PMHarrisCOL PEmails

From: Edward Robinson
Sent: Thursday, March 05, 2009 1:59 PM
To: Diediker, Nona H
Cc: HarrisCOL Resource
Subject: Harris ETE
Attachments: Tracked Changes_Harris ETE.doc; Clean Copy_Harris ETE.doc

Call me and we can discuss and work out a revision due date. Will require some minor rework on your end, but overall looked good.

-Eddie

Edward W. Robinson
Nuclear Engineer
Office of Nuclear Security & Incident Response
U.S. Nuclear Regulatory Commission
301-415-1022

Hearing Identifier: ShearonHarris_COL_Public
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From: Edward Robinson

Created By: Edward.Robinson@nrc.gov

Recipients:
"HarrisCOL Resource" <HarrisCOL.Resource@nrc.gov>
Tracking Status: None
"Diediker, Nona H" <nona.diediker@pnl.gov>
Tracking Status: None

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13.3.1C.R Evacuation Time Estimate (ETE) Analysis

13.3.1C.R.1

The Shearon Harris Nuclear Power Plant Units 1, 2, and 3 (HNP) Emergency Response Plan (HNP Emergency Plan) includes an analysis of the time required to evacuate the plume exposure pathway emergency planning zone (EPZ) and for taking other protective actions for various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations. The report titled "Harris Nuclear Plant Development of Evacuation Time Estimates," dated August 2007 (ETE Report) was provided as a separate document in the COL application. The ETE Report and the associated RAI responses provide the basis for the following discussion and analyses.

The staff reviewed the ETE Report against current NRC requirements and guidance and for consistency with other parts of the COL Application, including the Final Safety Analysis Report (FSAR). Citations in the report were verified by comparison to the cited document text. General descriptions of the HNP region, population, and highways were verified using internet searches and aerial photographs.

13.3.1B.R.1 Regulatory Basis for the ETE Analysis

The staff considered the following regulatory requirements and guidance in the review of the evacuation time estimate analysis:

[**10 CFR 52.79(a)(21) refers to Appendix E to 10 CFR 50**] Section IV. “Content of Emergency Plans,” of Appendix E to 10 CFR 50 requires that the nuclear power reactor operating license applicant provide an analysis of the time required to evacuate and for taking other protective actions for various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations.

The staff evaluated the ETE Report against Appendix 4, “Evacuation Time Estimates within the Plume Exposure Pathway Emergency Planning Zone,” to NUREG-0654/FEMA-REP-1. Appendix 4 contains detailed guidance that the staff used in determining whether the ETE analysis meets the applicable regulatory requirements in Appendix E to 10 CFR 50.

13.3.1B.R.2 Introductory Materials [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.I]

13.3.1B.R.2.1 Technical Information in Introductory Materials

Section 1, "Introduction," of the ETE Report provides an overview of the process used to estimate the ETE and presents a comparison to a 2002 ETE study conducted for the plant. A description, including a map (Figure 1-1, "Harris Nuclear Plan Site Location"), of the EPZ and surrounding area was provided. Additional information regarding provision of a map which identifies topographical features, including elevations, was requested in **RAI 13.03-04**. In response letter dated November 17, 2008, page 9, the applicant explained that the reference to topographical features in NUREG 0654 was interpreted as those features that could affect evacuation planning, not actual elevations which would be depicted as topographic contours. ~~The staff finds the clarification provided in the applicant’s response to **RAI 13.03-04** acceptable and therefore **resolved**.~~

The study estimates and assumptions of the ETE are provided in Section 2, “Study Estimates and Assumptions,” of the report. Population estimates in the ETE were based on data from the 2000 US census projected to the year 2007. County-specific growth-

rate projections were estimated by comparing 2000 census data and 2005 census estimates. County emergency management officials provided employment data that was used to estimate the population of employees who commute into the EPZ to work. County emergency management offices also provided information that was used to estimate special facilities populations.

Roadway capacity estimates are based on field surveys and application of Highway Capacity Manual 2000 published by the Transportation Research Board of the National Research Council (Highway Capacity Manual). Population mobilization times are based on a statistical analysis of data acquired from a telephone survey, as is the relationship between resident population and evacuating vehicles (vehicle occupancy factors). Those without access to private vehicles will be transported in waves to reception centers by county busses, with 50% sharing rides with family, neighbors, and friends. The analysis included elements such as voluntary evacuation of people within the EPZ but outside of regions for which evacuation is occurring, and "shadow" evacuations of people outside of the EPZ, when computing the ETE. These two evacuation elements are generally considered as a potential impediment to overall evacuation. The assumptions on evacuation were based on simultaneous evacuation of inner and outer sectors.

Additional assumptions regarding the development of population estimates, including pass-through populations and regional employees, are provided in Section 3, "Demand Estimation," and Appendix E, "Special Facility Data." Assumptions regarding transit-dependent and special populations are in Section 8, "Transit-Dependent and Special Facility Evacuation Time Estimates." Development of trip generation times from survey responses is described in Section 5, "Estimation of Trip Generation Time."

An outline of the approach for estimating the time to evacuate is presented in Section 1, with a link-node map (Figure 1-2, "Harris Link-node Analysis Network") of the evacuation routes that was developed for the analyses. **RAI 13.03-41** requested that the map be revised to include annotation of the nodes (numbered in some manner) to support the review and that a roadway map be provided that includes sector and quadrant boundaries. In response letter dated November 17, 2008, page 80, the applicant provided an updated PDF file of Figure 1-2. ~~The revised figure provides the information that was requested in the RAI, thus the staff finds the response to **RAI 13.03-41** acceptable and therefore **resolved**.~~

Further details on the methodology are provided in Section 3, Section 4, "Estimation of Highway Capacity," Section 5, and Section 6, "Demand Estimation for Evacuation Scenarios," as well as in Appendix C, "Traffic Simulation Model: PC-DYNEV," and Appendix D, "Detailed Description of Study Procedure." Details of the link-node map are presented in Appendix K, "Evacuation Roadway Network Characteristics."

A total of 12 "Scenarios" representing different seasons, time of day, day of week and weather were considered in the analysis. The analysis included one special event scenario: the construction period of a new nuclear plant using peak workforce population projections for proposed units 2 and 3. In **RAI 13.03-21(a, b, c, d)**, the staff requested additional information as to why no peak tourist events were considered as a special scenario (specifically Peak Fest, which is held every May) and for an explanation of resources used to determine special events. In response to **RAI 13.03-21(a, b, c, d)** in letter dated November 17, 2008, page 42, the applicant provided clarification regarding designating new plant construction as a special event, justification for their determination of special events, and justification for their determination of special events. In response

to **RAI 13.03-21(c)** the applicant acknowledged the large attendance at the Peak Fest and will include a sensitivity study of the festival in Appendix I of the revised ETE Report. ~~**Confirmatory Action NRC 13.03-01** was created to track this revision. Until the NRC staff receives and reviews the study referenced in response **RAI 13.03-21(c)** regarding the impact of Peak Fest on the evacuation time estimate, this issue is **Open Item 13.03-01**.~~

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13.3.1B.R.2.2 Technical Evaluation of Introductory Materials

The ETE Report describes the method of analyzing the evacuation times. A general description of the evacuation model was provided including the assumptions used in the evacuation time estimate analysis.

The ETE Report includes a map showing the proposed site and plume exposure pathway EPZ, as well as transportation networks, topographical features, and political boundaries. The boundaries of the EPZ, in addition to the evacuation subareas within the EPZ, are based on factors such as current and projected demography, topography, land characteristics, access routes, and jurisdictional boundaries.

The ETE Report describes the method of analyzing the evacuation times. A general description of the IDYNEV modeling system was provided. The IDYNEV system consists of several sub-models: a macroscopic traffic simulation model, an intersection capacity model, and 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 traffic assignment and distribution model, which 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.

The staff finds the responses provided by the applicant pertaining to **RAIs 13.03-04, 13.03-41, and RAI 13.03-21 (a,b, and d)** to be acceptable and therefore **resolved**. In response to **RAI 13.03-21(c)**, the applicant acknowledged the large attendance at the Peak Fest and stated that a sensitivity study of the festival in Appendix I will be included in the revised ETE Report. This issue was identified by the staff as **Confirmatory Action NRC 13.03-01.**

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~~**RAI 13.03-04** ask for a detailed map of the EPZ which identifies topographical features including elevations. In response, the applicant explained the reasoning for not including topographic contours on the maps within the ETE report. **RAI 13.03-41** requested the applicant provide a map that includes annotated nodes and sector and quadrant boundaries. The applicant provided a PDF file of Figure 1-2 with the features as requested in the RAI. The staff finds the responses provided by the applicant pertaining to **RAIs 13.03-04,** and **13.03-41, and RAI 13.03-21 (a,b, and d)** to be acceptable and therefore **resolved**.~~Furthermore,

~~**RAI 13.03-21(a, b, c, d)** ask for clarification regarding the assumptions related to special and peak tourist events and ask why the ETE report did not consider Peak Fest in its analysis. In response the applicant provided clarification regarding designating new plant construction as a special event and justification for their determination of special events. In response to **RAI 13.03-21(c)** the applicant acknowledged the large attendance at the Peak Fest and will include a sensitivity study of the festival in Appendix I of the revised ETE Report. T~~the ~~applicant was~~staff requested ~~requested~~that the applicant~~d to explain~~discuss the impact, if any, that the additional information

referenced in the response to RAI 13.03-21(c) regarding the Peak Fest would have on the Evacuation Time Estimate study.~~Until the NRC staff receives and reviews the additional information referenced in the response to **RAI 13.03-21(c)** regarding impact of Peak Fest on the evacuation time estimate, t~~ This issue ~~is~~ has been identified by the staff as **Open Item 13.03-01**.

