APPENDIX L

Sub-Area Boundaries

L. SUB-AREA BOUNDARIES

Sub-Area 2

Counties: Sherburne and Wright

Defined as the area within the following boundary: People north of County Road 39 (Golf Course Road) and west of Elm Street and County Road 50 in Monticello and Monticello Township in Wright County.

People south of US Highway 10, 137th Street Southeast and 140th Avenue (Sherburne Avenue) in the southern portion of Becker and Becker Township in Sherburne County.

Sub-Area 5N

County: Sherburne

Defined as the area within the following boundary: People in Becker and Becker Township in Sherburne County.

Sub-Area 5E

County: Sherburne

Defined as the area within the following boundary: People in Big Lake and Big Lake Township in Sherburne County.

Sub-Area 5S

County: Wright

Defined as the area within the following boundary: People north of County Road 106 (80th & 90th Streets) in the entire city of Monticello and all of Monticello Township in Wright County.

Sub-Area 5W

County: Wright

Defined as the area within the following boundary: People in Silver Creek Township and the northeast corner of Maple Lake Township in Wright County. This does include Lake Maria State Park.

Sub-Area 10N

County: Sherburne

Defined as the area within the following boundary: People south of County Road 16 (57th Street Southeast) and west of Hwy 48 in Santiago Township in Sherburne County. People east of County Road 53 and south of County Road 16 (57th Street Southeast) in Palmer Township in Sherburne County.

Sub-Area 10E

County: Sherburne

Defined as the area within the following boundary: People in the city of Orrock in Sherburne County. This area includes the Sand Dunes Game Refuge.

Sub-Area 10SE

County: Wright

Defined as the area within the following boundary: People west of County Road 19 in Otsego and Otsego Township in Wright County.

People west of County Road 19 and north of County Road 35 in St. Michael Township. This does not include downtown St. Michael or downtown Albertville.

Sub-Area 10S

County: Wright

Defined as the area within the following boundary: People north of Hwy 55, north of County Road 35, and west of Pelican Lake in the city of Buffalo and Buffalo Township, in Wright County.

Sub-Area 10SW

County: Wright

Defined as the area within the following boundary: People in Maple Lake Township and the city of Maple Lake in Wright County.

Sub-Area 10W

County: Wright

Defined as the area within the following boundary: People south of the Mississippi River, west of Elder Road, west of Gowan Ave NW, and east of Hwy 24, Ireland road and Illsley road in Clearwater Township and the city of Clearwater in Wright County.

People east of Ireland road and 91st street, east of Hwy 7 (south of County 39) and west of Gowan Ave NW in Corrina Township in Wright County.

Sub-Area 10NW

County: Sherburne

Defined as the area within the following boundary: People south and east of State Highway 24 and the Clear Lake city limits in Clear Lake Township in Sherburne County. This area DOES NOT INCLUDE the city of Clear Lake.

APPENDIX M

Evacuation Sensitivity Studies

M. EVACUATION SENSITIVITY STUDIES

This appendix presents the results of a series of sensitivity analyses. These analyses are designed to identify the sensitivity of the ETE to changes in some base evacuation conditions.

M.1 Effect of Changes in Trip Generation Times

A sensitivity study was performed to determine whether changes in the estimated trip generation time have an effect on the ETE for the entire EPZ. Specifically, if the tail of the mobilization distribution were truncated (i.e., if those who responded most slowly to the Advisory to Evacuate, could be persuaded to respond much more rapidly), how would the ETE be affected? The case considered was Scenario 6, Region 3; a winter, midweek, midday, good weather evacuation of the entire EPZ. Table M-1 presents the results of this study.

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

Trip Generation Period	Evacuation Time Estimate for Entire EPZ	
	90th Percentile	100th Percentile
3 Hours	2:25	3:20
3 Hours 30 Minutes	2:25	3:40
4 Hours (Base)	2:25	4:10

As discussed in Section 7.3, traffic congestion persists within the EPZ for about 3 hours and 15 minutes. As such, the ETE for the 100th percentile mirrors trip generation time after 3 hours and 15 minutes. The 90th percentile ETE is not sensitive to truncating the tail of the mobilization time distribution. The results indicate that programs to educate the public and encourage them toward faster responses for a radiological emergency, translate into shorter ETE at the 100th percentile. The results also justify the guidance to employ the [stable] 90th percentile ETE for protective action decision making.

