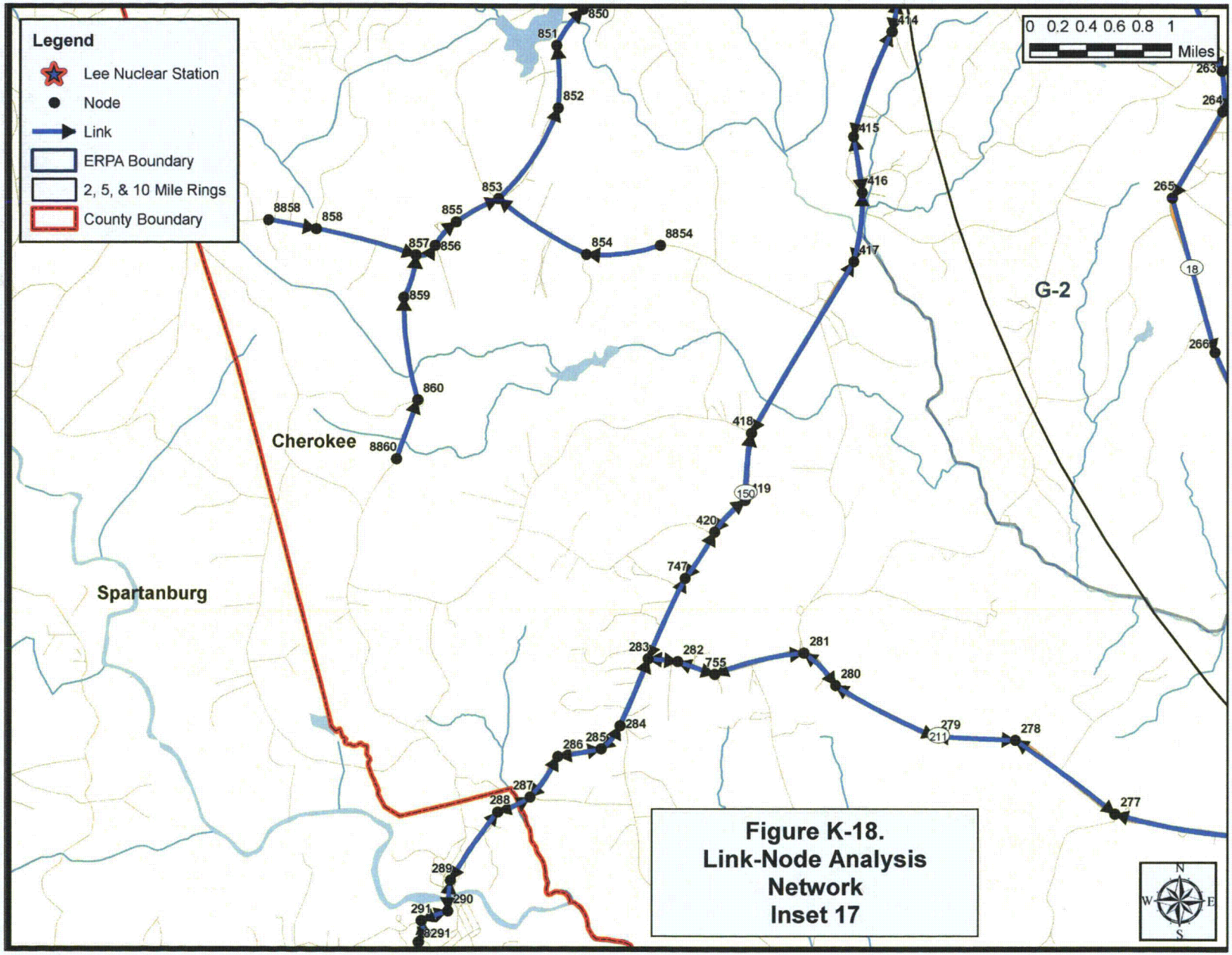

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Link-Node Analysis
Network
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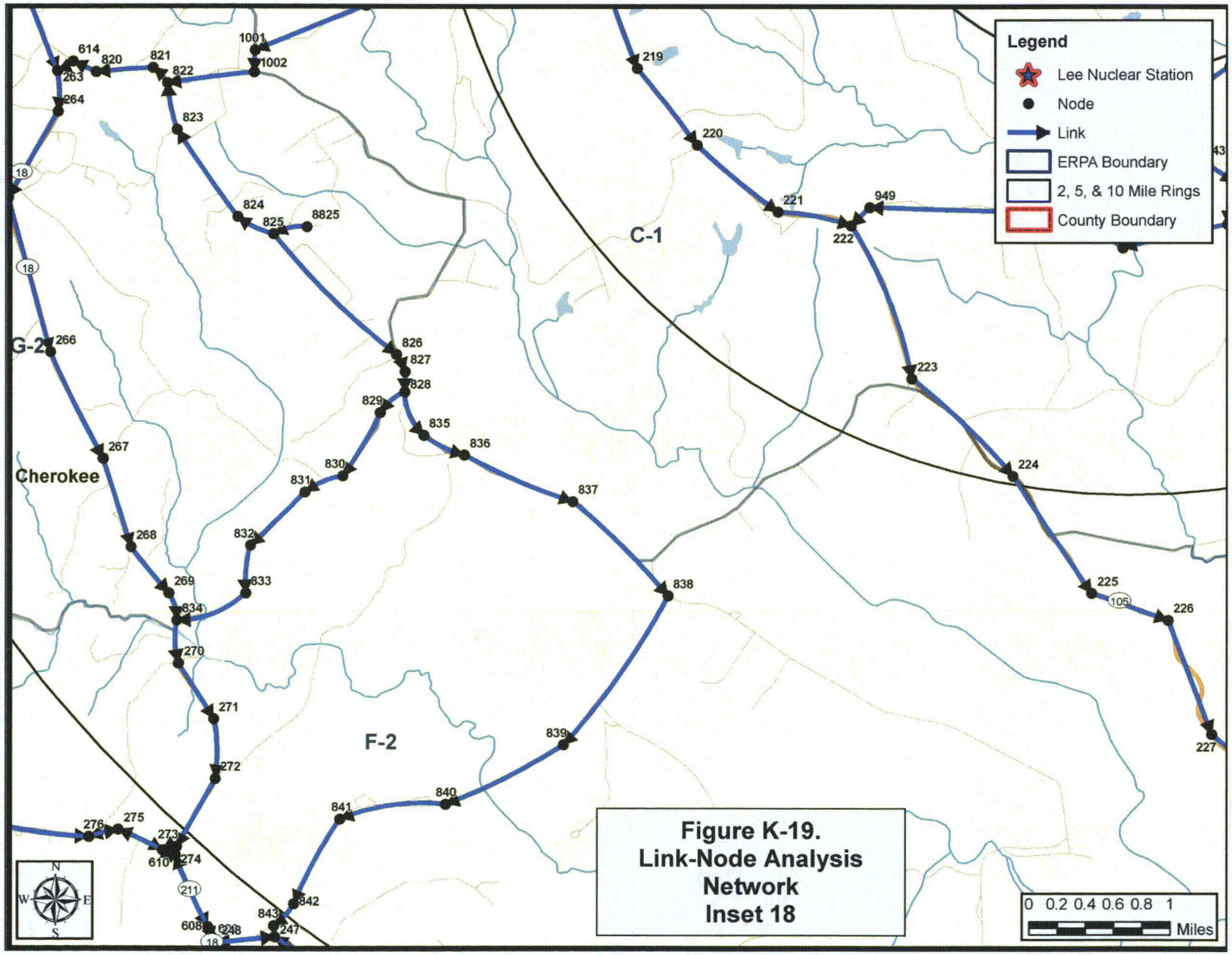