13.3.1B.R.3 Demand Estimation [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.II]

13.3.1B.R.3.1 Technical Information Related to Demand Estimation

Section 3 of the ETE Report provides an estimate of the number of people who could need to be evacuated in an event. The populations considered in this section include residents, employees, transients, and medical facilities. Appendix E provides separate tables for schools, day care facilities, medical and assisted living facilities, major employers, recreational areas, and lodging located within the EPZ. (A separate analysis for transit-dependent and special facility populations is contained in Section 8.) Employees who work within the EPZ but who live outside of the EPZ and commute to jobs within the EPZ are assumed to evacuate along with the permanent resident population. Other transient groups include visitors to local recreational areas, shopping centers, and parks, and those residing in non-permanent residential units (e.g., hotels, apartments, campgrounds). Vehicles traveling through the EPZ (external-external trips) at the time of an event are assumed to continue to enter the EPZ during the first 60 minutes. Subsequently, no "pass-through" vehicles will likely enter the EPZ and those remaining evacuate with the residents and other transients. Figures summarizing the various population groups are provided in the ETE in the format suggested by NUREG-0654 Appendix A. **RAI 13.03-1(a, b, c, d)** requested information regarding the population estimates. Additional information was requested in **RAI 13.03-1(a)** regarding the differences in population numbers between the ETE Report and the Environmental Report (ER) and FSAR. The applicant provided clarification in a letter dated November 17, 2008, page 4, on the different methodologies used in the ETE Report and the ER and FSAR to determine the population numbers. Because different population estimate methodologies were used for the stated documents, there are variations in the population numbers. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-1(a)** acceptable and therefore **resolved**.~~

RAI 13.03-1(b) ask for clarification if migrant workers were considered in the ETE transient population estimates because migrant workers had been addressed in the ER and FSAR, but not specifically mentioned in the ETE Report. The applicant responded in letter dated November 17, 2008, page 5 that the four EPZ county plans were reviewed and none of them mentioned a migrant worker population. The response further stated the during the road survey conducted for the ETE analysis, no major farms were observed. Therefore, they did not include migrant workers in the transient population estimates. Through further Staff review of the ER and FSAR, it was discovered that these two documents derived their migrant worker population estimates by using the state average provided in the USDA 2002 Census of Agriculture for North Carolina rather than from actual known populations identified within the vicinity of HNP. Staff review of the county-specific data found the 2002 census indicated very low migrant worker populations for Wake (101), Chatham (4), Harnett (61), and Lee (21) Counties. ~~Given that these numbers represent the entire migrant population within each county and the EPZ for HNP covers only portions of each county, observations made during the~~

~~road survey, and lack of mention of migrant worker populations in any of the county plans, the response for **RAI 13.03(b)** is acceptable and therefore **resolved**.~~

The transient populations identified within the HPN EPZ included users of Jordan Lake State Recreation Area and Harris Lake facilities with a total peak use estimate of 14,254 persons. In addition, there are three major hotels and three bed and breakfasts with a total capacity of 472 people. Therefore the entire transient population at peak use is estimated to be 14,726.

RAI 13.03-1(c) ask the applicant to describe the provisions for updating the ETE to account for population growth and changes in infrastructure in the EPZ over the life of the HNP. The response letter dated November 17, 2008, page 5, stated that the ETE analysis will remain valid until the population within the EPZ increases by greater than 10% and that an ETE update should be performed every five years to ensure the adequacy of other evacuation assumptions. ~~The staff finds the information provided in the applicant's response to **RAI 13.03-1(c)** acceptable and therefore **resolved**.~~

Section 3 contains a discussion of the special event scenario for peak construction in the year 2016. **RAI 13.03-1(d)** ask for clarification of the specific populations considered in this scenario and if different from those used in the 2007 scenarios, how comparison of the 2007 and 2016 provides meaningful information. The response to **RAI 13.03-1(d)** submitted by the applicant in letter dated January 8, 2009, page 4, provides detailed and sufficient information to assess the specific populations used in an updated 2016 scenario. The applicant indicates the information provided in the response will be added to the ETE Report and that Tables 6-4, 7-1 and J-1 will be updated accordingly in the revised Report. **Confirmatory Action NRC 13.03-~~01~~ 02** was created to track these revisions.

Figures 3-2, "Permanent Residents by Sector," and 3-3, "Permanent Resident Vehicles by Sector," both contain a note: "3 Miles to EPZ Boundary." (The note also appears on Figures 3-4, 3-5, 3-6, and 3-7.) **RAI 13.03-13** ask for clarification as to the meaning of the note as it was not evident from the figures themselves. In response dated November 17, 2008, page 27, the applicant explained the notation referred to the main body of the figure showing the detailed population from a distance of 3 miles to the EPZ boundary, hence the notation. ~~Staff found the explanation to be adequate and therefore **RAI 13.03-13** is **resolved**.~~

Employees who work within the EPZ, but who live outside of the EPZ and commute to jobs within the EPZ, are assumed to evacuate along with the permanent resident population. In **RAI 13.03-16**, the staff requested clarification of discrepancies in commuter values presented on page 8-3 versus the values presented in Table 6-3, "Percent of Population Groups for Various Scenarios." In response dated November 17, 2008, page 31, the applicant stated that a zip code was overlooked during the telephone survey and that revisions to Section 8 of the ETE Report will be made to reflect results from the telephone survey. In response to **RAI 13.03-16** the applicant provided a revised Table 6-3 which reflects consistent demographic statistics as those presented in Section 8 and Appendix F. As a result of extending the survey to include an overlooked zip code, the applicant will modify text and tables within Section 8 to reflect updated demographic statistics. **Confirmatory Action NRC 13.03-~~02~~ 03** was created to track

these revisions. **RAI 13.03-14** questioned why the employee values used in Table 6-3 for the various summer scenarios are reduced considering the large number of campsites and recreational areas identified in Section 3 of the Report. In response dated November 17, 2008, page 28, the applicant provided a sufficient explanation of the reasoning for the values presented including a rough estimate of the reduction of employees due to summer vacations. ~~The staff finds the explanation provided in the applicant's response to **RAI 13.03-14** acceptable and therefore **resolved**.~~ **RAI 13.03-22** questioned the basis for such a small number of employees estimated to work within the EPZ. In response letter dated November 17, 2008, page 44, the applicant explained that many residents travel outside of the EPZ to work. Based on the telephone survey, only 23% of the employed EPZ residents work within the EPZ. The response also described the methodology used to estimate the number of employees commuting into the EPZ. ~~The staff found the reasoning provided by the applicant in response to **RAI 13.03-22** adequate and therefore **resolved**.~~

RAI 13.03-10 requested a clarification on Table 6-4, "Vehicle Estimates by Scenario," regarding what data the table represents. In response dated November 17, 2008, page 21, the applicant clarified that Table 6-4 represents a 100% evacuation of the entire EPZ. In response to **RAI 13.03-10**, the applicant will make changes within Sections 3, 6, 7, and Appendix J to reflect changes in vehicle estimates. **Confirmatory Action NRC 13.03-~~03~~ 04** was created to track these revisions. **RAI 13.03-45(a)** ask the applicant to provide the assumption with regard to trip generation times and loading of the network for the shadow evacuation values used in Table 6-4. The applicant stated in response dated November 17, 2008, page 87, that the shadow vehicles are loaded on the transportation network using the same trip generation times as EPZ residents with Commuters – Distribution C in Table 5-1. ~~The response is considered adequate and therefore **RAI 13.03-45(a) resolved**.~~ **RAI 13.03-45(b)** requested in explanation as to how the 30% increase of vehicles depicted in Table I-2 of Appendix I was distributed through the EPZ. In response dated November 17, 2008, page 87, the applicant provided clarification regarding the shadow evacuation methodology used in the model. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-45(b)** acceptable and therefore **resolved**.~~ Staff requested in **RAI 13.03-47** that the applicant discuss allocation of the voluntary evacuation population within Table 6-3. The applicant clarified in response letter dated November 17, 2008, page 90, that Tables 6-3 and 6-4 represent an evacuation of the full EPZ and do not address voluntary evacuations. The response to **RAI 13.03-47** included a new table: Table H-1, "Percent of Sub-Zone Population Evacuating for Each Region" which will be provided in Appendix H of the revised ETE. **Confirmatory Action NRC 13.03-~~04~~ 05** was created to track this revision.

Section 8 of the ETE report includes separate calculations for special populations and transit-dependent individuals. The transit-dependent population considered included residents, employees, and transients that do not have a vehicle available, persons in households that do have vehicles that would not be available at the time the evacuation is ordered, and residents of special facilities such as schools, hospitals, and day cares. Telephone survey results (reported in Appendix F) were used to estimate the portion of the population requiring transit service. The study assumed that half of the transit-dependent people would ride-share with others, but that as indicated in Table 8-1, "Transit Dependent Population Estimates," a residual 1,645 persons would require about 55 buses for evacuation. Based on staff review, it appears that in Table 8-1 only residents were factored into those needing transit. Therefore, **RAI 13.03-23** requested

the applicant discuss if employees and transients are expected to need transit service. In response dated November 17, 2008, page 47, the applicant stated the lack of mass transit service in the area indicates virtually all transients and employees will have private vehicles available. In response to **RAI 13.03-23**, the applicant will revise the language of item 1 in the first paragraph of page 8-1 to read "(1) residents with no vehicles available; and" in the revised report. **Confirmatory Action NRC 13.03-~~05~~ 06** was created to track this revision. Results of the ETE for transit vehicles is provided for both good weather and adverse weather conditions, including an ETE for a "second wave" of buses needed along the more populous evacuation routes.