M.2 Effect of Changes in the Number of People in the Shadow Region Who Relocate

A sensitivity study was conducted to determine the effect on ETE of changes in the percentage of people who decide to relocate from the Shadow Region. The case considered was Scenario 6, Region 3; a winter, midweek, midday, good weather evacuation for the entire EPZ. The movement of people in the Shadow Region has the potential to impede vehicles evacuating from an Evacuation Region within the EPZ. Refer to Sections 3.2 and 7.1 for additional information on population within the shadow region.

Table M-2 presents the evacuation time estimates for each of the cases considered. The results show that the ETE is not impacted by shadow evacuation from 0% to 20%. Tripling the shadow percentage increases the ETE by 20 minutes at the 90th percentile – a material change. Decreasing the shadow percentage to 13 percent, reflecting the telephone survey results presented in Appendix F, does not have an effect on ETE.

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

Percent Shadow Evacuation	Evacuating Shadow Vehicles	Evacuation Time Estimate for Entire EPZ	
		90th Percentile	100th Percentile
0	0	2:25	4:10
13	5,628	2:25	4:10
20 (Base)	8,658	2:25	4:10
60	25,974	2:45	4:10

M.3 Effect of Changes in EPZ Resident Population

A sensitivity study was conducted to determine the effect on ETE of changes in the resident population within the study area (EPZ plus Shadow Region). As population in the study area changes over time, the time required to evacuate the public may increase, decrease, or remain the same. Since the ETE is related to the demand to capacity ratio present within the study area, changes in population will cause the demand side of the equation to change. The sensitivity study was conducted using the following planning assumptions:

1. The percent change in population within the study area was varied between -90% and +50%. Changes in population were applied to permanent residents only (as per federal guidance), in both the EPZ area and in the Shadow Region.
2. The transportation infrastructure remained fixed; the presence of new roads or highway capacity improvements were not considered.
3. The study was performed for the 2-Mile Region (R01), the 5-Mile Region (R02) and the entire EPZ (R03).
4. The good weather scenario which yielded the highest ETE values was selected as the case to be considered in this sensitivity study (Scenario 1).

Table M-3 presents the results of the sensitivity study. Section IV of Appendix E to 10 CFR Part 50, and NUREG/CR-7002, Section 5.4, require licensees to provide an updated ETE analysis to the NRC when a population increase within the EPZ causes ETE values (for the 2-Mile Region, 5-Mile Region or entire EPZ) to increase by 25 percent or 30 minutes, whichever is less. Note that all of the base ETE values are greater than 2 hours; 25 percent of the base ETE is always greater than 30 minutes. Therefore, 30 minutes is the lesser and is the criterion for updating.

Those percent population changes which result in ETE changes greater than 30 minutes are highlighted in red below – a 50% increase in the EPZ population. It is highly unlikely that an updated ETE analysis will be required due to a decrease in population. According to Table M-3, with a 90% decrease in population, the ETE for the full EPZ decreases by only 20 minutes. Xcel Energy will have to estimate the EPZ population on an annual basis. If the EPZ population increases by 50% or more, an updated ETE analysis will be needed.

Table M-3. ETE Variation with Population Change

EPZ and Shadow Resident Population	Base	Population Change 30%	40%	50%	Base	Population Change -30%	-50%	-90%
	85,139	110,681	119,195	127,709	85,139	59,597	42,570	8,514
ETE for 90th Percentile								
Region	**Base**	**Population Change 30%**	**40%**	**50%**	**Base**	**Population Change -30%**	**-50%**	**-90%**
2-MILE	2:05	2:05	2:05	2:05	2:05	2:05	2:05	2:05
5-MILE	2:30	2:40	2:45	2:50	2:30	2:15	2:10	2:10
FULL EPZ	2:25	2:40	2:45	**2:55**	2:25	2:15	2:10	2:10
ETE for 100th Percentile								
Region	**Base**	**Population Change 30%**	**40%**	**50%**	**Base**	**Population Change -30%**	**-50%**	**-90%**
2-MILE	4:00	4:00	4:00	4:00	4:00	4:00	4:00	4:00
5-MILE	4:05	4:05	4:10	4:15	4:05	4:05	4:05	4:05
FULL EPZ	4:10	4:10	4:10	4:20	4:10	4:10	4:10	4:10