Figure K-19.
Link-Node Analysis Network
Inset 18

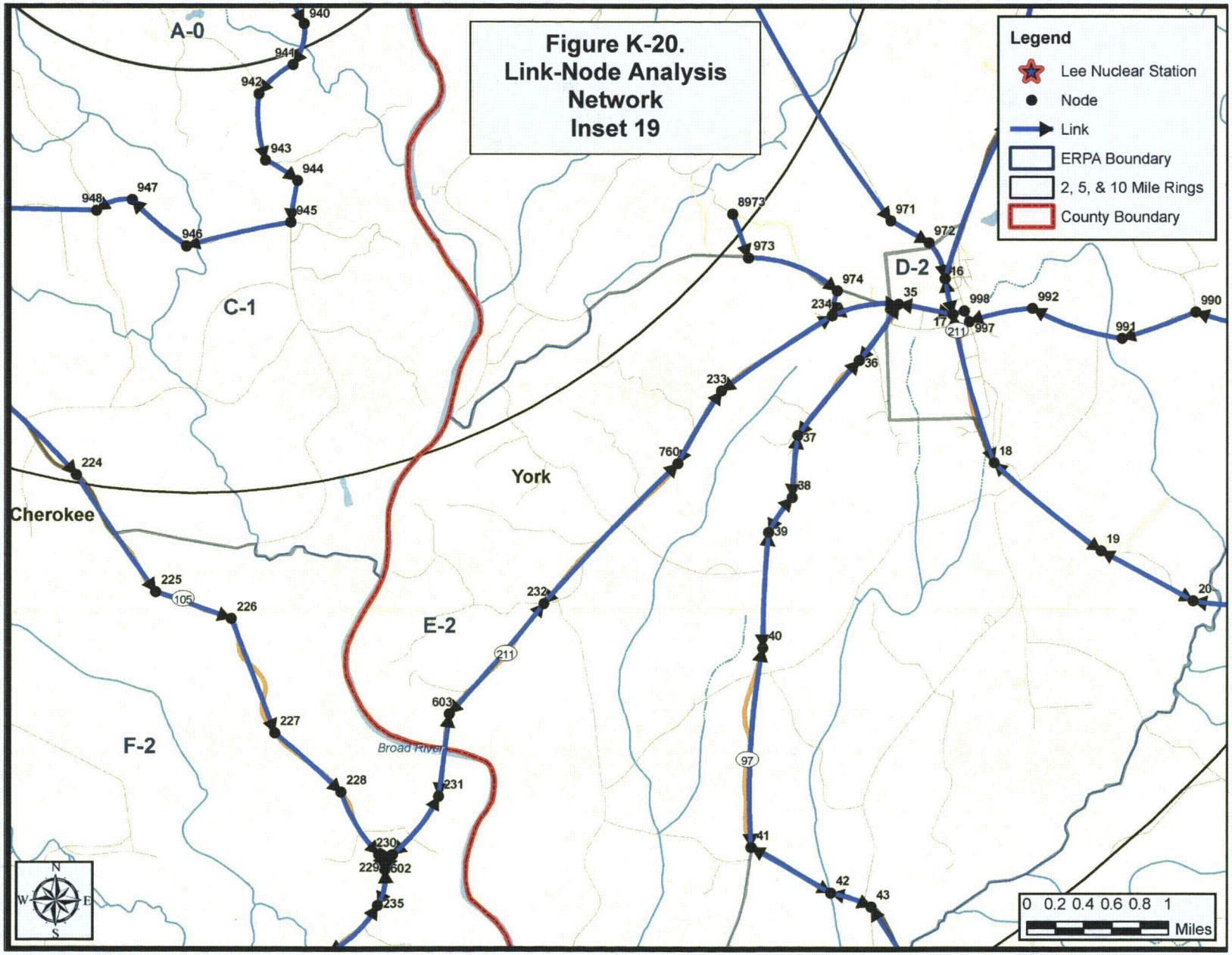
Figure K-20.
Link-Node Analysis
Network
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Lee Nuclear Station
Node
Link
ERPA Boundary
2, 5, & 10 Mile Rings
County Boundary
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C-1
D-2
E-2
F-2
York
Cherokee
Broad River
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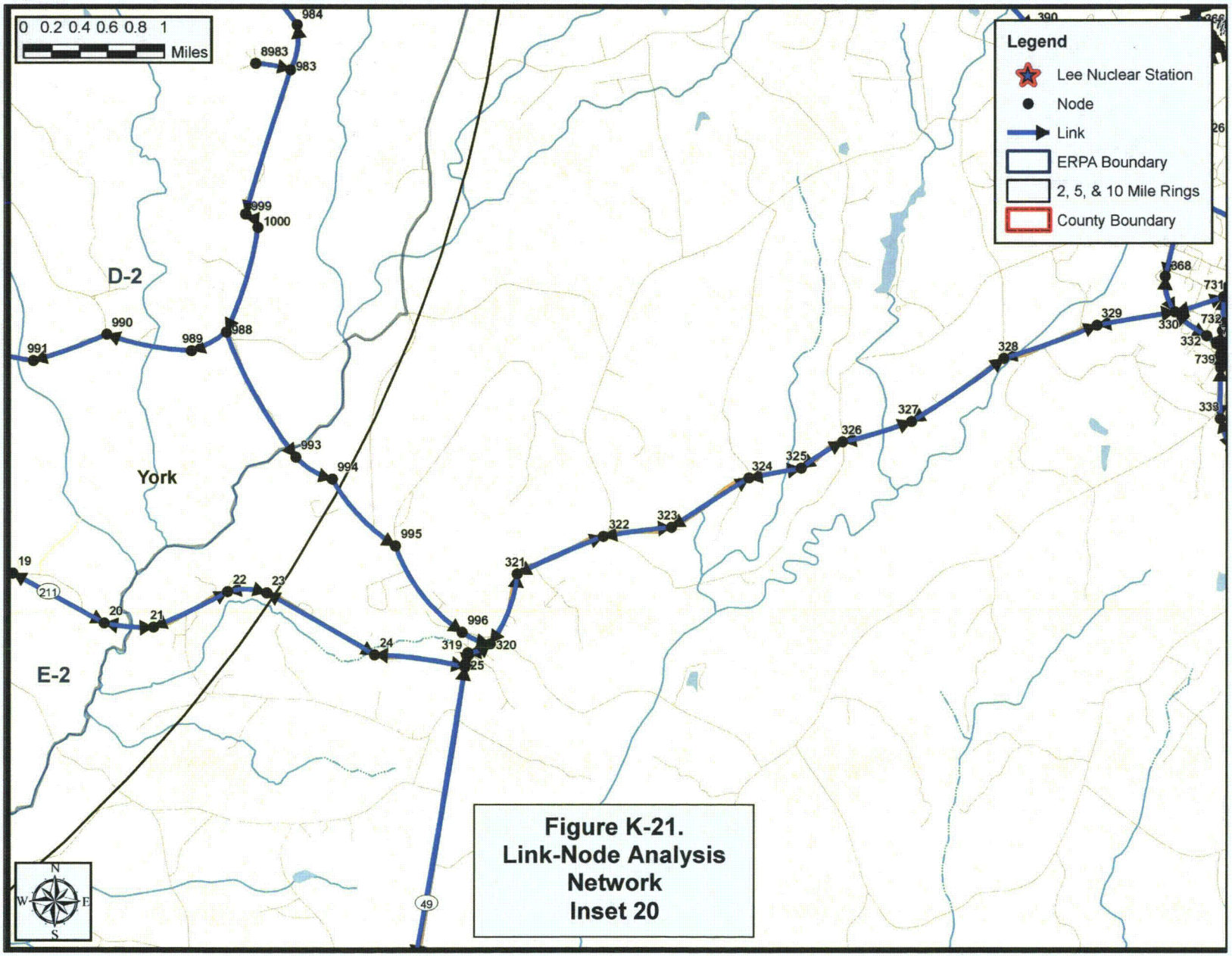