Special populations are discussed in detail in Appendix E, "Special Facility Data." The appendix includes special facility population information for schools, day care facilities, medical and assisted living facilities, and major employers. According to ETE Report Table 8-2, "School Population Demand Estimates," there are 21 schools in Wake County and one school in Chatham County. Based on Staff review of available data, it appeared that there may be schools within the EPZ that were not included in the ETE analysis. **RAI 13.03-25** lists eight schools that appear to be located within the EPZ but were not included in Appendix E or Table 8-2, and requested the applicant to verify if they are within the EPZ and if so, the affect the schools may have on the ETE. In the response letter dated November 17, 2008, page 49, the applicant provided a map showing the schools in question are outside the EPZ boundary. ~~The clarification provided by the applicant in response to **RAI 13.03-25** was found by staff to be acceptable and therefore the RAI is **resolved**.~~ **RAI 13.03-26(a, b, c)** stated that student populations shown in Table 8-2 differ from published values and ask for a discussion of the resources used to identify the school populations, if the larger student populations should be included in the special facility transit demand analysis and to provide information to support the evacuation time for the additional students. In response dated November 17, 2008, page 51, the applicant verified that school enrollment had increased by 9% since 2004-2005. The applicant identified that this increase would constitute the need for 26 more buses, and stated that it would not affect the ETEs for schools or the general population. ~~Although staff found the applicant's response to **RAI 13.03-26(a, b, c)** acceptable, Table 8-2 should be revised to reflect enrollment and bus demands for 2007-2008, therefore revision of the table is tracked as **Open Item 13.03-02**.~~

RAIs 13.03-27(a, b, c) requested information to support the data provided in Table 8-2. The issues were generally related to the number of buses required for evacuation of all schools simultaneously and driver availability. The applicant responded in letter dated November 17, 2008, page 54, that the counties had indicated sufficient bus and driver resources were available to evacuate all schools in a single wave. ~~**The staff found the reasoning provided by the applicant in response to RAI 13.03-27(a, b, c) acceptable and therefore resolved.**~~ **RAI 13.03-28** ask the applicant to clarify the estimate of the buses needed and whether or not teachers were included as part of the school population to be evacuated. In the response dated November 17, 2008, page 56, the applicant assumed one teacher per bus and recognized that the rounding down of buses in Table 8-2 did not match the data used for inputs in to the DYNEV model, provided with the response as Table 1, "Harris EPZ – School Bus Loading". As a result of the response to **RAI 13.03-28**, Table 8-2 will be revised to reflect the number of school buses input into the model as depicted in Table 1 of the response. **Confirmatory Action NRC 13.03-~~06~~ 07** was created to track this revision.

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According to Appendix E, there are 45 day care centers in Wake County; however, the appendix does not provide complete data regarding the current enrollment or employee numbers. The main text of the ETE does not specifically address the day care populations or their evacuation. **RAI 13.03-03** ask the applicant to discuss how the evacuation of day care children was addressed in the ETE analysis. In letter response dated November 17, 2008, page 8, the applicant stated that it was assumed daycare children are picked up by their parents and that the activity was accounted for in the mobilization times for residents. In response to **RAI 13.03-03**, the applicant will make changes to Section 8.2 of the revised ETE Report to discuss day care centers. **Confirmatory Action NRC 13.03-~~07~~ 08** was created to track this revision. In addition, **RAI 13.03-32** requested that a map be provided to indicate the location of special facilities (schools, day care, or medical) within the EPZ. In response letter dated November 17, 2008, page 65, the applicant provided three new figures that indicate the locations of these facilities: Figure E-1, "Schools within the Harris EPZ," Figure E-2, "Daycare Facilities within the Harris EPZ," and Figure E-3, "Medical Facilities within the Harris EPZ." In response to **RAI 13.03-32**, the applicant will include the new maps within Appendix E of the revised ETE Report. **Confirmatory Action NRC 13.03-~~08~~ 09** was created to track these revisions.

It was not clear if Table 8-1, "Transit Dependent Population Estimates," included individuals with special needs. **RAI 13.03-15** requested the applicant discuss whether data from registration cards was used in the ETE calculation for transit-dependent persons. The response submitted by the applicant in letter dated January 8, 2009, page 11, provided detailed information regarding recent communication with the counties concerning registered the homebound special needs population within the EPZ and sufficient information to assess the ETE of the transit dependent population. The applicant indicates the information provided in the response to **RAI 13.03-15** will be added to the ETE study on page 8-9 under a new subheading titled "Special Needs population". **Confirmatory Action NRC 13.03-~~09~~ 10** was created to track these revisions.

There are 27 medical and assisted living facilities in Wake County and one in Lee County found within the EPZ with capacity of 775 residents (current census is 597 residents) and approximately 500 staff. There are no correctional facilities within the EPZ boundaries. Table 8-4, "Special Facility Transit Demand," indicates that 23 ambulance runs are required. However, the table does not include current census information for six of the 27 facilities. **RAI 13.03-31(a, b, c)** ask the applicant to address ambulance needs based on capacity rather than census and identify assumptions used to determine sufficient ambulance availability. In the response letter dated November 17, 2008, page 63, the applicant provided justification regarding their assumptions for ambulance demand for special facilities. The applicant provided justification for their assumption that the special facility evacuation can be accomplished in a single wave, but also provided details regarding the special facility ETE for a second wave, if needed. The applicant stated that not all residents of a facility would require ambulance transportation. Based on available data, approximately 6.4% of facility occupants are bedridden. The ambulance needs for those facilities that could not be documented were projected based on the provided data. In response to **RAI 13.03-31(a, b, c)**, Table 8-4 will be revised to reflect ambulance demand for all special facilities and the special facilities discussion in Section 8.3 will be revised accordingly. **Confirmatory Action NRC 13.03-~~10~~ 11** was created to track these revisions.

RAI 13.03-19(a, b, c, d) requested clarification regarding the methodology used to determine the actual number of transit-dependent persons requiring bus service. In response, the applicant explained the reasoning for full bus capacity, timing between bus runs and explained actions that would be taken if buses did catch up with one another, and for the number of waves needed for the transit dependent evacuation. ~~Staff finds the responses provided for each item of **RAI 13.03-19(a, b, c, d)** are adequate and therefore **resolved**.~~

Page 3-17 of the ETE Report discusses the "pass-through" demand of vehicles entering the EPZ during an evacuation. **RAI 13.03-44** ask that the applicant provide the basis for the estimated 8,100 pass-through (external to external) trips and how it relates to the background traffic already on the roadway network. In response letter dated November 17, 2008, page 85, the applicant provided clarification regarding flow rates used in the ETE as well as background traffic assumed on the roadway when the evacuation begins. Based on the clarification provided in response to **RAI 13.03-44** the applicant further stated the following changes will be made to the revised ETE report:

> Page 3-17, change "60 minutes" to "90 minutes" in the final paragraph
> Page 3-17, change "8,100 vehicles" to "12,150 vehicles."

Confirmatory Action NRC 13.03-~~11~~ 12 was created to track these revisions.

Figures summarizing the various population groups are provided in the ETE Report in the format suggested in Appendix 4, "Evacuation Time Estimates within the Plume Exposure Pathway Emergency Planning Zone," of NUREG-0654/FEMA-REP-1. The figures include: Figure 3-2, "Permanent Residents by Sector," Figure 3-3, "Permanent Resident Vehicles by Sector," Figure 3-4, "Transient Population by Sector," Figure 3-5, "Transient Vehicles by Sector," Figure 3-6, "Employee Population by Sector," and Figure 3-7, "Employee Vehicles by Sector."

13.3.1B.R.3.2 Technical Evaluation of Information Related to Demand Estimation

The ETE Report provides an estimate of the number of people who may need to evacuate. Three population segments are considered: permanent residents, transients, and persons in special facilities. The permanent population is adjusted for growth, and the population data is translated into two groups: those using automobiles and those without automobiles. The number of vehicles used by permanent residents is estimated using an appropriate automobile occupancy factor. In addition, evacuation time estimates for simultaneous evacuation of the entire plume exposure pathway EPZ were determined.

Estimates of transient populations are developed using local data including peak tourist volumes and employment data. Estimates for special facility populations (schools, medical care, and day care) are also provided.

The subareas, for which evacuation time estimates were determined, encompass the entire area within the plume exposure EPZ. The maps are generally adequate for the purpose, and the level of detail is approximately the same as United States Geological Survey (USGS) quadrant maps. The assumptions on evacuation are based on simultaneous evacuation of inner and outer sectors.

~~**RAI 13.03-01(a)** requested additional information regarding the differences in population numbers between the ETE Report and the ER and FSAR. The applicant provided clarification on the different methodologies used in the reports thus resulting in variations~~

~~in population projections. **RAI 13.03-01(b)** ask for clarification if migrant workers were considered in the ETE transient population estimates. The applicant stated that migrant workers not considered due to the lack of inclusion in county plans or a visual presence within the EPZ. Staff conducted additional review of the 2002 Agriculture Census and found the applicant's assertions to be reasonable. **In RAI 13.03-01(c)** staff requested the applicant describe the provisions for updating the ETE to account for population growth and changes within the EPZ over the life of the HNP. The applicant stated the ETE analysis will remain valid until the population increases by greater than 10% and that an update should be performed every five years to ensure adequacy of other evacuation assumptions. **RAI 13.03-13** ask for clarification as to the meaning of the note "3 Miles to EPZ Boundary" as it appears in Figures 3-2, 3-3, 3-4, 3-5, 3-6, and 3-7 of the ETE Report. The applicant explained the notation referred to the main body of the figure showing population from a distance of 3 miles to the EPZ boundary. **RAI 13.03-14** questioned the employee values used in Table 6-3 for summer scenarios considering the number of campsites and recreational areas in the EPZ. The applicant provided an explanation of the reasoning behind the values used including a rough estimate of the reduction of employees due to summer vacations. **RAI 13.03-22** questioned the basis for the small number of employees estimated to work within the EPZ. The applicant provided justification for the employee estimates. **RAI 13.03-45(a)** and **13.03-45(b)** ask the applicant to provide information regarding shadow evacuation assumptions and trip generation times. The applicant provided clarification regarding the shadow evacuation methodology used in the model. **RAI 13.03-25** requested the applicant to verify the schools that are located within the EPZ based on additional schools identified by staff. In its response, the applicant provided a map showing the schools in questions are outside of the EPZ boundary. **RAI 13.03-27(a, b, c)** requested information to support the data provided in Table 8-2 regarding school bus demand on driver availability. The applicant responded that the counties had indicated that sufficient bus and driver resources are available to evacuate all schools simultaneously. **RAI 13.03-19(a, b, c, d)** requested clarification regarding the methodology used to determine the actual number of transit-dependent persons requiring bus service. In response to this RAI, the applicant provided the assumptions and reasoning that was used to estimate the needs of the transit-dependent population.~~

The staff finds the clarifications provided by the applicant pertaining to the following **RAIs: 13.03-01(a, b, c), 13.03-13, 13.03-14, 13.03-22, 13.03-45 (a, b), 13.03-25, 13.03-27(a, b, c), and 13.03-19(a, b, c, d)** to be acceptable and therefore **resolved**.