APPENDIX N

ETE Criteria Checklist

N. ETE CRITERIA CHECKLIST

Table N-1. ETE Review Criteria Checklist

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
1.0 Introduction		
a. The emergency planning zone (EPZ) and surrounding area should be described.	Yes	Section 1
b. A map should be included that identifies primary features of the site, including major roadways, significant topographical features, boundaries of counties, and population centers within the EPZ.	Yes	Figure 1-1, Figure 3-1, Figure 6-1
c. A comparison of the current and previous ETE should be provided and includes similar information as identified in Table 1-1, "ETE Comparison," of NUREG/CR-7002.	Yes	Table 1-3
1.1 Approach		
a. A discussion of the approach and level of detail obtained during the field survey of the roadway network should be provided.	Yes	Section 1.3
b. Sources of demographic data for schools, special facilities, large employers, and special events should be identified.	Yes	Sections 2.1, Section 3, Section 8
c. Discussion should be presented on use of traffic control plans in the analysis.	Yes	Section 1.3, Section 2.3, Section 9, Appendix G
d. Traffic simulation models used for the analyses should be identified by name and version.	Yes	Section 1.3, Table 1-3, Appendix B, Appendix C

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
e. Methods used to address data uncertainties should be described.	Yes	Section 3 – avoid double counting Section 5, Appendix F – 4.5% sampling error at 95% confidence interval for telephone survey
1.2 Assumptions		
a. The planning basis for the ETE includes the assumption that the evacuation should be ordered promptly and no early protective actions have been implemented.	Yes	Section 2.3 – Assumption 1 Section 5.1
b. Assumptions consistent with Table 1-2, "General Assumptions," of NUREG/CR-7002 should be provided and include the basis to support their use.	Yes	Sections 2.2, 2.3
1.3 Scenario Development		
a. The ten scenarios in Table 1-3, Evacuation Scenarios, should be developed for the ETE analysis, or a reason should be provided for use of other scenarios.	Yes	Table 2-1, Table 6-2
1.3.1 Staged Evacuation		
a. A discussion should be provided on the approach used in development of a staged evacuation.	Yes	Section 5.4.2, Section 7.2
1.4 Evacuation Planning Areas		
a. A map of EPZ with emergency response planning areas (ERPAs) should be included.	Yes	Figure 6-1
b. A table should be provided identifying the ERPAs considered for each ETE calculation by downwind direction in each sector.	Yes	Table 6-1, Table 7-5, Table H-1

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
c. A table similar to Table 1-4, "Evacuation Areas for a Staged Evacuation Keyhole," of NUREG/CR-7002 should be provided and includes the complete evacuation of the 2, 5, and 10 mile areas and for the 2 mile area/5 mile keyhole evacuations.	Yes	Table 6-1, Table 7-5, Table H-1
2.0 Demand Estimation		
a. Demand estimation should be developed for the four population groups, including permanent residents of the EPZ, transients, special facilities, and schools.	Yes	Permanent residents – Section 3 Employees, transients – Section 3, Appendix E Special facilities, schools – Section 8, Appendix E
2.1 Permanent Residents and Transient Population		
a. The US Census should be the source of the population values, or another credible source should be provided.	Yes	Section 3.1
b. Population values should be adjusted as necessary for growth to reflect population estimates to the year of the ETE.	Yes	2010 used as the base year for analysis.
c. A sector diagram should be included, similar to Figure 2-1, "Population by Sector," of NUREG/CR-7002, showing the population distribution for permanent residents.	Yes	Figure 3-2
2.1.1 Permanent Residents with Vehicles		
a. The persons per vehicle value should be between 1 and 2 or justification should be provided for other values.	Yes	1.97 persons per vehicle – Table 1-3
b. Major employers should be listed.	Yes	Appendix E – Table E-4