Figure K-21.
Link-Node Analysis Network
Inset 20

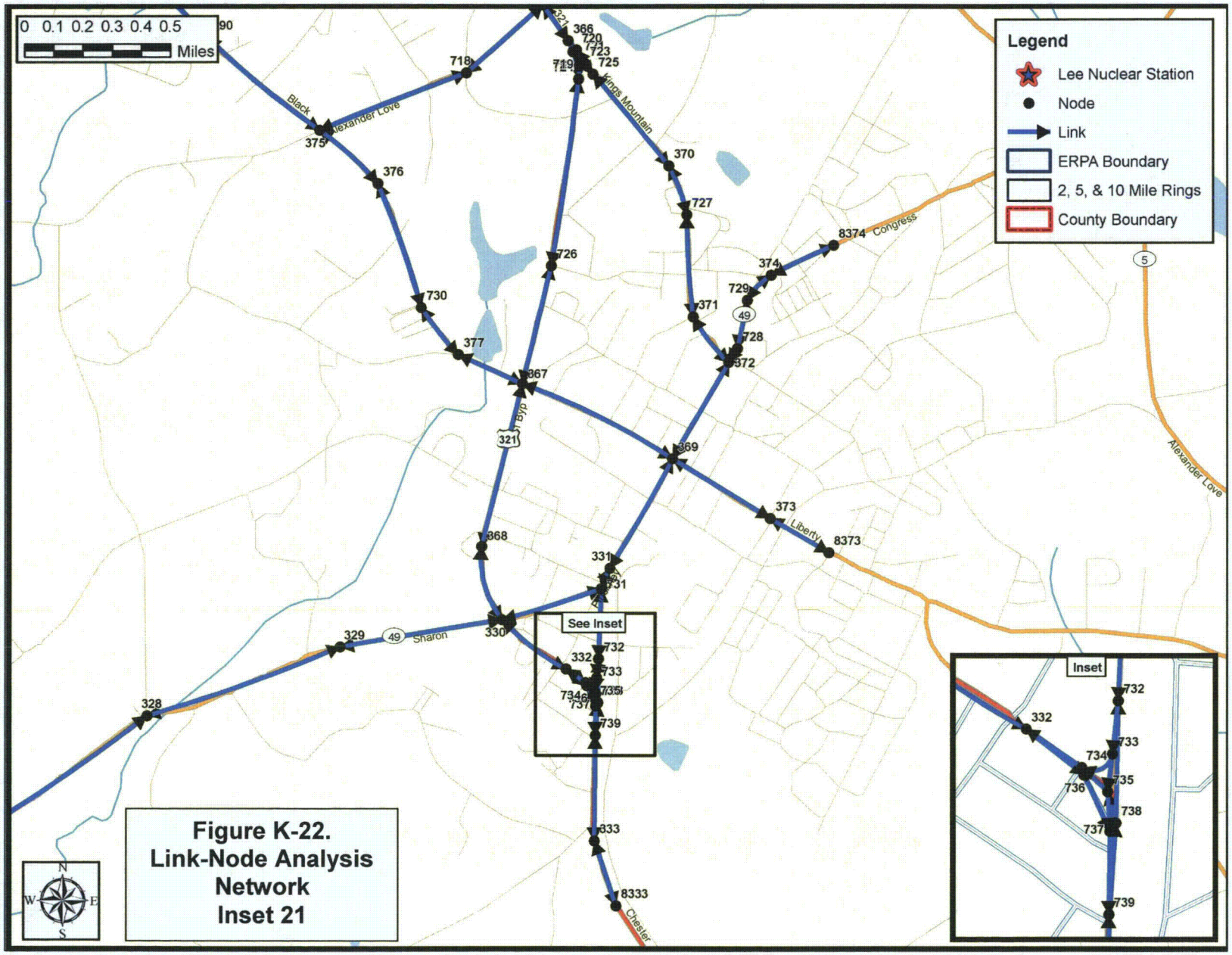

Figure K-22.
Link-Node Analysis
Network
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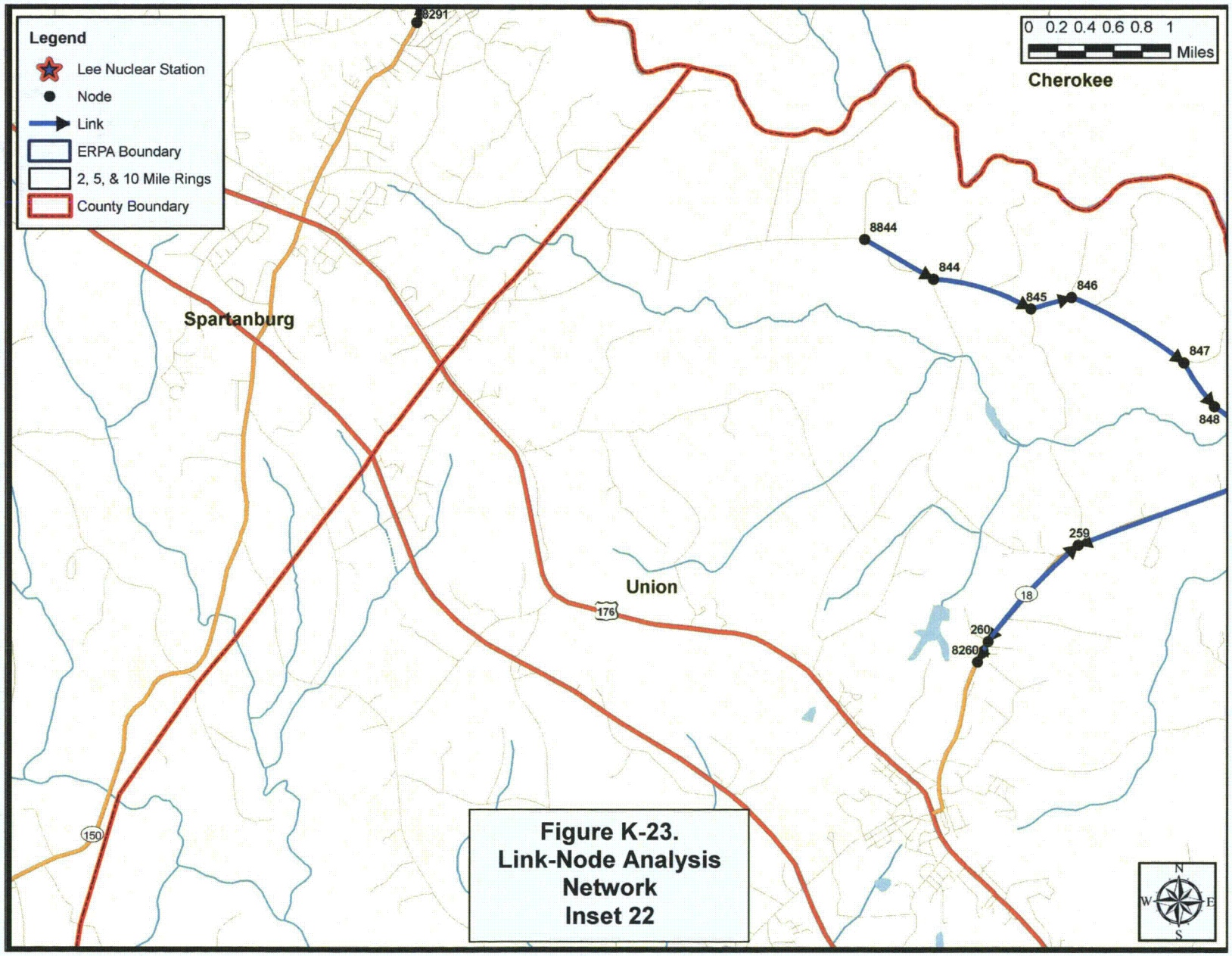

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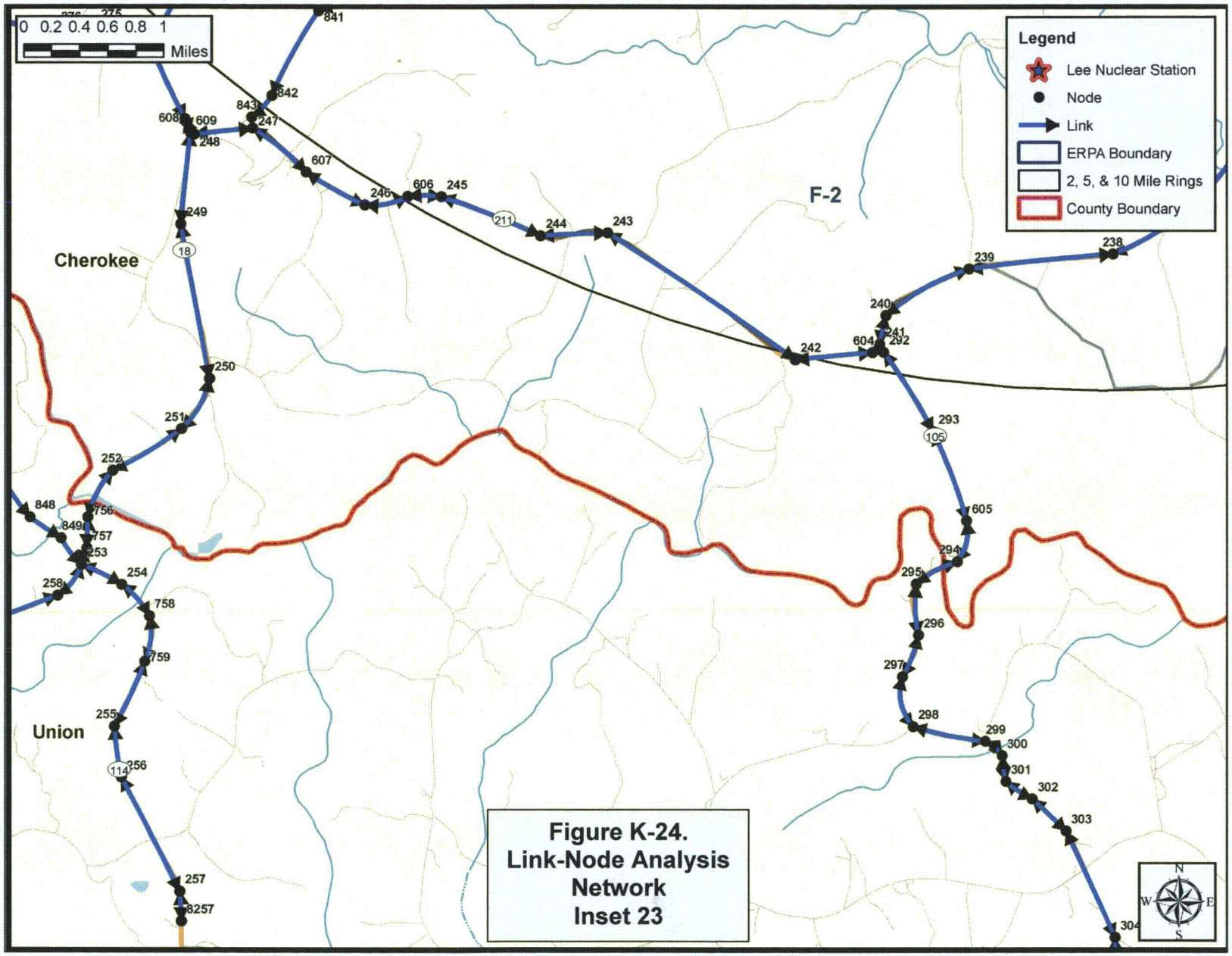
Link-Node Analysis Network
Inset 22



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Link-Node Analysis Network
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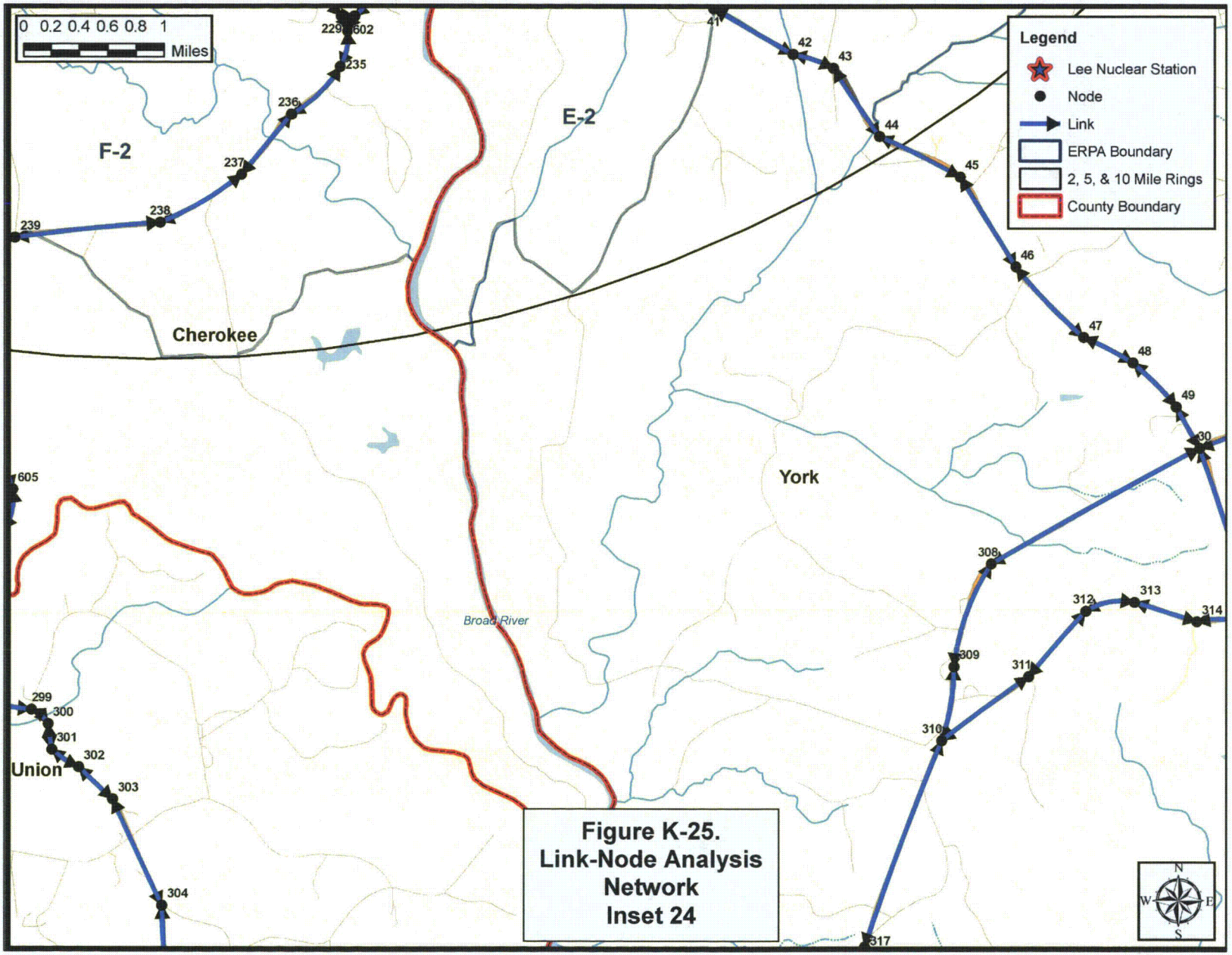