[Insert a brief summary for each Confirmatory Action explaining the commitment that the applicant has made to the staff. Make reference to the original RAI number rather than re-stating the original RAI question. Look at the Technical Evaluation portion of the "Introductory Materials" and the latest guidance document for additional details]

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~~**RAI 13.03-01(d)** requested clarification of the specific populations considered in the special event scenario presented in Section 3. In response the applicant states they will revise discussion of construction scenario on page 3-2 of the ETE Report to indicate that all vehicles were extrapolated to 2016, with the exception of external traffic and Table 6-4 will be updated. The applicant will rerun construction ETE cases and update Tables 7-1 and J-1 accordingly. This issue is **Confirmatory Action NRC 13.03-01**.~~

~~**RAI 13.03-16** requested clarification of discrepancies in commuter values presented in Table 6-3 and on page 8-3. In response the applicant will make revisions to Section 8 of~~

the ETE report to reflect results from the telephone survey. The applicant provided a revised Table 6-3 which reflects consistent demographic statistics as those presented in Section 8 and Appendix F. As a result of extending the survey to include an overlooked zip code, the applicant will modify text and tables within Section 8 to reflect updated demographic statistics. This issue is **Confirmatory Action NRC 13.03-02**.

RAI 13.03-10 requested a clarification on Table 6-4 regarding what data the table represents. In response the applicant clarified that Table 6-4 represents a 100% evacuation of the entire EPZ. The applicant will make changes within Sections 3, 6, 7, and Appendix J to reflect changes in vehicle estimates. This issue is **Confirmatory Action NRC 13.03-03**.

RAI 13.03-47 requested that the applicant discuss allocation of the voluntary evacuation population within Table 6-3. In response the applicant will provided a new table that will be included in Appendix H of the revised ETE report that will identify the voluntary evacuation percentages per sub-zone. This issue is **Confirmatory Action NRC 13.03-04**.

RAI 13.03-23 requested the applicant discuss if employees and transients are expected to need transit service. In response, the applicant will revise item 1 in the first paragraph of page 8-1 to read "(1) residents with no vehicles available; and" in the revised ETE Report. This issue is **Confirmatory Action NRC 13.03-05**.

RAI 13.03-28 ask the applicant to clarify the estimate of the buses needed and whether or not teachers were included as part of the school population to be evacuated. In response, the applicant will revise Table 8-2 to reflect the number of buses input into the model as depicted in Table 1 of the response. This issue is **Confirmatory Action NRC 13.03-06**.

RAI 13.03-03 ask the applicant to discuss how the evacuation of day care children was addressed in the ETE analysis. In response the applicant will make changes to Section 8.2 of the ETE report to clarify the elements of the mobilization times for residents including a discussion of day care centers. This issue is **Confirmatory Action NRC 13.03-07**.

RAI 13.03-32 ask that a map be provided to indicate the location of special facilities within the EPZ. In response the applicant will include maps of schools, daycare, and medical facilities within Appendix E of the revised ETE report. This issue is **Confirmatory Action NRC 13.03-08**.

RAI 13.03-15 requested the applicant discuss whether data from registration cards was used in the ETE calculation for transit-dependent persons. The response submitted by the applicant provides detailed and sufficient information to assess the ETE of the Transit Dependent Population. The applicant indicates the information provided in the response will be added to the ETE study. This issue is **Confirmatory Action NRC 13.03-09**.

RAI 13.03-31(a, b, c) ask the applicant to address ambulance needs based on capacity rather than census and to identify assumptions used to determine sufficient ambulance availability. The applicant provided justification regarding their assumptions and stated that Table 8-4 will be updated in the revised ETE Report based on the information provided in the response and that the discussion in Section 8.3 will be updated accordingly. This issue is **Confirmatory Action NRC 13.03-10**.

~~**RAI 13.03-44** ask the applicant to provide the basis for the estimated 8,100 pass-through trips and how it relates to the background traffic already on the roadway network. In response the applicant provided clarification regarding flow rates used in the ETE as well as background traffic assumed on the roadway when the evacuation begins. The applicant stated the following changes will be made to the revised ETE report:~~

> ~~Page 3-17, change "60 minutes" to "90 minutes" in the final paragraph~~
> ~~Page 3-17, change "8,100 vehicles" to "12,150 vehicles."~~

~~This issue is **Confirmatory Action NRC 13.03-11**.~~

~~**RAI 13.03-26(a-c)** ask for information regarding the student population numbers presented in the ETE Report and noted that the most recent published values are higher than those presented in the report. The applicant verified that enrollment had increased by 9% and provided documentation that the need for 26 more buses to account for this increase would not affect the ETEs.~~ Furthermore, ~~although the~~Although as a result to the~~staff foundound the~~ applicants response to **RAI 13.03-26(a,b,c)** ~~the response acceptable,~~, ~~T~~, the staff requested that Table 8-2 of the ETE Report ~~should~~ be revised to reflect enrollment and bus demands for 2007-2008 prior to the staff concluding that RAI 13.03-26 (a,b,c) is acceptable.~~.~~ ~~T~~, ~~therefore t~~his issue is **Open Item 13.3-02.**

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13.3.1B.R.4 Traffic Capacity [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.III]

13.3.1B.R.4.1 Technical Information Related to Traffic Capacity

Section 4 of the ETE Report describes estimation of highway capacity. The methods used are generally taken from the Highway Capacity Manual published by the Transportation Research Board of the National Research Council. Clarification of capacity estimation and trip generation was requested in **RAI 13.03-09(a, b, c, d, e, f)** with regard to the values for each intersection variable. **RAI 13.03-09(a)** requested the applicant provide a general description of other important algorithms used in the PC-DYNEV traffic simulation model, in particular, routines describing traffic control and vehicle routing. In response letter dated November 17, 2008, page 17, the applicant refers to additional references which are identified in the original ETE report for further information on algorithms used. While these references do not in fact discuss the algorithms, they do provide information on measures of effectiveness for the algorithms in the model and are sufficient to support the response to the RAI. **RAI 13.03-09(b)** requested the applicant provide the values of the parameters in the equations, where applicable, including Mean Duration of Green Time and Mean Queue Discharge as described on page 4-1, clarify if values were estimated or field verified and discuss if the equation is applicable for manned intersections. The discussion provided in response letter dated November 17, 2008, page 18, identified how the variables were derived by applying the I-DYNEV system and how the model allocates effective green time for intersections. **RAI 13.03-09(c)** ask the applicant to explain how the Capacity Estimate on Approaches to Intersections equation on page 4-1 is affected by traffic control at intersections and to discuss if the modeling addressed traffic through intersections considering traffic control or the equation presented. In response letter dated November 17, 2008, page 18, the applicant provided discussion on the relationship between traffic

control points (TCPs) and modeling of intersections. In **RAI 13.03-09(d)**, the applicant was asked to discuss the assumptions and inputs for the nodes and segments with respect to the field survey. The response submitted by the applicant in letter dated January 8, 2009, page 7, provides detailed and sufficient information on assumptions and inputs used in the analysis of the roadway network. The information provided clarifies the use of field data in the assessment of evacuation times as presented in the ETE study. **RAI 13.03-09(e)** noted the definition of "F" on page 4-2 is defined as various known factors influencing "hm" and requested the applicant identify the important "F"-factors for the turn movement "hm". The response submitted by the applicant in letter dated January 8, 2009, page 9, provided detailed and sufficient information on capacity reduction factors used in the analysis of the roadway network. The information provided clarifies the use of the equations presented in the ETE study. **RAI 13.03-09(f)** ask the applicant to discuss the level of detail to which the traffic management strategy is represented in the modeling. In response letter dated November 17, 2008, page 20, the applicant provided an adequate discussion on the allocation of effective green time for traffic controlled intersections. ~~Staff finds the information provided in the applicant's responses to **RAI 13.03-09(a, b, c, d, e, f)** acceptable and therefore **resolved**.~~

In **RAI 13.03-24** the applicant was ask to discuss the reasoning behind transients not returning to their "residence" prior to evacuation as shown in Section 5, Figure 5-1, Events and Activities Preceding the Evacuation Trip. Staff further noted that those in hotels may return to gather their belongings therefore the applicant was ask to also discuss how this would affect the time for the transient population to evacuate. In response letter dated November 17, 2008, page 17, the applicant clarified the assumptions regarding transient population mobilization and stated the mobilization distribution for transients extends over a period of 2 ½ hours and those who elect to return to the motel to pick up belongings would be able to do so within this time frame. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-24** acceptable and therefore **resolved**.~~

Section 4, page 4-4, states "based on empirical data collected on freeways, we have employed a value of R=0.85." In **RAI 13.03-43** the applicant was ask to provide additional information, such as a reference, for the basis of this empirical data, to clarify if the R factor applied only to freeways or was also applied to the rural roads of the EPZ, and to explain the basis for applying this factor to other than freeways, if applicable. In response letter dated November 17, 2008, page 83, the applicant provided clarification regarding the reduction factor used in modeling including a statement that the advisability of such a capacity factor is based upon empirical studies that identified a fall-off in the service flow rate when congestion occurs at 'bottlenecks" or "choke points" on a freeway system. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-43** acceptable and therefore **resolved**.~~

For the trip generation time events and activities in Figure 5-1, Events and Activities Preceding the Evacuation Trip, it appears that for scenarios (b) and (c), the assumption is 100% of the public is at home when the sirens sound. **RAI 13.03-50** requested an explanation for the basis for not having a 'prepare to leave activity' and 'travel home' sequence for these scenarios. In response letter dated November 17, 2008, page 50, the applicant acknowledged the error and will modify Figure 5-1 to include those residents who may work during scenarios (b) and (c). **Confirmatory Action NRC 13.03-~~12~~ 13** was created to track these revisions.