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
2.1.2 Transient Population		
a. A list of facilities which attract transient populations should be included, and peak and average attendance for these facilities should be listed. The source of information used to develop attendance values should be provided.	Yes	Sections 3.3, Section 3.4, Appendix E
b. The average population during the season should be used, itemized and totaled for each scenario.	Yes	Tables 3-4, 3-5 and Appendix E itemize the transient population and employee estimates. These estimates are multiplied by the scenario specific percentages provided in Table 6-3 to estimate transient population by scenario.
c. The percent of permanent residents assumed to be at facilities should be estimated.	Yes	Sections 3.3, 3.4
d. The number of people per vehicle should be provided. Numbers may vary by scenario, and if so, discussion on why values vary should be provided.	Yes	Sections 3.3, 3.4
e. A sector diagram should be included, similar to Figure 2-1 of NUREG/CR-7002, showing the population distribution for the transient population.	Yes	Figure 3-6 – transients Figure 3-8 – employees
2.2 Transit Dependent Permanent Residents		
a. The methodology used to determine the number of transit dependent residents should be discussed.	Yes	Section 8.1, Table 8-1
b. Transportation resources needed to evacuate this group should be quantified.	Yes	Section 8.1, Table 8-5, Table 8-10
c. The county/local evacuation plans for transit dependent residents should be used in the analysis.	Yes	Section 8.1, Section 8.4

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
d. The methodology used to determine the number of people with disabilities and those with access and functional needs who may need assistance and do not reside in special facilities should be provided. Data from local/county registration programs should be used in the estimate, but should not be the only set of data.	Yes	Section 8.5
e. Capacities should be provided for all types of transportation resources. Bus seating capacity of 50% should be used or justification should be provided for higher values.	Yes	Section 2.3 – Assumption 10 Section 3.5, Section 8.1, Section 8.2, Section 8.3
f. An estimate of this population should be provided and information should be provided that the existing registration programs were used in developing the estimate.	Yes	Table 8-1 – transit-dependents Section 8.4 – transit-dependents Section 8.5 – special needs
g. A summary table of the total number of buses, ambulances, or other transport needed to support evacuation should be provided and the quantification of resources should be detailed enough to assure double counting has not occurred.	Yes	Section 8.4 – page 8-6 Table 8-5, Section 8-3
2.3 Special Facility Residents		
a. A list of special facilities, including the type of facility, location, and average population should be provided. Special facility staff should be included in the total special facility population.	Yes	Appendix E - Table E-3, Table E-9 – list facilities, type, location, and population
b. A discussion should be provided on how special facility data was obtained.	Yes	Section 8.3, Section 3.5 – medical facilities Section 8.6 – correctional facility

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
c. The number of wheelchair and bed-bound individuals should be provided.	Yes	Section 8.3, Table 8-4, Table E-3
d. An estimate of the number and capacity of vehicles needed to support the evacuation of the facility should be provided.	Yes	Section 8.3, Section 8.6 Table 8-4, Table 8-5
e. The logistics for mobilizing specially trained staff (e.g., medical support or security support for prisons, jails, and other correctional facilities) should be discussed when appropriate.	Yes	Section 8.4 – medical facilities Wright County Jail – shelters-in-place
2.4 Schools		
a. A list of schools including name, location, student population, and transportation resources required to support the evacuation, should be provided. The source of this information should be provided.	Yes	Table 8-1 – Schools Table 8-2 - Daycares Section 8.2
b. Transportation resources for elementary and middle schools should be based on 100% of the school capacity.	Yes	Table 8-1, Table 8-2
c. The estimate of high school students who will use their personal vehicle to evacuate should be provided and a basis for the values used should be discussed.	Yes	Section 8.2
d. The need for return trips should be identified if necessary.	Yes	There are insufficient resources to evacuate schools and daycares in a single wave. Section 8.4 and Figure 8-1 discuss the potential for a multiple wave evacuation.

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
2.5.1 Special Events		
a. A complete list of special events should be provided and includes information on the population, estimated duration, and season of the event.	Yes	Section 3.7
b. The special event that encompasses the peak transient population should be analyzed in the ETE.	Yes	Section 3.7
c. The percent of permanent residents attending the event should be estimated.	Yes	Section 3.7
2.5.2 Shadow Evacuation		
a. A shadow evacuation of 20 percent should be included for areas outside the evacuation area extending to 15 miles from the NPP.	Yes	Section 2.2 – Assumption 5 Figure 2-1, Figure 7-1 Section 3.2
b. Population estimates for the shadow evacuation in the 10 to 15 mile area beyond the EPZ are provided by sector.	Yes	Section 3.2 Figure 3-4 Table 3-3
c. The loading of the shadow evacuation onto the roadway network should be consistent with the trip generation time generated for the permanent resident population.	Yes	Section 5 – Table 5-9
2.5.3 Background and Pass Through Traffic		
a. The volume of background traffic and pass through traffic is based on the average daytime traffic. Values may be reduced for nighttime scenarios.	Yes	Section 3.6, Section 6 Table 3-6, Table 6-3, Table 6-4