**Figure K-25.
Link-Node Analysis
Network
Inset 24**

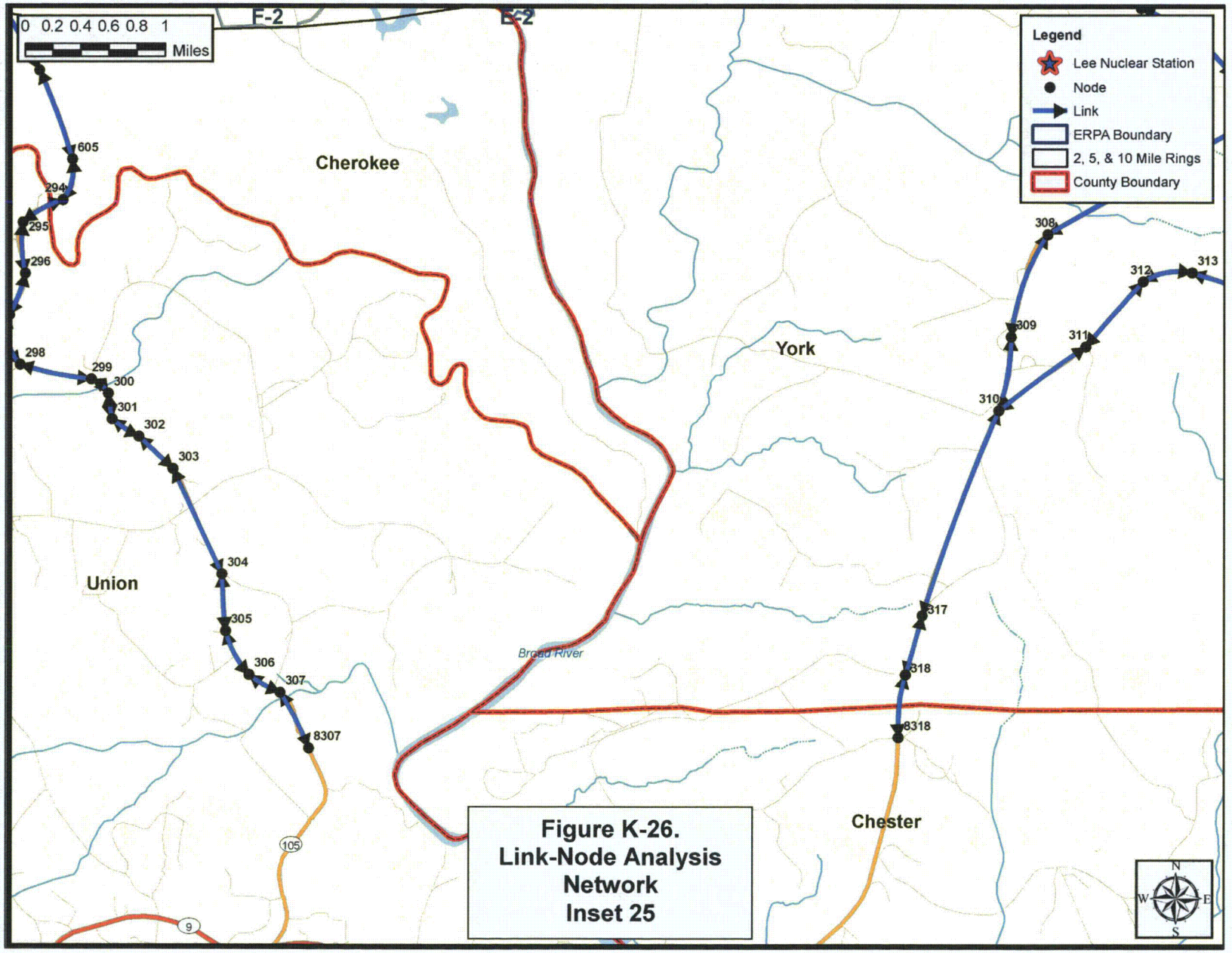

Figure K-26.
Link-Node Analysis Network
Inset 25

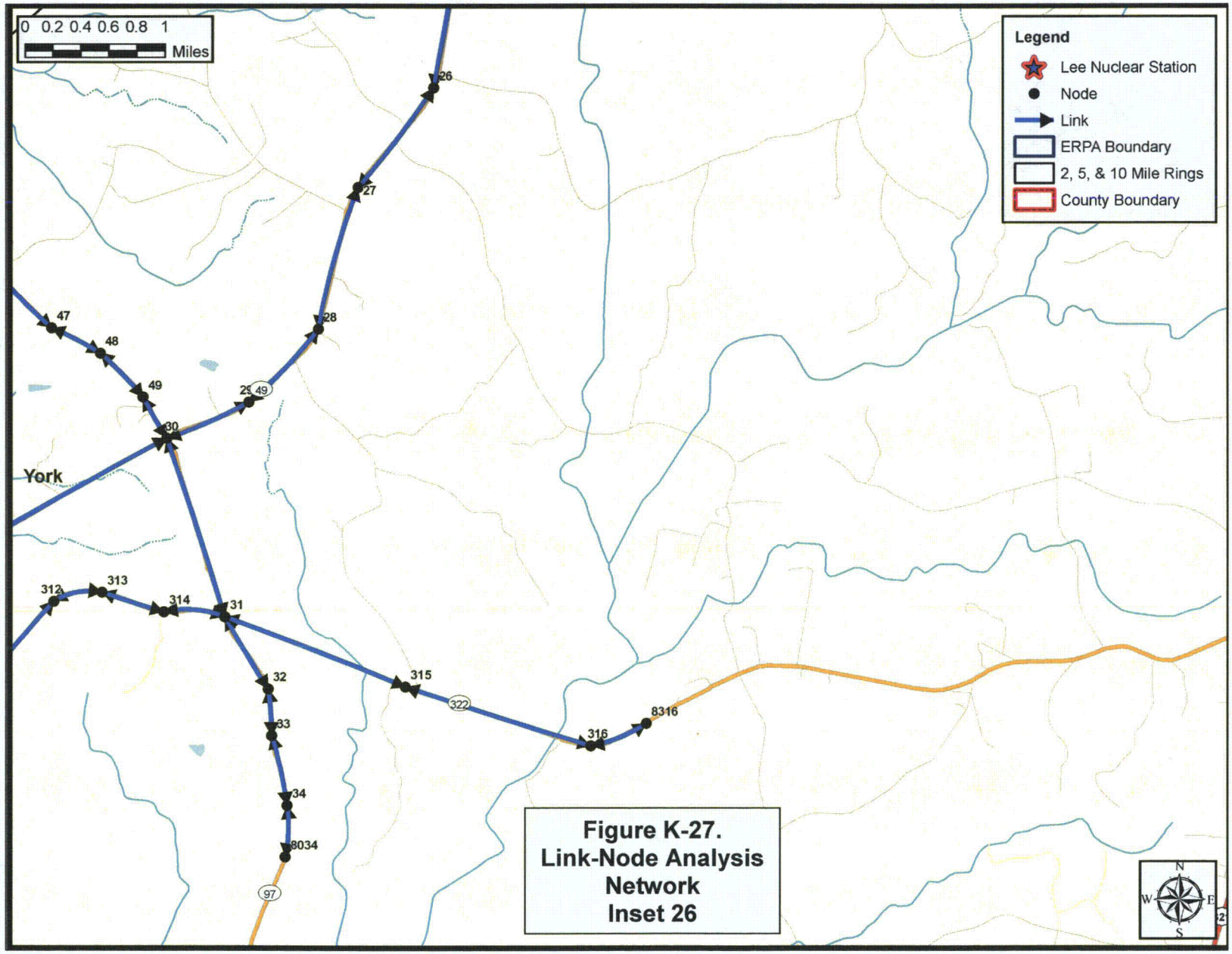

Figure K-27.
Link-Node Analysis
Network
Inset 26

Table K-1. Evacuation Roadway Network Characteristics

Upstream Node Number	Downstream Node Number	Length (Miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
1	218	52	1	1714	55
2	59	54	1	1500	40
2	187	87	1	1714	55
2	689	47	1	1714	55
3	4	32	1	1500	50
3	50	32	2	1714	50
3	334	9	2	1714	50
4	3	32	1	1500	50
4	5	28	1	1500	50
5	4	28	1	1500	50
5	6	77	1	1500	50
6	5	77	1	1500	50
6	7	52	1	1500	50
7	6	52	1	1500	50
7	8	59	1	1500	50
8	7	59	1	1500	50
8	9	46	1	1500	40
9	8	46	1	1500	50
9	10	38	1	1500	40
10	9	38	1	1500	40
10	11	44	1	1500	50
11	10	44	1	1500	40
11	12	43	1	1500	50
12	11	43	1	1500	50
12	13	32	1	1500	50
13	12	32	1	1500	50
13	14	135	1	1500	50
14	13	135	1	1500	50
14	15	44	1	1500	50
15	14	44	1	1500	50
15	16	114	1	1714	40
16	15	114	1	1500	50
16	17	24	1	1714	40
17	16	24	1	1714	40
17	18	103	1	1714	40
17	35	39	1	1714	40
18	17	103	1	1714	40
18	19	104	1	1714	60
19	18	104	1	1714	60

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

Attachment 2 to RAI 13.03-038

Markup of the Affected Portion of ETE Report (Rev. 1) Section 1, Subsection titled "Developing the Evacuation Times Estimates"

Highway capacity was estimated for each highway segment based on the field surveys and on the principles specified in the 2000 Highway Capacity Manual (HCM[1]). The link-node representation of the physical highway network was developed using Geographic Information System (GIS) mapping software and the observations obtained from the field survey. This network representation of "links" and "nodes" is shown in Figure 1-2.

Given the scale of Figure 1-2, it is not feasible to identify the links and nodes to enable the reader to relate to the information presented in Appendix K. The directional arrows on the links and the node numbers have been removed from Figure 1-2 to clarify the figure. The detailed figures provided in Appendix K depict the analysis network with directional arrows shown and node numbers provided.

Analytical Tools

The IDYNEV System that was employed for this study is comprised of several integrated computer models. One of these is the PC-DYNEV (DYnamic Network EVacuation) macroscopic simulation model that was developed by KLD under contract with the Federal Emergency Management Agency (FEMA).

PC-DYNEV consists of three submodels:

- A macroscopic traffic simulation model (for details, see Appendix C).
- An intersection capacity model (for details, see Highway Research Record No. 772, Transportation Research Board, 1980, papers by Lieberman and McShane & Lieberman).
- A dynamic, node-centric routing model that adjusts the "base" routing in the event of an imbalance in the levels of congestion on the outbound links.

Another model of the IDYNEV System is the TRAD (TRaffic Assignment and Distribution) model. This model integrates an equilibrium assignment model with a trip distribution algorithm to compute origin-destination volumes and paths of travel designed to minimize travel time. For details, see Appendix B.

Still another software product developed by KLD, named UNITES (UNIfied Transportation Engineering System) was used to expedite data entry.

The procedure for applying the IDYNEV System within the framework of developing ETE is outlined in Appendix D. Appendix A is a glossary of terms.