In the distribution of data tables in Section 5, there is a note that states the survey data was normalized to the "Don't Know" response. **RAI 13.03-51** ask the applicant to provide additional information to explain the normalization process. In response letter dated November 17, 2008, page 97, the applicant provided clarification regarding the normalization of the "Don't Know" response within the telephone survey by stating it is accepted practice in conducting surveys of this type to accept the answers of a respondent who offers a "don't know" response. The "don't know" responses are, in effect, ignored and the distributions are based upon the positive data acquired. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-51** acceptable and therefore **resolved**.~~

Section 2.1, Data Estimate 3, states that roadway capacity was estimated for each segment based on the field surveys and on the HCM. Section 4, page 4-5, states the two-lane roadway capacity is 1700 pc/hr as identified in Chapter 20 of the HCM. The HCM identifies these capacities for 'ideal conditions which include physical and operational conditions. Chapter 20 of the HCM does identify 1700 pc/hr as the capacity of a 2-lane roadway when the roadway meets the Base Conditions of Chapter 12 such as 12-foot lane widths and 6-foot shoulders. Operational conditions would include such items as time spent following other vehicles. Clarification was requested in **RAI 13.03-42** if the field survey confirmed that lane widths meet the conditions for 'ideal'. The applicant was asked to discuss the operational considerations applied to the roadway capacity estimate and if necessary, to explain the affect on the ETE if the capacity is determined to be lower than the value used. In response letter dated November 17, 2008, page 81, the applicant provided clarification regarding information provided in Appendix K which provides the downward adjustments to the capacity estimate of 1,700 pc/hr when the base conditions were not realized. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-42** acceptable and therefore **resolved**.~~

The roadway network is identified on multiple figures including Figure 1-2 Harris Link-Node Analysis Network. According to the North Carolina Department of Transportation and the North Carolina Turnpike Authority, a new Interstate (I-540) is under construction and planned to traverse immediately west of Apex. I-540, which is planned to be open to traffic in the fall of 2011, will link Apex, Holly Springs, and Fuquay-Varina. **RAI 13.03-39** requested the applicant discuss why this new Interstate was not considered in the modeling of the roadway network and to identify the affects this roadway may have on the ETE. In response letter dated November 17, 2008, page 77, the applicant provided clarification regarding what portions of the highway that have already been opened and stated that there is ongoing controversy over financing the remainder of the highway and that its completion is uncertain. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-39** acceptable and therefore **resolved**.~~

Appendix K that provides road characteristics, lists lane widths as 1 or 2 inferring two lane and highways. The actual width of the lane is not provided. It is not mentioned whether lane widths were measured, most likely during the field survey, and if they were one consistent width. Section 1.3, page 1-5, states that unusual roadway characteristics were identified in the field survey including: narrow bridges, sharp curves, poor pavement, flood warning signs, inadequate delineations, etc. This information is not discussed in other areas within the document. Identify the narrowest section or other areas that are not uniform. **RAI 13.03-40** requested the applicant discuss how this information was used in the ETE calculations, provide the value that was used for the

"Full Lane" lane width in Appendix K identify where the narrowest roadway sections exist within the roadway network and discuss how this was factored into the calculation. In response letter dated November 17, 2008, page 78, the applicant provided clarification regarding the field information obtained during the roadway survey and the representation of this information within the ETE study and Appendix K. ~~The staff finds the clarifications provided in the applicant's response to **RAI 13.03-40** acceptable and therefore **resolved**.~~

The proposal to increase the level of the Harris Reservoir by approximately 20 feed could potentially affect the evacuation time. This additional depth will have an impact on the surrounding infrastructure and roadway network, the effect of which is difficult to define without details on the improvements to accompany the increase in size of the reservoir. **RAI 13.03-57(a, b, c, d, e, f)** ask for additional information to clarify any affect on the ETE. **RAI 13.03-57(a)** ask the applicant to identify the proposed water surface elevation and limits of the area in which the reservoir is to be raised. In response letter dated November 17, 2008, page 106, the applicant provided information on the proposed water surface elevation as well as the area where the reservoir is to be raised. **RAI 13.03-57(b)** requested discussion of whether the roadway alignments will remain the same. In response letter dated November 17, 2008, page 107, the applicant discussed the two roadway alignments that are expected to change as a result of the reservoir. **RAI 13.03-57(c)** requested the applicant discuss whether electrical power lines within the area will need to be raised to provide adequate roadway clearance or if any new roadways will be constructed to avoid power line replacement. In response letter dated November 17, 2008, page 107, the applicant provided clarification that if any roads are improved, electrical power lines will be adjusted to the required height as necessary and that roadway/power line improvements are not anticipated to impact evacuation times**. RAI 13.03-57(d)** requested a discussion of whether infrastructure adjacent to the reservoir will require reconstruction and if so, will the size of the facilities be the same as current or add additional capacity that could then impact the evacuation times. In response letter dated November 17, 2008, page 107, the applicant discussed a possible capacity increase for boat ramps but that the increase would not impact the existing evacuation times. **RAI 13.03-57(e)** requested the applicant discuss whether the higher water level will cause nearby roadways to be susceptible to flooding during adverse weather conditions. In response letter dated November 17, 2008, page 107, the applicant discussed the possibility of flooding on roadways due to the increased height of the reservoir. Roadways susceptible to flooding during adverse weather would be addressed as part of the final design of roadway improvements. This is a design element and as such it is appropriate to defer this to the designers responsible for the roadway. **RAI 13.03-57(f)** ask the applicant to discuss whether the higher water level will create any new areas that may be land-locked by water and require additional time to evacuate. In response letter dated November 17, 2008, page 107, the applicant clarifies that there would be no new land-locked areas as a result of raising the level of the reservoir. ~~Staff finds the information provided in the applicant's responses to **RAI 13.03-57(a, b, c, d, e, f)** acceptable and therefore **resolved**.~~

A Transportation Impact Analysis (TIA) report was prepared by the applicant to evaluate the impact of raising the level of the reservoir by 20 feet and improving some of the road/interchanges near the plant to accommodate construction traffic. The ETE Report

does not reference the TIA. **RAI 13.03-58** requested the applicant discuss if the transportation network, as analyzed in the ETE, considers any improvements or modifications identified in the TIA and any impact on the ETE as a result of the TIA. In response letter dated December 3, 2008, page 2, the applicant provides a detailed assessment of potential impacts of improvements identified in the TIA. A new appendix (Appendix N, "ETE for Construction and Build-Out Scenarios") will be added to the ETE that includes time estimates for each of the scenarios identified in the TIA. The ETE values in the appendix support a conclusion that the improvements will reduce the ETE by a small amount when complete. In conjunction, the applicant will also add to the end of the "Construction" discussion on page 3-2 of the revised ETE report:

> "Appendix N presents ETE for Regions R01, R02 and R03 with the roadway improvements and estimated traffic demand presented in the Traffic Impact Analysis report."

Confirmatory Action NRC 13.03-~~13~~ 14 was created to track these revisions.

Section 9, "Traffic Management Strategy," presents a traffic control and management strategy that is designed to expedite the movement of evacuating traffic. The traffic management strategy is based on a field survey of critical locations, computer analysis of the evacuation traffic flow environment, consultation with emergency management and enforcement personnel, and prioritization of traffic control points. This section also proposes the use of Intelligent Transportation Systems (ITS) technologies to benefit the evacuation process (such as dynamic message signs, highway alert radio, automated traveler information systems, and GPS units).

RAI 13.03-36 requested the applicant provide a discussion of how the traffic management plan discussed in Section 9 and detailed in Appendix G, "Traffic Management," was integrated into the ETE modeling, if intersections were modeled as indicated in Appendix G or if intersections were modeled as having signalization control, and whether or not the ETE provided in Table 7-1D, Time to Clear the Indicated Area of 100% of the Affected Population, was calculated based upon these traffic controls being in place. In response letter dated November 17, 2008, page 17, the applicant stated that conservatively, the ETE calculations do not rely upon any of the traffic control measures in Appendix G and provided clarification regarding the traffic management plan. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-36** acceptable and therefore **resolved**.~~

Section 9, page 9-2, explains the importance of establishing traffic control in a prioritized manner. Page 9-2 also states that the traffic control plans were developed in conjunction with county emergency management and law enforcement and that concern was expressed over the manpower and equipment shortages. **RAI 13.03-38** requested the applicant discuss if these concerns were provided as comments to the traffic control plan and if these were resolved. The applicant was also asked to clarify if the law enforcement who reviewed the ETE report have agreed and understand the priority of traffic control placement. In response letter dated November 17, 2008, page 75, the applicant stated the draft traffic management plan was sent to law enforcement and emergency planning representatives for each of the EPZ counties and that the plan was refined through meetings, conference calls, and emails during which the potential

manpower and equipment shortages were carefully reviewed. The response also provided clarification regarding prioritization of traffic signals. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-38** acceptable and therefore **resolved**.~~