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
b. Pass through traffic is assumed to have stopped entering the EPZ about two hours after the initial notification.	Yes	Section 2.3 – Assumption 5 (offsite agencies indicated pass through traffic would be diverted within 2 hours) Section 3.6 Table 6-3 – External Through Traffic footnote
2.6 Summary of Demand Estimation		
a. A summary table should be provided that identifies the total populations and total vehicles used in analysis for permanent residents, transients, transit dependent residents, special facilities, schools, shadow population, and pass-through demand used in each scenario.	Yes	Table 3-7, Table 3-8
3.0 Roadway Capacity		
a. The method(s) used to assess roadway capacity should be discussed.	Yes	Section 4
3.1 Roadway Characteristics		
a. A field survey of key routes within the EPZ has been conducted.	Yes	Section 1.3, Appendix D
b. Information should be provided describing the extent of the survey, and types of information gathered and used in the analysis.	Yes	Section 1.3, Appendix D
c. A table similar to that in Appendix A, "Roadway Characteristics," of NUREG/CR-7002 should be provided.	Yes	Appendix K, Table K-1
d. Calculations for a representative roadway segment should be provided.	Yes	Section 4

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
e. A legible map of the roadway system that identifies node numbers and segments used to develop the ETE should be provided and should be similar to Figure 3-1, "Roadway Network Identifying Nodes and Segments," of NUREG/CR-7002.	Yes	Appendix K, Figures K-1 through K-42 present the entire link-node analysis network at a scale suitable to identify all links and nodes
3.2 Capacity Analysis		
a. The approach used to calculate the roadway capacity for the transportation network should be described in detail and identifies factors that should be expressly used in the modeling.	Yes	Section 4
b. The capacity analysis identifies where field information should be used in the ETE calculation.	Yes	Section 1.3, Section 4
3.3 Intersection Control		
a. A list of intersections should be provided that includes the total number of intersections modeled that are unsignalized, signalized, or manned by response personnel.	Yes	Appendix K, Table K-2
b. Characteristics for the 10 highest volume intersections within the EPZ are provided including the location, signal cycle length, and turn lane queue capacity.	Yes	Table J-1
c. Discussion should be provided on how signal cycle time is used in the calculations.	Yes	Section 4.1, Appendix C

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
3.4 Adverse Weather		
a. The adverse weather condition should be identified and the effects of adverse weather on mobilization time should be considered.	Yes	Table 2-1, Section 2.3 – Assumption 9 Mobilization time – Table 2-2, Section 5.3 (page 5-10)
b. The speed and capacity reduction factors identified in Table 3-1, "Weather Capacity Factors," of NUREG/CR-7002 should be used or a basis should be provided for other values.	Yes	Table 2-2 – based on HCM 2010. The factors provided in Table 3-1 of NUREG/CR-7002 are from HCM 2000.
c. The study identifies assumptions for snow removal on streets and driveways, when applicable.	Yes	Section 5.3 – page 5-10 Appendix F – Section F.3.3
4.0 Development of Evacuation Times		
4.1 Trip Generation Time		
a. The process used to develop trip generation times should be identified.	Yes	Section 5
b. When telephone surveys are used, the scope of the survey, area of survey, number of participants, and statistical relevance should be provided.	Yes	Appendix F
c. Data obtained from telephone surveys should be summarized.	Yes	Appendix F
d. The trip generation time for each population group should be developed from site specific information.	Yes	Section 5, Appendix F