[1] Highway Capacity Manual (HCM2000), Transportation Research Board, National Research Council, 2000.

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-041

NRC RAI:

ETE-41

Section 3, "Demand Estimation," (page 3-15) indicates that 300 vehicles per lane for major routes and 150 vehicles per lane for minor routes are on the roadway, traveling through for a total of 6,300 vehicles.

a. Explain the calculation including number of lanes assessed such that 300 and 150 vehicles become 6,300 vehicles.

b. Is Floyd Baker Boulevard in Gaffney included in the estimate of through traffic?

c. Discuss if additional vehicles need to be added to Table 6-4, "Vehicle Estimates by Scenario".

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's December 9, 2008 response to the NRC Request for Additional Information 13.03-041(c) (Reference 1).

The assumption of 90 minutes for the time when external traffic begins to be diverted and the calculated number of vehicles representing "External Traffic" was discussed in Duke Energy's response to RAI 13.03-014 (November 20, 2008) (Reference 2) and RAI 13.03-041(c) (December 9, 2008).

The responses to RAI 13.03-014 (November 20, 2008) and RAI 13.03-041(c) (December 9, 2008) provided information specific to Table 6-4 of the Lee Nuclear Station ETE Report (Rev 1) as requested. During preparation of Revision 2 of the ETE Report additional areas were identified that require revision to ensure clarity and consistency with the initial RAI responses as provided.

Section 3 Subsection titled "Total Demand in Addition to Permanent Population", Table 6-3 footnote titled "External Through Traffic" and Item 5 of Section 2.3, "Study Assumptions" of the ETE Report (Rev 1) will be revised as provided in Attachments 1, 2 and 3, respectively, to clearly reflect this assumption.

In addition, Item 5 of Section 2.3 will be revised to include clarifying information provided by offsite agencies in a meeting held on May 7, 2007, to discuss the traffic management plans outlined in Section 9 and Appendix G of the ETE Report. Item 5 will be revised as provided in Attachment 3 to clarify that traffic will not be diverted along Interstate-85. The decision by offsite agencies to not divert Interstate-85 traffic is based on the limited availability of resources to implement the action, difficulty of the task to interrupt traffic flow on a major interstate and an

assessment that the anticipated radiological consequences are acceptable and do not require the action.

The changes described in this supplemental response are provided in Attachments 1, 2 and 3 will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

References:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 050) Ltr #WLG2008.12-01, dated December 9, 2008. (ADAMS Accession No. ML083460112)
2) Duke Energy Letter, Partial Response to Request for Additional Information WLG2008.11-09, dated November 20, 2008. (ADAMS Accession No. ML083300288)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Section 3, Subsection titled "Total Demand in Addition to Permanent Population" of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 1.

Revise Table 6-3, footnote titled "External Through Traffic" of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 2.

Revise Item 5 of Section 2.3, "Study Assumptions" of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 3.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

1) Markup of Affected Portions of ETE Report (Rev 1), Section 3
2) Markup of Affected Portions of ETE Report (Rev 1), Table 6-3, "Percent of Population Groups for Various Scenarios"
3) Markup of Affected Portion of ETE Report (Rev 1) Section 2.3

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

Attachment 1 to RAI 13.03-041

Markup of Affected Portions of ETE Report (Rev 1), Section 3

Medical Facilities

Data request forms were completed for each of the medical facilities within the WLS EPZ. Chapter 8 details the evacuation of medical facilities and their patients. The number and type of evacuating vehicles that need to be provided depends on the patients' state of health. Buses can transport up to 40 people; vans, up to 12 people; ambulances, up to 2 people (patients).

Total Demand in Addition to Permanent Population

Vehicles will be traveling through the EPZ (external-external trips) at the time of an accident. After the Advisory to Evacuate is announced, these through travelers will also evacuate. These through vehicles are assumed to travel on the major routes – Interstate 85 and US Route 29 – as well as some of the minor routes in the EPZ – Route 150 and Route 11. It is assumed that this traffic will continue to enter the EPZ during the first ~~60~~90 minutes following the Advisory to Evacuate. We estimate 300 vehicles per lane per hour for the major routes and 150 vehicles per lane per hour for the minor routes for a total of 6,300 vehicles per hour entering the EPZ as external-external trips ~~during this period~~resulting in 9,450 total vehicles entering the EPZ prior to the activation of the ACP.

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

Attachment 2 to RAI 13.03-041

Markup of Affected Portions of ETE Report (Rev 1), Table 6-3, "Percent of Population Groups for Various Scenarios"

Table 6-3. Percent of Population Groups for Various Scenarios

Scenarios	Residents With Commuters in Household	Residents With No Commuters in Household	Employees	Transients	Shadow	Special Events	School Buses	Transit Buses	External Through Traffic
1	68%	32%	96%	50%	40%	0%	10%	100%	100%
2	68%	32%	96%	50%	40%	0%	10%	100%	100%
3	10%	90%	47%	100%	35%	0%	0%	100%	100%
4	10%	90%	47%	100%	35%	0%	0%	100%	100%
5	10%	90%	10%	45%	31%	0%	0%	100%	60%
6	68%	32%	100%	30%	40%	0%	100%	100%	100%
7	68%	32%	100%	30%	40%	0%	100%	100%	100%
8	68%	32%	100%	30%	40%	0%	100%	100%	100%
9	10%	90%	47%	60%	35%	0%	10%	100%	100%
10	10%	90%	47%	60%	35%	0%	10%	100%	100%
11	10%	90%	10%	25%	31%	0%	0%	100%	60%
12	68%	32%	96%	50%	40%	100%	10%	100%	100%

Resident Households With Commuters.....Households of EPZ residents who await the return of commuters prior to beginning the evacuation trip.

Resident Households With No Commuters.....Households of EPZ residents who do not have commuters or will not await the return of commuters prior to beginning the evacuation trip.

Employees.....EPZ employees who live outside of the EPZ.

Transients.....People who are in the EPZ at the time of an accident for recreational or other (non-employment) purposes.

Shadow.....Residents and employees in the shadow region (outside of the EPZ) who will spontaneously decide to relocate during the evacuation. The basis for the values shown is a 30% relocation of shadow residents along with a proportional percentage of shadow employees. The percentage of shadow employees is computed using the scenario-specific ratio of EPZ employees to residents.

Special Events.....Additional vehicles in the Lee Nuclear Station area during the construction phase of a new unit.

School and Transit Buses.....Vehicle-equivalents present on the road during evacuation servicing schools and transit-dependent people (1 bus is equivalent to 2 passenger vehicles).

External Through Traffic.....Traffic on local highways and major arterial roads at the start of the evacuation. This traffic is stopped by access control approximately ~~1-2 hours~~ 90 minutes after the evacuation begins.

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

Attachment 3 to RAI 13.03-041

Markup of Affected Portion of ETE Report (Rev 1) Section 2.3

2.3 Study Assumptions

1. The Planning Basis Assumption for the calculation of ETE is a rapidly escalating accident that requires evacuation, and includes the following: a. Advisory to Evacuate is announced coincident with the siren notification. b. Mobilization of the general population will commence within 10 minutes after siren notification. c. ETE are measured relative to the Advisory to Evacuate.
2. It is assumed that everyone within the group of ERPA forming a Region that is issued an Advisory to Evacuate will, in fact, respond and evacuate in general accord with the planned routes.
3. It is further assumed that:
   a. Schools will be given the earliest notification possible so they can begin evacuating prior to notification of the general public, if conditions permit. In the case of a rapidly escalating accident, however, this may not be possible.
   b. 68 percent of the households in the EPZ have at least 1 commuter; 71 percent of those households with commuters will await the return of a commuter before beginning their evacuation trip, based on the telephone survey results.
4. The ETE will also include consideration of "through" (External-External) trips during the time that such traffic is permitted to enter the evacuated Region. "Normal" traffic flow is assumed to be present within the EPZ at the start of the emergency.
5. Access Control Points (ACP) will be staffed within approximately ~~1—2 hours~~90 minutes following the siren notifications, to divert traffic attempting to enter the EPZ. Earlier activation of ACP locations would delay returning commuters. Vehicles entering the EPZ along Interstate 85 will not be diverted as the manpower and equipment needs would be too great. It is assumed that no vehicles (except those on Interstate 85) will enter the EPZ after this ~~1—2 hour~~90 minute time period.
6. Traffic Control Points (TCP) within the EPZ will be staffed over time, beginning at the Advisory to Evacuate. Their number and location will depend on the Region to be evacuated and resources available. It is assumed that drivers will act rationally, travel in the directions identified in the plan, and obey all control devices and traffic guides.
7. Buses will be used to transport those without access to private vehicles:
   a. If schools are in session, transport (buses) will evacuate students directly to the assigned Reception Centers or host schools.
   b. Medical facilities are required to have a detailed evacuation plan

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-045

NRC RAI:

ETE-45:

It appears the analysis may include truncated distributions:

a. The longest evacuation time for 100% of the ETE is 4 hours 50 minutes in Table 7-1D, "Time to Clear the Indicated Area of 100% of the Affected Population."' This is based on the distributions in Section 5. The distribution in Section 5 for "Time to Prepare Home for Evacuation" is 135 minutes; however, Figure F-11, "Time to Prepare Home for Evacuation" in Appendix F, Telephone Survey, indicates, that 360 minutes, or 6 hours is the time for 100% of the population to "prepare to evacuate". Explain how the maximum evacuation time for 100% of the public was calculated using the data from Figure F-11.

b. Table 5-3, "Time Distribution for Employees to Leave Work," identifies 100% of the employees having left at 90 minutes. However, Figure F-9, "Time to Prepare to Leave Work/School," indicates that the tail of the curve may go out to 150 minutes. Explain how 90 minutes was derived for Table 5-3. Discuss any effects on the ETE if the time is 150 minutes as indicated in Appendix F.

c. Table 5-4, "Time Distribution for Commuters to Return Home," identifies 100% of the population returning home in 75 minutes. However, Appendix F, Telephone Survey," page F-9, states that nearly all individuals travel home in 90 minutes. Figure F- 10, "Work to Home Travel Time," indicates that the tail may go out to 150 minutes. Explain if the 100% ETE identified in Table 7-1D, "Time to Clear the Indicated Area of 100% of the Affected Population," includes these tail values or if the tails were truncated for the tables in Section 5.

d. Table 5-5, "Time Distribution of Population Ready to Evacuate," identifies 100% of the population ready to evacuate in 135 minutes. Appendix F, page F-10, states that 90% are ready in 1.5 hours and that the remaining population (100%) is ready in 3.5 hours. However, the tail in Figure F-11, "Time to Prepare Home for Evacuation," indicates this could take as long as 6 hours. Discuss if the values in Table 5-5 were truncated.

e. In Figure 5-2, "Evacuation Mobilization Activities," the time to prepare home is identified as approximately 140 minutes, however Appendix F, page F- 10, would indicate this should be a minimum of 210 minutes and may be as long as 360 minutes. Explain why Figure 5.2 indicates 140 minutes. If necessary, reconcile Figure 5-2 with the comments above on other tables in Section 5.

f. If necessary, reconcile Figure 5-3, "Comparison of Trip Generation Distributions" and Table 5-8, "Trip Generation for the EPZ Population," with the comments on other tables in Section 5.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's December 17, 2008 response to the NRCs Request for Additional Information 13.03-045 (e) and (f) (Reference 1).