Section 4 of the ETE Report describes the modeling of intersections and states on page 4-1 that critical intersections will often be provided by traffic control personnel. **RAI 13.03-46** ask the applicant how intersections that are controlled by traffic personnel are modeled and further ask the applicant to explain any assumptions on traffic speed, service flow, capacity, and queue discharge through a manned intersection. In response letter dated November 17, 2008, page 89, the applicant stated that traffic control points are modeled as traffic signals with a reasonable allocation of effective green time to each of the competing traffic streams. (Refer to RAI 13.03-09, 13.3.1B.R.4.1, for further information.) ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-46** acceptable and therefore **resolved**.~~

The ETE Report discusses intelligent transportation systems (ITS), dynamic message signs, and highway advisory radio in Section 9. It is not clear if the use of such systems was considered in the ETE or if the results are dependent upon their use. Appendix G provides traffic control tactics for traffic control points, which have been developed in conjunction with the county emergency management representatives and law enforcement personnel. Section 1.3 Analytical Tools, page 1-8, states that the analyst can identify bottlenecks and develop countermeasures that are designed to expedite the movement of vehicles. In **RAI 13.03-54** the staff requested additional information regarding whether any such adjustments were integrated into the traffic management plan and if so, to identify any adjustments that were made to expedite the movement of vehicles and improve evacuation times. In response letter dated November 17, 2008, page 101, the applicant stated that the ETE study did not identify a need for specific actions to improve evacuation times and that if any such actions had been identified, they would be addressed in state and local emergency plans. In addition, the applicant provided clarification regarding countermeasures integrated into the traffic management plan. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-54** acceptable and therefore **resolved**.~~

Section 2.3 Assumption 8 states that traffic control points outside of the EPZ should be established to facilitate evacuation flow to the reception centers. **RAI 13.03-37** requested the applicant discuss if the ETE includes such traffic control in the modeling and if local authorities have agreed to implement the traffic control outside of the EPZ as suggested. In response letter dated November 17, 2008, page 74, the applicant stated that the ETE do not depend on traffic control at traffic control points and provided further clarification regarding the traffic management plan and traffic control points. (Refer also to responses associated with RAI 13.03-9(c) and 13.03-36, 13.3.1B.R.4.1). ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-37** acceptable and therefore **resolved**.~~

Section 10, “Evacuation Routes,” provides a discussion of the evacuation routes. Maps of the evacuation routes are provided for each county within the EPZ. Reception centers are shown on Figure 10-1, “General Population Reception Centers,” and in the individual evacuation route maps for each county (Figures 10-2, 10-3, 10-4, and 10-5). **RAI 13.03-56** ask the applicant to provide textual information regarding the location, types, and capacities of the facilities to be used in an evacuation. In response letter dated November 17, 2008, page 105, the applicant responded that the type and capacities of the reception centers do not impact the ETE, but that Figure 6 of each county plan lists the reception and care center details requested in the RAI. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-56** acceptable and therefore **resolved**.~~

Section 11, “Surveillance of Evacuation Operations,” briefly describes methods that could be utilized for traffic surveillance during an evacuation. These options include traffic control personnel located at Traffic and Access Control Points, ground patrols undertaken along well-defined paths to ensure coverage of highways that serve as major evacuation routes, aerial surveillance of evacuation operations using helicopter or fixed-wing aircraft, and cellular phone calls from motorists to provide direct reports of road blockages. The report also suggested that tow trucks with a supply of gas, be deployed at strategic locations within, or just outside, the EPZ.

13.3.1B.R.4.2 Technical Evaluation of Information Related to Traffic Capacity

The ETE Report describes the location of reception centers for registering and monitoring evacuees.

The ETE Report provides a complete review of the evacuation road network that is slightly enhanced from those in the older ETE Report for HNP Unit 1. Analyses are made of travel times and potential locations for congestion. The evacuation time estimates are not dependent on the establishment of traffic control points and access control points. Therefore, manpower and equipment shortages have no effect on the evacuation time estimate calculations. In addition, all evacuation route segments and their characteristics, including capacity are described.

A traffic control and management strategy that is designed to expedite the movement of evacuating traffic is described. The traffic management strategy is based on a field survey of critical locations and consultation with emergency management and enforcement personnel.

The ETE Report included assumptions for determining the number of vehicles needed, as well as the methodology, for determining the transport-dependent population. The applicant also analyzed travel times and potential locations for serious congestion along the evacuation routes.

~~Clarification of capacity estimation and trip generation was requested in **RAI 13.03-09(a-f)** with regard to the values for each intersection variable. In response the applicant provided extensive discussion on the use of algorithms and variables in Section 4 of the ETE Report. In **RAI 13.03-24** the applicant was ask to discuss the reasoning behind transients not returning to their “residence” prior to evacuation as shown in Section 5, Figure 5-1, Events and Activities Preceding the Evacuation Trip. The applicant clarified the assumptions regarding transient population mobilization and stated the mobilization distribution for transients extends over a period of 2 ½ hours and those who elect to return to the motel to pick up belongings would be able to do so within this time frame. In **RAI 13.03-43** the applicant was ask to provide additional information, such as a~~

reference, for the basis of this empirical data, to clarify if the R factor applied only to freeways or was also applied to the rural roads of the EPZ, and to explain the basis for applying this factor to other than freeways, if applicable. The applicant provided clarification regarding the reduction factor used in modeling including a statement that the advisability of such a capacity factor is based upon empirical studies that identified a fall off in the service flow rate when congestion occurs at 'bottlenecks" or "choke points" on a freeway system. **RAI 13.03-51** ask the applicant to provide additional information to explain the normalization process for the "Don't Know" responses to the telephone survey. The applicant provided clarification regarding the normalization of the "Don't Know" response by stating it is accepted practice in conducting surveys of this type to accept the answers of a respondent who offers a "don't know" response. The "don't know" responses are, in effect, ignored and the distributions are based upon the positive data acquired. Clarification was requested in **RAI 13.03-42** if the field survey confirmed that lane widths meet the conditions for 'ideal'. The applicant was asked to discuss the operational considerations applied to the roadway capacity estimate and if necessary, to explain the affect on the ETE if the capacity is determined to be lower than the value used. The applicant provided clarification regarding information provided in Appendix K which provides the downward adjustments to the capacity estimate of 1,700 pc/hr when the base conditions were not realized. **RAI 13.03-39** requested the applicant discuss why this new Interstate was not considered in the modeling of the roadway network and to identify the affects this roadway may have on the ETE. The applicant provided clarification regarding what portions of the highway that have already been opened and stated that there is ongoing controversy over financing the remainder of the highway and that its completion is uncertain. **RAI 13.03-40** requested the applicant discuss how the information in Appendix K was used in the ETE calculations, provide the value that was used for the "Full Lane" lane width in Appendix K identify where the narrowest roadway sections exist within the roadway network and discuss how this was factored into the calculation. The applicant provided clarification regarding the field information obtained during the roadway survey and the representation of this information within the ETE study and Appendix K. **RAI 13.03-57(a, b, c, d, e, f)** ask for additional information to clarify any affect raising of the reservoir by 20 feet might have on the ETE. The applicant provided information on the proposed water elevation, roadway alterations, increases in boat ramp capacity, and flooding of roadways. The applicant does not anticipate that any of the issues discussed within the RAI response would impact the ETE. **RAI 13.03-36** requested the applicant provide a discussion of how the traffic management plan discussed in Section 9 and detailed in Appendix G, "Traffic Management," was integrated into the ETE modeling, if intersections were modeled as indicated in Appendix G or if intersections were modeled as having signalization control, and whether or not the ETE provided in Table 7-1D, Time to Clear the Indicated Area of 100% of the Affected Population, was calculated based upon these traffic controls being in place. The applicant stated that conservatively, the ETE calculations do not rely upon any of the traffic control measures in Appendix G and provided clarification regarding the traffic management plan. **RAI 13.03-38** requested the applicant discuss if the emergency management and law enforcement concerns provided as comments to the traffic control plan and were resolved. The applicant was also asked to clarify if the law enforcement who reviewed the ETE report have agreed and understand the priority of traffic control placement. The applicant stated the draft traffic management plan was sent to law enforcement and emergency planning representatives for each of the EPZ counties and that the plan was refined through meetings, conference calls, and emails during which the potential manpower and equipment shortages were carefully reviewed. The response also provided clarification regarding prioritization of traffic signals. **RAI**

13.03-46 ask the applicant how intersections that are controlled by traffic personnel are modeled and further ask the applicant to explain any assumptions on traffic speed, service flow, capacity, and queue discharge through a manned intersection. The applicant stated that traffic control points are modeled as traffic signals with a reasonable allocation of effective green time to each of the competing traffic streams. In **RAI 13.03-54** the staff requested additional information regarding whether adjustments were integrated into the traffic management plan and if so, to identify any adjustments that were made to expedite the movement of vehicles and improve evacuation times. The applicant stated that the ETE study did not identify a need for specific actions to improve evacuation times and that if any such actions had been identified, they would be addressed in state and local emergency plans. In addition, the applicant provided clarification regarding countermeasures integrated into the traffic management plan. **RAI 13.03-37** requested the applicant discuss if the ETE includes such traffic control in the modeling and if local authorities have agreed to implement the traffic control outside of the EPZ as suggested. The applicant stated that the ETE do not depend on traffic control at traffic control points and provided further clarification regarding the traffic management plan and traffic control points. **RAI 13.03-56** ask the applicant to provide textual information regarding the location, types, and capacities of the facilities to be used in an evacuation. The applicant responded that the type and capacities of the reception centers do not impact the ETE, but that Figure 6 of each county plan lists the reception and care center details requested in the RAI.

The staff finds the clarifications provided by the applicant pertaining to the following **RAIs: 13.03-09(a, b, c, d, e, f), 13.03-24, 13.03-43, 13.03-51, 13.03-42, 13.03-39, 13.03-40, 13.03-57(a, b, c, d, e, f), 13.03-36, 13.03-38, 13.03-46, 13.03-54, 13.03-37 and 13.03-56** to be acceptable and therefore **resolved**.