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
4.1.1 Permanent Residents and Transient Population		
a. Permanent residents are assumed to evacuate from their homes but are not assumed to be at home at all times. Trip generation time includes the assumption that a percentage of residents will need to return home prior to evacuating.	Yes	Section 5 discusses trip generation for households with and without returning commuters. Table 6-3 presents the percentage of households with returning commuters and the percentage of households either without returning commuters or with no commuters. Appendix F presents the percent households who will await the return of commuters. Section 2.3, Assumption 3
b. Discussion should be provided on the time and method used to notify transients. The trip generation time discusses any difficulties notifying persons in hard to reach areas such as on lakes or in campgrounds.	Yes	Section 5.4.3
c. The trip generation time accounts for transients potentially returning to hotels prior to evacuating.	Yes	Section 5.4.3, Figure 5-1
d. Effect of public transportation resources used during special events where a large number of transients should be expected should be considered.	Yes	Section 3.7
e. The trip generation time for the transient population should be integrated and loaded onto the transportation network with the general public.	Yes	Section 5, Table 5-9

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
4.1.2 Transit Dependent Residents		
a. If available, existing plans and bus routes should be used in the ETE analysis. If new plans should be developed with the ETE, they have been agreed upon by the responsible authorities.	Yes	Section 8.4 – page 8-7 and 8-8. Pre-established bus routes do not exist. Basic bus routes were developed for the ETE analysis – see Figure 8-2, Table 8-10. State and local emergency agencies should review the ETE study including these prescribed routes.
b. Discussion should be included on the means of evacuating ambulatory and non-ambulatory residents.	Yes	Section 8.4, Section 8.5
c. The number, location, and availability of buses, and other resources needed to support the demand estimation should be provided.	Yes	Section 8.4, Table 8-5
d. Logistical details, such as the time to obtain buses, brief drivers, and initiate the bus route should be provided.	Yes	Section 8.4, Figure 8-1
e. Discussion should identify the time estimated for transit dependent residents to prepare and travel to a bus pickup point, and describes the expected means of travel to the pickup point.	Yes	Section 8.4, page 8-8
f. The number of bus stops and time needed to load passengers should be discussed.	Yes	Section 8.4
g. A map of bus routes should be included.	Yes	Figure 8-2
h. The trip generation time for non-ambulatory persons includes the time to mobilize ambulances or special vehicles, time to drive to the home of residents, loading time, and time to drive out of the EPZ should be provided.	Yes	Section 8.5

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
i. Information should be provided to supports analysis of return trips, if necessary.	Yes	Section 8.4 Figure 8-1 Tables 8-11 through 8-13
4.1.3 Special Facilities		
a. Information on evacuation logistics and mobilization times should be provided.	Yes	Section 8-4, Tables 8-14 through 8-16, Table 8-18
b. Discussion should be provided on the inbound and outbound speeds.	Yes	Section 8.4, Section 8.6
c. The number of wheelchair and bed-bound individuals should be provided, and the logistics of evacuating these residents should be discussed.	Yes	Section 8.4, Table 8-4, Tables 8-14 through 8-16
d. Time for loading of residents should be provided	Yes	Section 8.4, Section 8.6
e. Information should be provided that indicates whether the evacuation can be completed in a single trip or if additional trips should be needed.	Yes	Section 8.4 – pages 8-10 through 8-12 Table 8-5
f. If return trips should be needed, the destination of vehicles should be provided.	Yes	Section 8.4 – page 8-10 through 8-12
g. Discussion should be provided on whether special facility residents are expected to pass through the reception center prior to being evacuated to their final destination.	Yes	Section 8.4
h. Supporting information should be provided to quantify the time elements for the return trips.	Yes	Section 8.4 – pages 8-10 through 8-12

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
4.1.4 Schools		
a. Information on evacuation logistics and mobilization time should be provided.	Yes	Section 8.4, Tables 8-7 through 8-9
b. Discussion should be provided on the inbound and outbound speeds.	Yes	School bus routes are presented in Table 8-6. School bus speeds are presented in Tables 8-7 (good weather), 8-8 (rain) and 8-9 (snow). Section 8.4 discusses inbound and outbound speeds
c. Time for loading of students should be provided.	Yes	Tables 8-7 through 8-9, Discussion in Section 8.4
d. Information should be provided that indicates whether the evacuation can be completed in a single trip or if additional trips are needed.	Yes	Section 8.4 – page 8-6 through 8-7 Table 8-5
e. If return trips are needed, the destination of school buses should be provided.	Yes	Section 8.4 – page 8-6 through 8-8 Tables 8-7 through 8-9
f. If used, reception centers should be identified. Discussion should be provided on whether students are expected to pass through the reception center prior to being evacuated to their final destination.	Yes	Table 8-3. Students are evacuated to sister schools (reception centers for some daycares) where they will be picked up by parents or guardians.