As discussed in the supplemental response to RAI 13.03-031 (Enclosure 10 of this letter) all simulations were re-run as a result of a data input error correction.

Figure 7-7, "Evacuation Time Estimates for WLS Summer, Midweek, Midday, Good Weather Evacuation of Region 03 (Entire EPZ))" discussed in the December 17, 2008, response will be revised and renumbered as described in the supplemental response to RAI 13.03-033 (Enclosure 12 of this letter). The curves of renumbered Figure 7-6 are essentially horizontal past 3 hours (zero slope indicates zero flow rate), for the evacuation of the entire EPZ (Region R03) in Scenario 1 as opposed to the 4 hours discussed in the December 17, 2008 response.

Figure 5-2 and Figure 5-3 will be revised to accurately reflect the inputs to the model, the description of activities and adjust the x-axis to remove unnecessary portions of the graph.

The changes described in this supplemental response will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) WLG2008.12-20, dated December 17, 2008. (ADAMS Accession No. ML083540416)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Figure 5-2 of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 1.

Revise Figure 5-3 of the Lee Nuclear Station ETE Report (Rev 1) as provided in Attachment 2.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachments:

1) Markup of the Affected Portion of ETE Report (Rev 1) Figure 5-2, "Evacuation Mobilization Activities"
2) Markup of the Affected Portion of ETE Report (Rev 1 Figure 5-3, "Comparison of Trip Generation Distributions"

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

Attachment 1 to RAI 13.03-045

Markup of the Affected Portion of ETE Report (Rev 1) ETE Report (Rev. 1) Figure 5-2, "Evacuation Mobilization Activities"

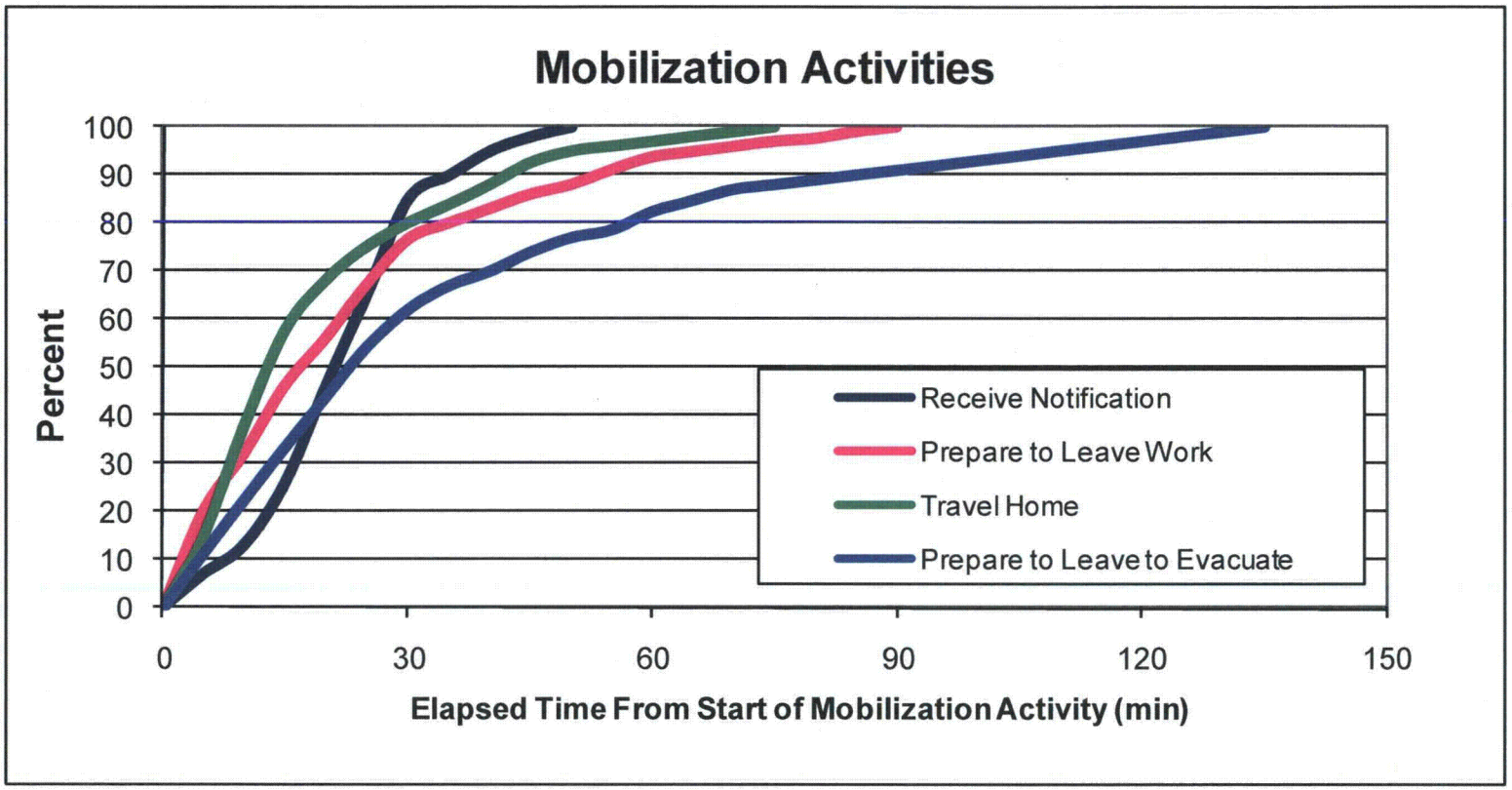

Figure 5-2. Evacuation Mobilization Activities

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

Attachment 2 to RAI 13.03-045

Markup of the Affected Portion of ETE Report (Rev. 1) Figure 5-3, "Comparison of Trip Generation Distributions"

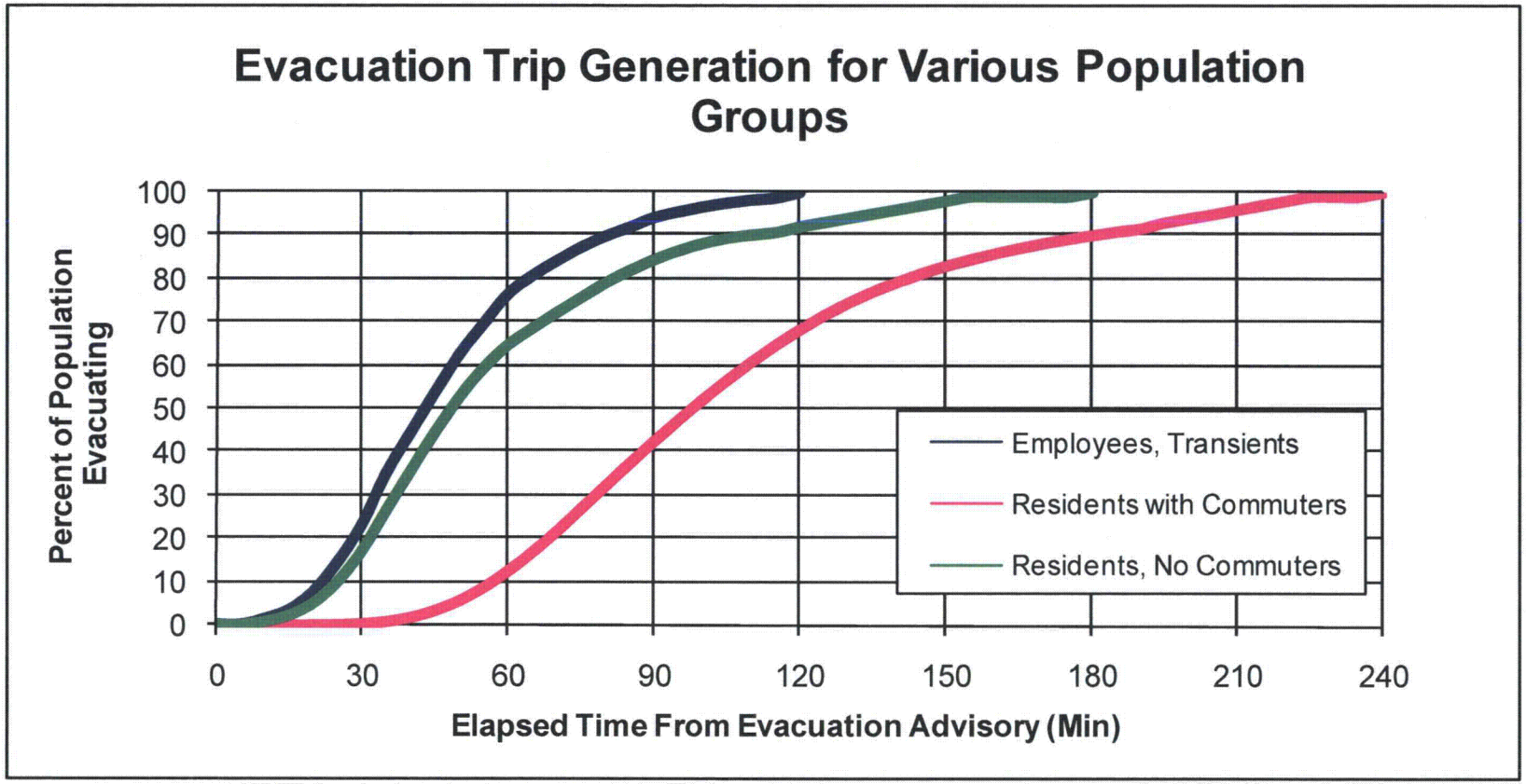

Figure 5-3. Comparison of Trip Generation Distributions

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

RAI Letter No. 025

NRC Technical Review Branch: Licensing and Inspection Branch (NSIR/DPR/LIB (EP))

Reference NRC RAI Number(s): 13.03-048

NRC RAI:

ETE-48:

Patterns of traffic congestion are discussed in Section 7.2, "Patterns of Traffic Congestion During Evacuation." Congestion is expected to peak at 2 hours following evacuation and will begin to dissipate in most areas after the third hour. Figures 7-3 through 7-6, "Areas of Traffic Congestion 1-4 Hours After Advisory to Evacuate," illustrate the patterns of traffic congestion that arise for the case when the entire EPZ (Region R03) is advised to evacuate during the summer, weekend, midday period under good weather conditions (Scenario 3). The maps show congested areas in red and absence of congestion in white but delay times are not indicated. Provide additional information on delay times.