RAI 13.03-50 requested an explanation for the basis for not having a 'prepare to leave activity' and 'travel home' sequence for scenarios (b) and (c) in Figure 5-1. The applicant acknowledged the error and will modify Figure 5-1 to include those residents who may work during scenarios (b) and (c). **Confirmatory Action NRC 13.03-12** was created to track these revisions.

RAI 13.03-58 requested the applicant discuss if the transportation network, as analyzed in the ETE, considers any improvements or modifications identified in the TIA and any impact on the ETE as a result of the TIA. The applicant provided a detailed assessment of potential impacts of improvements identified in the TIA. A new appendix (Appendix N, "ETE for Construction and Build-Out Scenarios") will be added to the ETE that includes time estimates for each of the scenarios identified in the TIA. In conjunction, the applicant will also add to the end of the "Construction" discussion on page 3-2 of the revised ETE report:

> "Appendix N presents ETE for Regions R01, R02 and R03 with the roadway improvements and estimated traffic demand presented in the Traffic Impact Analysis report."

Confirmatory Action NRC 13.03-13 was created to track these revisions.

13.3.1B.R.5 Analysis of Evacuation Times [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.IV]

13.3.1B.R.5.1 Technical Information Related to Analysis of Evacuation Times

Sections 4, 5, and 6 of the ETE Report describe the methods used to estimate the evacuation times. Section 4 describes estimation of highway capacity and the methods used are generally taken from the Highway Capacity Manual. Section 5 provides estimates of the distributions of elapsed times associated with mobilization activities undertaken by the public to prepare for the evacuation trip ("trip generation times"). The elapsed time associated with each activity is represented as a statistical distribution reflecting differences between members of the public. The quantification of these activity-based distributions relies largely on the results of a telephone survey. Section 2.3 Assumption 3.b. states that 26 percent of households will await the return of a commuter. However, Appendix F, Telephone Survey, page F-7 indicates that 57 percent of households will await the return of other family members. **RAI 13.03-5** requested the applicant discuss the basis for using 26 percent for households awaiting the return of a commuter. In response letter dated November 17, 2008, page 9, the applicant acknowledges that the percent of households referenced was incorrect in the original ETE report and will correct the values as specified below:

> "26 percent of households" will be changed to "39 percent of households" on page 2-4 of the revised ETE Report.

Confirmatory Action NRC 13.03-~~14~~ 15 was created to track this revision.

RAI 13.03-7 (a, b) requested clarification regarding mobilization and evacuation assumptions for schools. Section 2.3 assumption 3.a. states "schools may be evacuated prior to notification of the general public." If notification is to take place in 10 minutes and mobilization of buses takes 90 minutes, it is not clear how this assumption can be valid. **RAI 13.03-7(a)** asked the applicant to explain the use of this assumption. In response letter dated November 17, 2008, page 14, the applicant acknowledged the assumption is not feasible with the planning basis used in the ETE report. In response the applicant identified correctly that the assumption does not influence the ETE calculations or results. The applicant will remove Assumption 3.a. from the revised ETE report. **Confirmatory Action NRC 13.03-~~15~~ 16** was created to track this revision. Information on the "experience" used to establish the mobilization time of 90 minutes for buses is also not provided. **RAI13.03-7(b)** requested that for Section 8 (page 8-1), the applicant include a reference or more information on the 'experience' used to establish the mobilization time of 90 minutes. In response letter dated November 17, 2008, page 14, the applicant states that the 90 minute mobilization time for transit vehicles is based on discussions with local emergency management personnel at the site as well as at several other sites. Discussion with local emergency management on mobilization times for these vehicles is an adequate approach and provides an adequate basis for use of the time identified. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-7(b)** acceptable and therefore **resolved**~~.

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Section 6 defines the various evacuation cases (a combination of a scenario and a region) for which time estimates were made. A scenario is defined as a combination of circumstances, including time of day, day of week, season, and weather conditions. Scenarios define the number of people in each of the affected population groups and their respective mobilization time distributions. A region is defined to be a grouping of contiguous evacuation zones, which forms either a "keyhole" sector-based area, or a circular area within the plume exposure pathway EPZ that is evacuated due to a radiological emergency. The HNP EPZ contains 14 separate sub-zones, with boundaries generally defined by major roads, county lines, or water bodies, and 25 evacuation regions. The sub-zone boundary definitions are provided in Appendix L.

The use of the "keyhole" in the ETE is not clear. **RAI 13.03-6(a)** requested the applicant clarify Section 2.2 Assumption 5 and whether the keyhole evacuation extend to 10 miles or stop at 5 miles as indicated in the referenced Figure 2-1, "Voluntary Evacuation Methodology." In addition the RAI requested the applicant discuss if 100% of the population is considered when calculating the ETEs for the 10-mile EPZ or if 35% is used between the 5- and 10-mile rings as indicated in Figure 2-1. Section 2.3 Assumption 2 states that it is assumed that everyone within the group of ERPA forming a Region will evacuate. ERPAs extend to 10 miles from the plant. However, Figure 2-1, Voluntary Evacuation Methodology, indicates that the area to be evacuated 100% extends to 5 miles from the plant. **RAI 13.03-6(b)** ask the applicant to clarify if 100% of the people out to 10 miles are included in the ETE calculation and if so, Figure 2-1 may need to be modified to be representative of the evacuation assumptions. In response letter dated November 17, 2008, page 12, the applicant clarified the assumptions regarding percentages of residents evacuating from the area and will add an additional table to Appendix H(Table H-1) that identifies percentage of vehicles within each sub-zone assumed to evacuate for each region. This new table is also being provided in response to RAI 13.03-47, 13.3.1B.R.3.1, and is being tracked as **Confirmatory Action NRC 13.03-~~04~~05**.

Section 2.3 Assumption 11 states that rain and ice are used for the adverse weather scenarios and the table indicates that "No Effect" is included for mobilization time. However, Section 8 frequently indicates that time is increased for activities during mobilization – such as, Section 8.4 Activity: Mobilize Drivers, "Mobilization time is slightly longer, 100 minutes, when raining". **RAI 13.03-08** ask the applicant to discuss the meaning of the term 'No Effect' as used in the assumption. In response letter dated November 17, 2008, page 15, the applicant stated the "No Effect" in the table on page 2-5 refers to the mobilization time for the general population. The applicant further explained the reasoning behind the assumption that adverse weather has no effect on mobilization time of the general public. In response to **RAI 13.03-08** the applicant will change the last column of the table referenced to read "Mobilization Time for the General Population" in the revised ETE report. **Confirmatory Action NRC 13.03-~~16~~ 17** was created to track this revision.

Section 2.3 Assumption 2 states that it is assumed that everyone within the group of ERPA forming a Region will evacuate. However, Section 7.3 states that these ETE estimates do not and should not be distorted to account for stragglers. **RAI 13.03-49** requested the applicant discuss whether reference to 100% evacuation, throughout the ETE does indeed represent 100% evacuation or if values have been truncated to eliminate those that may take longer to evacuate. In response letter dated November 17, 2008, page 95, the applicant stated that Assumption 2 in Section 2.3 is a general statement, without direct reference to ETE, and that the entire population within a region is considered to evacuate. The applicant also provided clarification regarding assumptions made for those people making up the tail of the evacuation. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-49** acceptable and therefore **resolved**.~~

Section 7, "General Population Evacuation Time Estimates (ETE)," provides results of the General Population ETE that cover the 25 regions within the HNP EPZ and the 12 Evacuation Scenarios discussed in Section 6. Appendix J provides the ETE results for all regions and scenarios and provides plots of all evacuation scenarios for evacuation Region 3. Results are presented for 50%, 90%, 95%, and 100% of the population

within a region to evacuate from that region. Results are provided for good and adverse (rainy or icy) conditions. A variant of the NUREG-0654 format is used for the presentation of ETE results. The maximum times are presented, as well as, the times to achieve lower percentages. Times are reported separately for general population (Section 7 and Appendix J), schools (Section 8), and transit-dependent population (Section 8). The general population includes both permanent residents and transients. The ETE report uses figures to illustrate the patterns of traffic congestion that arise for the case when the entire EPZ is advised to evacuate during the summer, midweek, midday period under good weather conditions. These figures display congestion patterns after 1, 2, 3, and 3 ¼ hours after evacuation advisory. Appendix I presents a series of sensitivity tests that were performed to determine the sensitivity of the results to trip generation time. Individual tests included studies related to the shadow region, changes in the average number of evacuating vehicles per household, and traffic control tactics.

In the Executive Summary, Tables 7-1C, "Time to Clear the Indicated Area of 95% of the Affected Population," and 7-1D, "Time to Clear the Indicated Area of 100% of the Affected Population," are described as the times needed to clear the indicated regions of 95 and 100 percent of the population. **RAI 13.03-02** requested the applicant clarify that these tables, which indicate times of around 4 hours, do not include schools, transit dependents, and special facilities - the latter of which are acknowledged to sometimes exceed the general population in Section 8.4. In response letter dated November 17, 2008, page 17, the applicant noted that the effect of schools, special facilities and the transit-dependent population evacuating over the same timeframe is considered. The ETE for these populations are calculated separately in Section 8. The applicant will revise Section 7 of the ETE report to clarify the 100 percent evacuation is intended to represent the general population. The second paragraph of Section 7 will be revised as follows:

> The ETE for the *general population* (permanent residents, transients and employees commuting to work in the EPZ) for all Evacuation Cases are presented in Tables 7-1A through 7-1D. These tables present the estimated times to clear the indicated population percentages from the Evacuation Regions for all Evacuation Scenarios. The tablulated values of ETE are obtained from the PC-DYNEV simulation model outputs of vehicles exiting the specified evacuation areas. These data are generated at 10-minute intervals, and then interpolated to the nearest 5 minutes. Separate ETE are computed for the special facility (schools and medical facilities) and transit-dependent populations within the EPZ; see Section 8 for details.

Confirmatory Action NRC 13.03-~~17~~ 18 was created to track this revision.