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
g. Supporting information should be provided to quantify the time elements for the return trips.	Yes	Section 8-4 – page 8-7 through 8-8. Tables 8-7 through 8-9 provide time needed to arrive at sister school/reception center, which could be used to compute a second wave evacuation for each school and daycare
4.2 ETE Modeling		
a. General information about the model should be provided and demonstrates its use in ETE studies.	Yes	DYNEV II (Ver. 4.0.11.0). Section 1.3, Table 1-3, Appendix B, Appendix C
b. If a traffic simulation model is not used to conduct the ETE calculation, sufficient detail should be provided to validate the analytical approach used. All criteria elements should have been met, as appropriate.	No	Not applicable as a traffic simulation model was used
4.2.1 Traffic Simulation Model Input		
a. Traffic simulation model assumptions and a representative set of model inputs should be provided.	Yes	Appendix B and Appendix C describe the simulation model assumptions and algorithms Table J-2 – mode inputs
b. A glossary of terms should be provided for the key performance measures and parameters used in the analysis.	Yes	Appendix A Table C-1 Table C-2

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
4.2.2 Traffic Simulation Model Output		
a. A discussion regarding whether the traffic simulation model used must be in equilibration prior to calculating the ETE should be provided.	Yes	Appendix B
b. The minimum following model outputs should be provided to support review: 1. Total volume and percent by hour at each EPZ exit node. 2. Network wide average travel time. 3. Longest queue length for the 10 intersections with the highest traffic volume. 4. Total vehicles exiting the network. 5. A plot that provides both the mobilization curve and evacuation curve identifying the cumulative percentage of evacuees who have mobilized and exited the EPZ. 6. Average speed for each major evacuation route that exits the EPZ.	Yes	1. Table J-5. 2. Table J-3. 3. Table J-1. 4. Table J-3. 5. Figures J-1 through J-14 (one plot for each scenario considered). 6. Table J-4. Network wide average speed also provided in Table J-3.
c. Color coded roadway maps should be provided for various times (i.e., at 2, 4, 6 hrs., etc.) during a full EPZ evacuation scenario, identifying areas where long queues exist including level of service (LOS) "E" and LOS "F" conditions, if they occur.	Yes	Figures 7-3 through 7-9
4.3 Evacuation Time Estimates for the General Public		
a. The ETE should include the time to evacuate 90% and 100% of the total permanent resident and transient population	Yes	Table 7-1, Table 7-2

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
b. The ETE for 100% of the general public should include all members of the general public. Any reductions or truncated data should be explained.	Yes	Section 5.4 – truncating survey data to eliminate statistical outliers Table 7-2 – 100th percentile ETE for general public
c. Tables should be provided for the 90 and 100 percent ETEs similar to Table 4-3, "ETEs for Staged Evacuation Keyhole," of NUREG/CR-7002.	Yes	Table 7-3, Table 7-4
d. ETEs should be provided for the 100 percent evacuation of special facilities, transit dependent, and school populations.	Yes	Section 8.4 Tables 8-7 through 8-9 Tables 8-11 through 8-18
5.0 Other Considerations		
5.1 Development of Traffic Control Plans		
a. Information that responsible authorities have approved the traffic control plan used in the analysis should be provided.	Yes	Section 9, Appendix G
b. A discussion of adjustments or additions to the traffic control plan that affect the ETE should be provided.	Yes	Appendix G
5.2 Enhancements in Evacuation Time		
a. The results of assessments for improvement of evacuation time should be provided.	Yes	Appendix M
b. A statement or discussion regarding presentation of enhancements to local authorities should be provided.	Yes	Results of the ETE study were formally presented to local authorities at the final project meeting. Recommended enhancements were discussed.