Duke Energy Supplemental Response:

This response updates and supplements Duke Energy's November 24, 2008 response to the NRCs Request for Additional Information 13.03-048 (Reference 1).

As discussed in the supplemental response to RAI 13.03-031 (Enclosure 10 of this letter) all simulations were re-run as a result of a data input error correction. Based on the new simulation runs, congestion within the EPZ clears by 3 hours and 15 minutes after the advisory to evacuate versus 4 hours and 15 minutes as indicated in the ETE Report (Rev. 1). As a result of the new simulation runs, the congestion diagrams will be revised and shown as Figures 7-3 through 7-5. Figure 7-6, "Areas of Traffic Congestion 4 Hours After the Advisory to Evacuate" in Revision 1 of the ETE Report showed congestion patterns at 4 hours after the advisory to evacuate. Given that congestion clears before 4 hours in the new simulation runs, Figure 7-6 is no longer necessary and will be deleted as described in the supplemental response to RAI 13.03-033 (Enclosure 12 of this letter).

In the November 24, 2008 response to this RAI, a table summarizing the average delay at the identified congestion points in the EPZ was provided as Attachment 1. As discussed above, the congestion patterns within the EPZ have changed as a result of the new simulation runs. As a result, the location of congestion points #2, 6, 8 and 9 in the delay table will be changed. Also, the average delay times for all congestion points in the table will be updated based on the new simulation runs. The table of average delay times will be added to the Lee Nuclear Station ETE Report as new Table 7-3, "Average Delay for Selected Roadways in the WLS Analysis Network" rather than within Section 7.2 as was proposed in the November 24, 2008 response. Section 7 of the Lee Nuclear Station ETE Report will be revised as provided in Attachment 1 of this enclosure to reflect updates made to the proposed text, figures and tables that were submitted in the November 24, 2008 response.

The changes described in this supplemental response will be included in Revision 2 of the Lee Nuclear Station ETE Report.

Revision 2 of the Lee Nuclear Station ETE Report was provided to the respective State and County emergency management agencies for review and comment. State and County letters acknowledging the review will be included with the submittal of the ETE Report for regulatory review.

Reference:

1) Duke Energy Letter, Partial Response to Request for Additional Information (RAI No. 50) Ltr # WLG2008.11-13, dated November 24, 2008 (ADAMS Accession No. ML083450547)

Associated Revisions to the Lee Nuclear Station Evacuation Time Estimate Report:

Revise Section 7 of the Lee Nuclear Station ETE Report (Rev 1) as described in Attachment 1.

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report or Emergency Plan:

None

Attachment:

1) Markup of Affected Portions of ETE Report (Rev 1) Section 7, "General Population Evacuation Time Estimates (ETE)"

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

Attachment 1 of RAI 13.03-048

Markup of Affected Portions of ETE Report (Rev 1) Section 7, "General Population Evacuation Time Estimates (ETE)"

7.2 Patterns of Traffic Congestion During Evacuation

Figures 7-3 through 7-~~6~~5 illustrate the patterns of traffic congestion that arise for the case when the entire EPZ (Region R03) is advised to evacuate during the summer, midweek, midday period under good weather conditions (Scenario 1).

Traffic congestion, as the term is used here, is defined as Level of Service (LOS) F. LOS F is defined as follows (2000 HCM):

> Level of Service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level of Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow, which causes the queue to form, and Level of Service F is an appropriate designation for such points.

This definition is general and conceptual in nature, and applies primarily to uninterrupted flow. Levels of Service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

All highway "links" which experience LOS F are delineated in these Figures by a red line; all others are lightly indicated. Congestion develops rapidly around concentrations of population and traffic bottlenecks. ~~Many~~ All of the major routes out of Gaffney are congested one hour (Figure 7-3) after the Advisory to Evacuate (ATE), including:

- ~~All entrance~~Interstate 85 southbound and all access ramps to Interstate 85 southbound
- ~~Southbound~~ US Route 29 southbound
- Route 18 southbound
- Route 150 northbound and southbound
- ~~Westbound~~ Route 11 westbound

Figure 7-4 presents the congestion pattern two hours after the ~~Advisory to Evacuate. Congestion continues to grow in the routes leading out of Gaffney and within Gaffney, while congestion begins to build on the following routes:~~ATE. Congestion is dissipating southbound on Route 150, Route 18, and US Route 29 while congestion persists southbound along Interstate 85.

~~- Route 329 northbound approaches to I-85~~
~~- Route 150 southbound and Route 18 southbound out of Gaffney~~
~~- Northbound routes toward Shelby, NC~~

~~Congestion persists on the routes out of Gaffney at 3 hours after the start of evacuation, as illustrated in Figure 7-5. Figure 7-6 shows that much of the congestion in the EPZ has eased at 4 hours after the Advisory to Evacuate; however, congestion still persists in the shadow area outside of Gaffney.~~
Most of the congestion in the EPZ has dissipated by 3 hours after the ATE, as seen in Figure 7-5. Congestion only persists along Interstate 85 southbound; this congestion dissipates 15 minutes later. The absence of congestion on network links implies that traffic demand there has decreased below the roadway capacity for a period of time sufficient to dissipate any traffic queues. It does not imply that traffic has completely cleared from these roadway sections.

The congestion clears before the trip generation time of 4 hours (See Section 5); thus, the ETE for the 100th percentile evacuation is dictated by the trip generation time.

Table 7-3 provides a description of each congestion point identified in Figures 7-3 through 7-5, including the link experiencing the congestion. The table illustrates the average delay, per vehicle, at congestion points, at designated times following the advisory to evacuate.

7.3 Evacuation Rates

Evacuation is a continuous process, as implied by Figures 7-3 through 7-65. Another format for displaying the dynamics of evacuation is depicted in Figure 7-7. This plot indicates the rate at which traffic flows out of the indicated areas for the case of an evacuation of the full EPZ (Region R03) under the indicated conditions. Appendix J presents these plots for all Evacuation Scenarios for Region R03.

As indicated in Figure 7-7, there is typically a long "tail" to these distributions. Vehicles evacuate an area slowly at the beginning, as people respond to the Advisory to Evacuate at different rates. Then traffic demand builds rapidly (slopes of curves increase). When the system becomes congested, traffic exits the EPZ at rates somewhat below capacity until some evacuation routes have cleared. As more routes clear, the aggregate rate of egress slows since many vehicles have already left the EPZ. Towards the end of the process, relatively few evacuation routes service the remaining demand.

This decline in aggregate flow rate, towards the end of the process, is characterized by these curves flattening and gradually becoming horizontal. Ideally, it would be desirable to fully saturate all evacuation routes equally so that all will service traffic near capacity levels and all will clear at the same time. For this ideal situation, all curves would retain the same slope until the end -- thus minimizing evacuation time. In the real world, this ideal is generally unattainable reflecting the variation in population density and in highway capacity over the EPZ.

7.4 Guidance on Using ETE Tables

Tables 7-1A through 7-1D present the ETE values for all 22 Evacuation Regions and all 12 Evacuation Scenarios. They are organized as follows:

Table	Contents
7-1A	ETE represents the elapsed time required for 50 percent of the population within a Region, to evacuate from that Region.
7-1B	ETE represents the elapsed time required for 90 percent of the population within a Region, to evacuate from that Region.
7-1C	ETE represents the elapsed time required for 95 percent of the population within a Region, to evacuate from that Region.
7-1D	ETE represents the elapsed time required for 100 percent of the population within a Region, to evacuate from that Region.

Table 7-3. Average Delay for Selected Roadways in the WLS Analysis Network

CP #	Link		Roadway	Average Delay per Vehicle (min/veh) at Indicated Time		
	From Node	To Node		1:00	2:00	3:00
1	485	486	State Hwy 11 Westbound	0.0	0.0	0.0
2	504	879	State Hwy 150 Northbound	0.0	0.0	0.0
3	761	396	US Hwy 29 Southbound - lane drop from 2 lanes to 1 lane	2.3	2.3	0.0
4	283	284	State Hwy 150 Southbound - intersection with State Hwy 211	0.0	0.0	0.0
5	102	98	State Hwy 105 Northbound - approach to I-85 ramps	2.1	0.0	0.0
6	274	608	State Hwy 18 Southbound	0.2	0.0	0.0
7	205	193	State Hwy 329 Northbound - approach to I-85 ramps	4.9	0.5	0.0
8	104	105	I-85 Southbound	3.3	6.2	5.8
9	565	566	Old Post Rd Northbound approach to State Hwy 11	4.0	4.2	0.0
10	564	90	State Hwy 11 Westbound - approach to I-85 ramps	3.7	2.3	0.0