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
5.3 State and Local Review		
a. A list of agencies contacted and the extent of interaction with these agencies should be discussed.	Yes	Table 1-1
b. Information should be provided on any unresolved issues that may affect the ETE.	Yes	There are no outstanding issues.
5.4 Reviews and Updates		
a. A discussion of when an updated ETE analysis is required to be performed and submitted to the NRC.	Yes	Appendix M, Section M.3
5.5 Reception Centers and Congregate Care Center		
a. A map of congregate care centers and reception centers should be provided.	Yes	Figure 10-1
b. If return trips are required, assumptions used to estimate return times for buses should be provided.	Yes	Section 8.3 discusses a multi-wave evacuation procedure. Figure 8-1
c. It should be clearly stated if it is assumed that passengers are left at the reception center and are taken by separate buses to the congregate care center.	Yes	Section 2.3 – Assumption 7h Section 10

Technical Reviewer _____ Date _____

Supervisory Review _____ Date _____

Enclosure 2

2012 Monticello Nuclear Generating Plant Evacuation Time Estimate Recommendations

(2 pages follow)

KLD ENGINEERING, P.C.

Memo

To: Amy Hass, Edward Weinkam

From: Brandon Allen

CC: Kevin Weinisch

Date: 11/28/12

Re: Recommendations Memo

As a result of the Monticello Nuclear Generating Plant Evacuation Time Estimate (ETE) study, KLD offers the following recommendations:

1. Examination of the general population ETE in Section 7 shows that the ETE for 100 percent of the population is generally 1 to 2 ½ hours longer than for 90 percent of the population. Specifically, the additional time needed for the last 10 percent of the population to evacuate can be as much as double the time needed to evacuate 90 percent of the population. This non-linearity reflects the fact that these relatively few stragglers require significantly more time to mobilize (i.e. prepare for the evacuation trip) than their neighbors. This leads to two recommendations:
    a. The public outreach (information) program should emphasize the need for evacuees to minimize the time needed to prepare to evacuate (secure the home, assemble needed clothes, medicines, etc.).
    b. The decision makers should reference Table 7-1 which list the time needed to evacuate 90 percent of the population, when preparing recommended protective actions, as per NUREG/CR-7002 guidance.
2. Staged evacuation is not beneficial because traffic congestion within the 5-mile region never extends upstream to the point where it creates an impedance to evacuees from within the 2-mile region. Staged evacuation also adversely impacts many evacuees located beyond the 2-mile region since they are forced to unnecessarily wait before they can start their evacuation trip.
3. The roadway impact scenario – a single lane eastbound on Interstate-94 from a location by MNGP (between exits 183 and 193) to the end of the analysis-network at the interchange with SR-101 (exit 207) – has a significant impact on ETE with increases of up to 45 minutes for both the 90th and 100th percentiles. State and local law enforcement could consider traffic management tactics such as re-routing of traffic along other evacuation routes to avoid overwhelming I-94. All efforts should be made to remove the blockage on I-94 as expeditiously as possible.

4. Counties should implement procedures whereby schools and daycares are contacted prior to dispatch of buses from the depots to get an accurate count of students needing transportation and the number of buses required (See Section 8).
5. Table 8-5 indicates that there are insufficient transportation resources to evacuate the transit-dependent population and special facility population within the EPZ in a single wave. A second wave is required to evacuate all students and staff at schools and daycares. Mobilization time for the evacuation of the transit-dependent population, ambulatory and wheelchair-bound persons residing in medical facilities and ambulatory and wheelchair-bound homebound special needs persons are dictated by when buses have returned to the EPZ after the first wave evacuation of schoolchildren has been completed. The second-wave ETE for transit-dependent population exceeds the general population ETE at the 90th percentile. See Sections 8.4 and 8.5.
6. Intelligent Transportation Systems (ITS) such as Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), Automated Traveler Information Systems (ATIS), etc. could be used to facilitate the evacuation process (See Section 9). The placement of additional signage should consider evacuation needs.
7. Counties/State could establish strategic locations to position tow trucks provided with gasoline containers in the event of a disabled vehicle during the evacuation process (see Section 11) and could encourage gas stations to remain open during the evacuation.
8. Counties/states could establish a system/procedure to confirm that the Advisory to Evacuate is being adhered to (see the approach suggested by KLD in Section 12). Should the approach recommended by KLD in Section 12 be used, consideration should be given to keep a list of telephone numbers within the EPZ in the Emergency Operations Center (EOC) at all times.