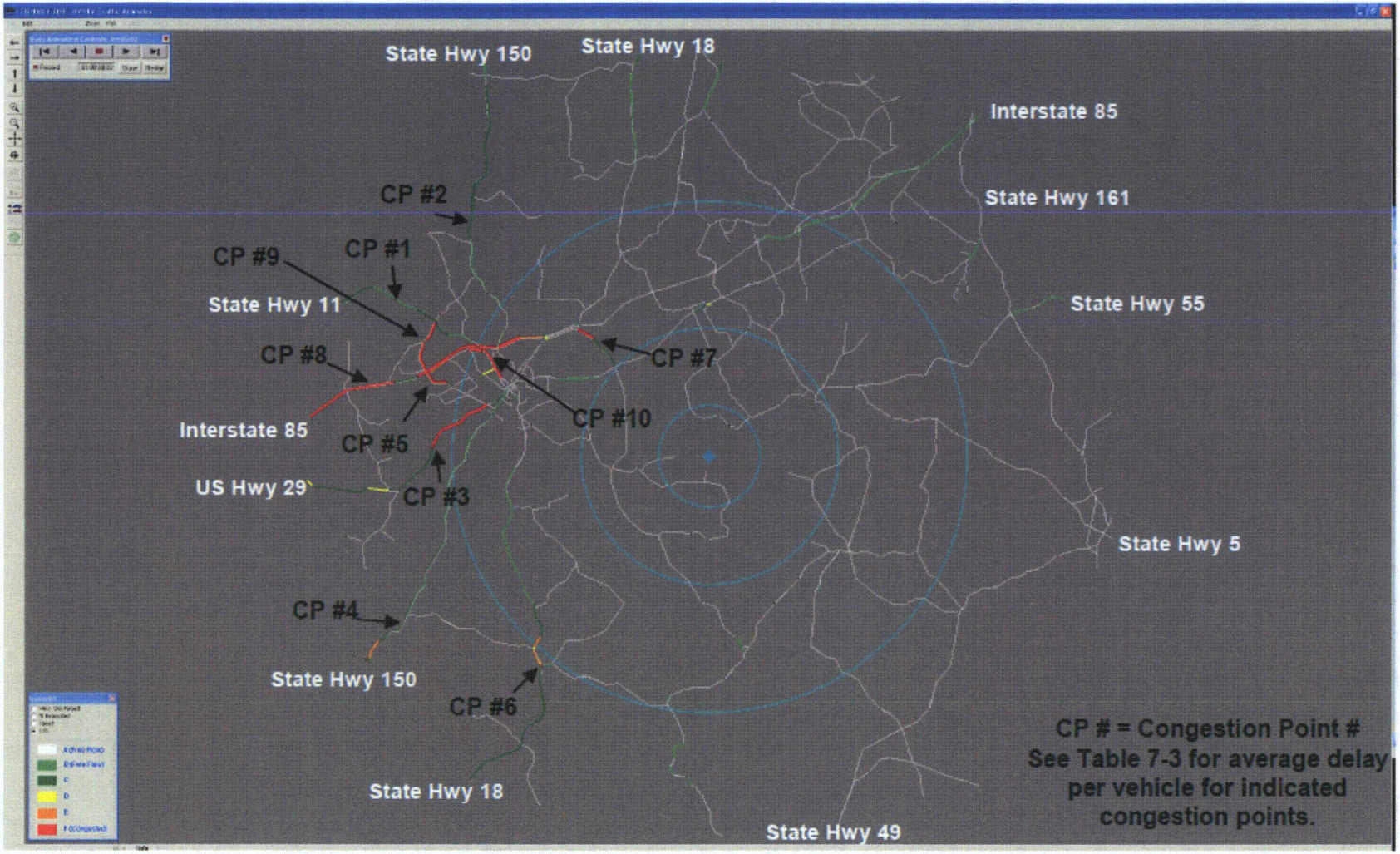

Figure 7-3. Areas of Traffic Congestion 1 Hour after the Advisory to Evacuate

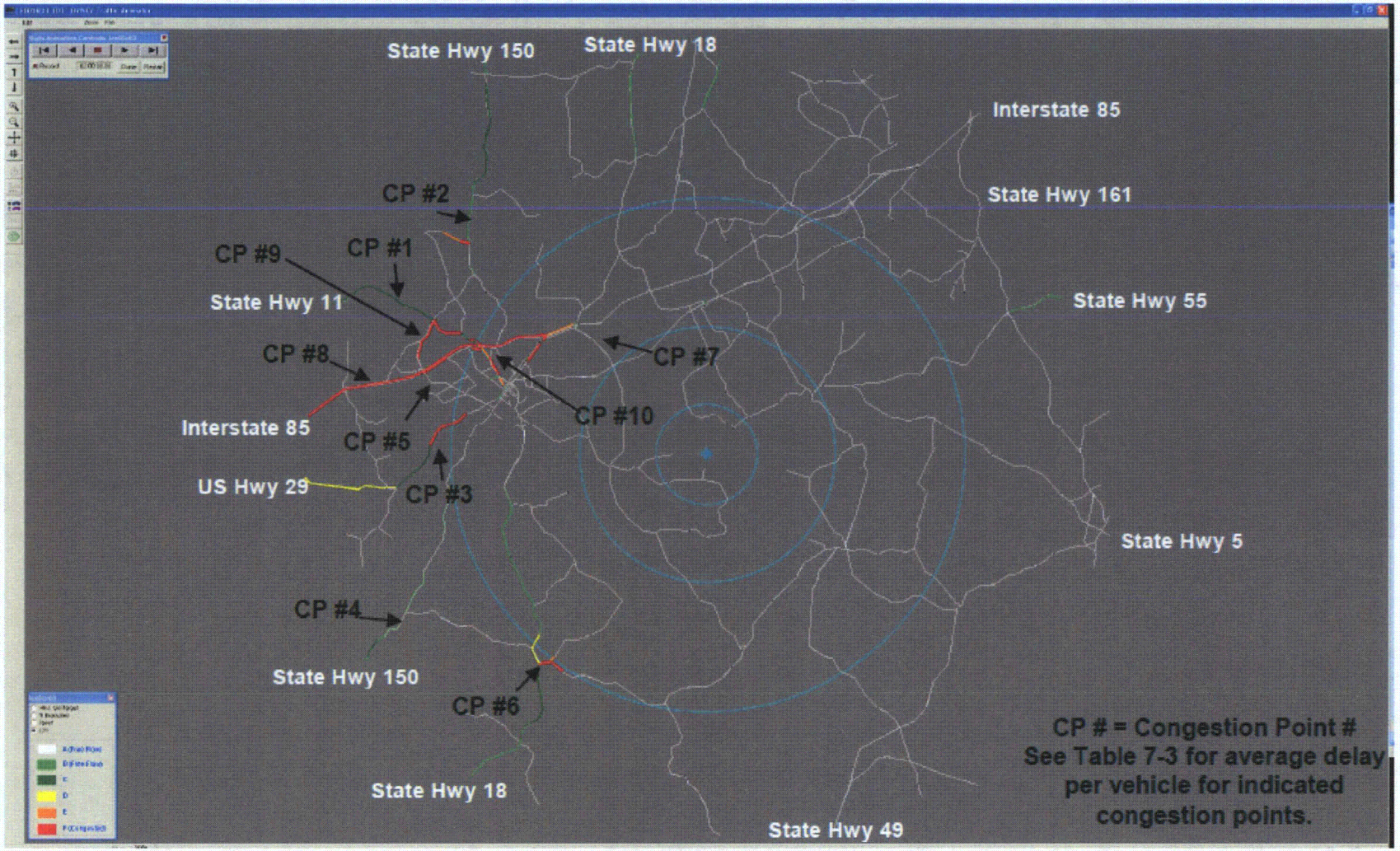

Figure 7-4. Areas of Traffic Congestion 2 Hours after the Advisory to Evacuate

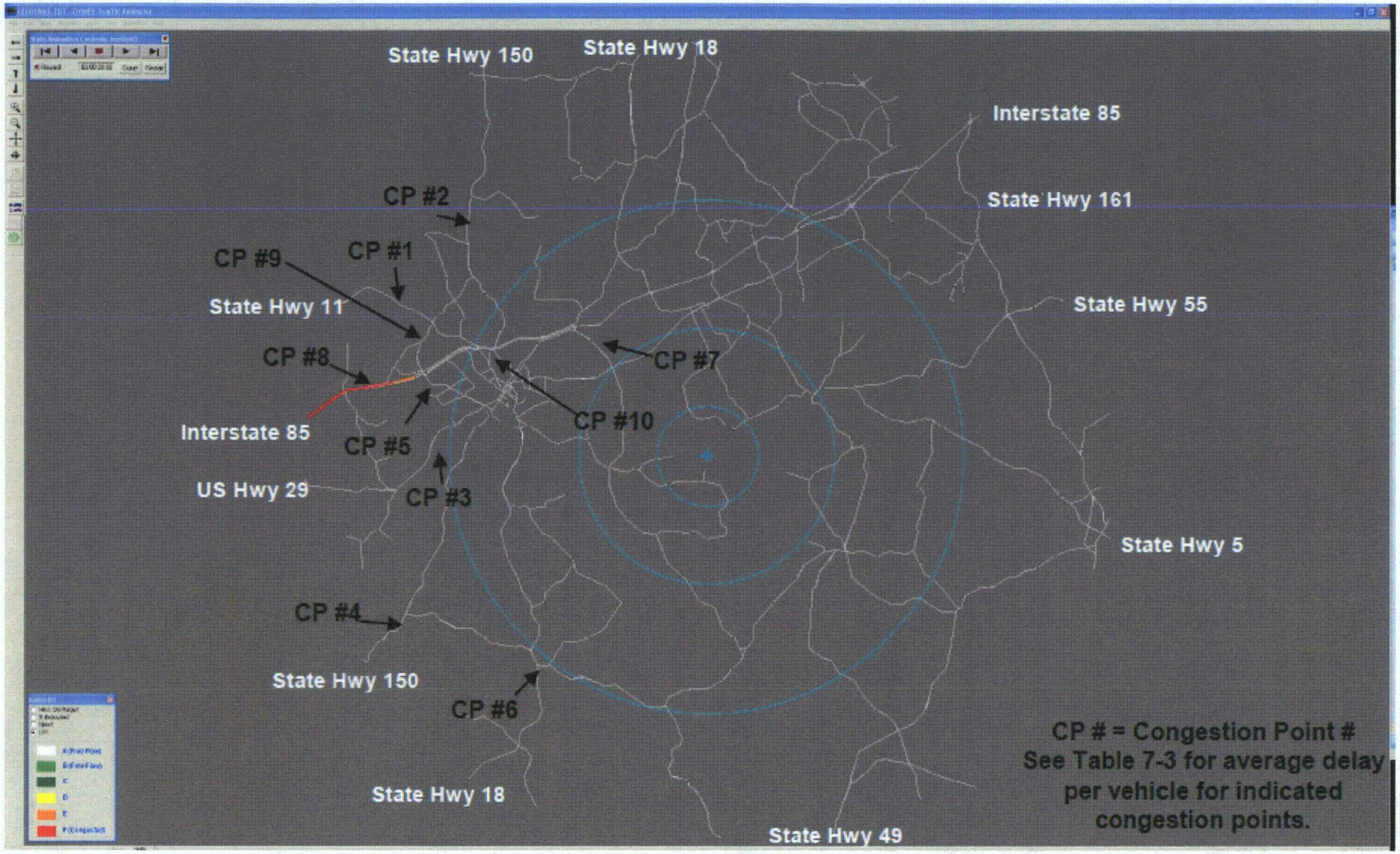

Figure 7-5. Areas of Traffic Congestion 3 Hours after the Advisory to Evacuate