The routes for individuals requiring public transit are identified in Section 8. Additional information regarding the transit-dependent population was requested in **RAI 13.03-11(a, b, c, d, e)**. **RAI 13.03-11(a)** ask the applicant to discuss if the ETE developed for school in session includes consideration that the same buses will be used to evacuate transit dependent individuals. In response letter dated November 17, 2008, page 23, the applicant responded that the ETE developed for schools that are in session assume that schools receive first priority in the assignment of bus resources and that any subsequent use of the same buses to evacuate transit dependent individuals would not influence the ETE for school evacuation. **RAI 13.03-11(b)** ask if the same buses are used, to explain the effect on the ETE for the transit dependent residents under this scenario. In

response letter dated November 17, 2008, page 23, the applicant stated that if there are not sufficient buses to support the evacuation of all school children and all transit-dependent persons in one wave, buses will be prioritized for school evacuation and then return for a second wave. **RAI 13.03-11(c)** stated that unloading the bus in 5 minutes as shown in Tables 8-7A and 8-7B and discussed in Section 8.4 seems optimistic for individuals who are likely carrying belongings. In response letter dated November 17, 2008, page 24, the applicant clarified that Exhibit 27-9 in HCM 2000 states typical alighting service time is 1.7-2.0 seconds per person and that assigning a conservative factor of 5 to account for carrying luggage yields a rate of up to 10 seconds per person and 5 minutes for 30 people to leave a bus. Page 7-4 says summer implies school is not in session, but tables 6-3 and 6-4 show 10% of school buses evacuating in Scenarios 1 and 2. **RAI 13.03-11(d)** ask the applicant to discuss why 10% of the school buses are planned for use in Scenarios 1 and 2. In response letter dated November 17, 2008, page 24, the applicant stated that for Scenarios 1 and 2 the buses are evacuating summer school students and the percentages in Table 6-3 were discussed with the counties during the review process. **RAI 13.03-11(e)** requested the applicant discuss the basis for the 75% value used for "Residents with Commuters in Household" as shown in Table 6-3. In response letter dated November 17, 2008, page 24, the applicant stated the value has been corrected in the revised report and now read 68% which matches the data presented in Figure F-6. In response to **RAI 13.03-11(a, b, c, d, e)** the following changes will be made in the revised ETE Report:

- Reference to "Table 8-6" on page 8-4 will be changed to "Table 8-7."
- Update Table 6-3 to change the 75% value for "Residents with Commuters in Household" to correctly read 68%.
- Clarify the text of Section 8.4 as detailed in the full response to RAI 13.03-11(b).

Confirmatory Action NRC 13.03-~~18~~ 19 was created to track these revisions.

In Table 8-7A Transit Dependent Evacuation Time Estimates – Good Weather, the initial route time of 45 minutes would occur during the period when Figure 7-4, Congestion Patterns at 2 Hours after the Evacuation Advisory, indicates many of these roadways would have Level of Service F, which is very congested. This is also described as the peak congestion period in Section 7.2. Buses would be traveling through traffic control points, such as TCP E11A, that would be established to discourage thru traffic. **RAI 13.03-12(a, b, c)** ask the applicant for the following clarifications regarding the transit dependent ETE: **RAI 13.03-12(a)** ask the applicant to explain how the route times were derived considering distance and speed. In response letter dated November 17, 2008, page 25, the applicant responded that upon reconsideration, the time estimate will be modified to 45 minutes and will make changes to travel times reflected in the ETE for the transit dependent population. **RAI 13.03-12(b)** requested the applicant discuss if passing through TCPs was considered in the travel speed and to discuss the basis for using 45 minutes for route 1 and 30-minute route times for the remaining routes. In response letter dated November 17, 2008, page 26, the applicant stated the TCPs are created to facilitate and guide evacuating traffic – not to impede their progress. As such, it is assumed that the inbound speeds of transit vehicles and emergency response vehicles are not affected by the implementation of TCPs. **RAI 13.03-12(c)** requested the applicant provide a basis for using 10 minutes for pick up time in Table 8-7A and to clarify how many stops this includes along each route. These same questions are

applicable to Table 8-7B (Transit Dependent Evacuation time Estimates – Rain). The 10 minutes conflicts with Section 8.4 [Activity: Board Passengers (C→D)] that indicates 15 minutes for normal weather and 20 minutes for adverse weather. In response letter dated November 17, 2008, page 26, the applicant provided new calculations or the time required for a bus to decelerate, accelerate, stop and board passengers. In response to RAI 13.03-12(a, b, c) the following changes will be made in the revised ETE report:

- Change travel time for bus route 2 to 45 minutes in description of route on page 8-7.
- Update Tables 8-7A and B – 45 minutes travel time for Route 2.
- Revise discussion of transit boarding time under "Activity: Board Passengers" on page 8-5.

Confirmatory Action NRC 13.03-~~19~~ 20 was created to track these revisions.

The routes for individuals requiring public transit are identified in Figure 8-2 Proposed Transit Dependent Bus Routes. It appears from Figure 8-2, that much of the EPZ is not serviced by bus routes (there are no bus routes serving sub-zones A, B, C, D, J, L, and M), but there is no mention of how transit-dependent individuals get from their residences to these bus routes. **RAI 13.03-17(a)** ask the applicant to discuss the means by which individuals are assumed to travel to the transit route stops and discuss how the time required for this activity is included in the ETE. The response submitted by the applicant in letter dated November 17, 2008, page 34 states that given the evacuees in question have no access to private transportation, then those who are ambulatory and within an accessible distance would walk to the routes and that since there will be multiple bus runs on each route, those who take longer to get to the route will still have the opportunity to board a later bus run. **RAI 13.03-17(b)** ask the applicant to discuss how the large distances between transit-dependent residents and the bus routes was considered in the ETE calculation. The response submitted by the applicant in letter dated January 8, 2009, page 15 clarifies the bus routes were designed to service the populated areas of the EPZ and that the few transit-dependent people who will not be able to access a bus route will need to register as "special needs" persons to be picked up at home. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-17(a, b)** acceptable and therefore **resolved**.~~

In **RAI 13.03-18** the applicant was ask to discuss why Table 8-7B, "Transit Dependent Evacuation Time Estimates – Rain," was developed for the transit-dependent adverse weather condition when ice was identified in Section 2.3 Assumption 11 as the more limiting adverse weather condition and to discuss if using ice for the adverse weather would increase the ETEs provided in Table 8-7B. In response letter dated November 17, 2008, page 36, the applicant explained the counties had indicated at the kickoff meeting that the ice scenario was a low probability event and that rain was deemed the more likely adverse weather condition. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-24** acceptable and therefore **resolved**~~.

RAI 13.03-20 ask the applicant to discuss the basis for using five buses for routes 1 and 5, six buses for routes 2, 3 and 6, and eight buses for route 4 as depicted on page 8-7, Analysis of Bus Route Operations and to discuss the basis used to determine the number of buses required for each route. In response letter dated November 17, 2008, page 39, the applicant explained the reasoning for the distribution of buses throughout the urban areas of the EPZ and provided a revised Table 8-6 to include 50 scheduled

bus runs. In response to RAI 13.03-20 the applicant will make the following revisions to the ETE Report:

- Revise Table 8-6 to account for an increase in bus runs to 50.
- Add the discussion provided in the RAI response to page 8-7 of the revised report.
- Revise the discussion of the number of buses needed for each r4oute on pages 8-7 and 8-8 of the revised report.

Confirmatory Action NRC 13.03-~~20~~ 21 was created to track these revisions.

In reference to Table 8-5A, "School Evacuation Time Estimates – Good Weather," **RAI 13.03-29** requested that the applicant provide the assumptions for loading the students in 5 minutes and to discuss any further assumptions on the boarding time for school buses. For Apex High School, population 2215 students, this would require 44 buses. Seventy-passenger school buses are usually around 35-40 feet long. Assuming 10 feet between buses, this would require almost one-half mile of buses lined up for students to then board and evacuate. The logistics of such a movement indicate a 5-minute loading time would be challenging. In response letter dated November 17, 2008, page 59, the applicant provided additional assumptions on boarding time which provide the needed information to demonstrate the loading times assumed are practical. The applicant diagramed the bus loading area to scale showing 44 buses within the parking and loading area of the Apex High School. The proximity of the buses to the school, as provided in the diagram, should facilitate boarding within the time periods assumed in the ETE study. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-29** acceptable and therefore **resolved**.~~

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 on page 8-5 in Section 8.4, "Evacuation Time Estimates for Transit-Dependent People," 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. RAI 13.03-30 ask the applicant to explain why the average speed for the evacuation was used rather than the speeds that would exist during this timeframe for the evacuation. In response letter dated November 17, 2008, page 62, the applicant agrees that most schools are located in areas that will experience some congestion on the roadways and that speeds used in the analysis should reflect this congestion. The applicant will revise travel times in Tables 8-5A (School Evacuation Time Estimates – Good Weather) and 8-5B (School Evacuation Time Estimates – Rain) to reflect the local speeds as output by the computer model. The applicant will revise the discussion on pages 8-5 and 8-6 in Section 8 Transit Dependent and Special Facility Evacuation Time Estimates to reflect the changes. **Confirmatory Action NRC 13.03-~~21~~ 22** was created to track these revisions.

In reference to Section 8.4, page 8-8, "Evacuation of Ambulatory Persons from Special Facilities," **RAI 13.03-33(a, b, c)** requested the applicant explain the basis for mobilizing buses in 90 minutes. Page 8-9 states that the average speed output by the model at 90 minutes is 22.9 mph. Use of the model is a good approach for establishing the speeds; however, mobilization time for the buses is 90 minutes, and loading of the buses is at

least 30 minutes as indicated on page 8-9, totaling 2 hours. **RAI 13.03-33(a)** ask the applicant to discuss why the 2-hour speed, which is the peak congestion period as stated in Section 7, was not used. In response letter dated November 17, 2008, page 69, the applicant replied that use of the model-derived speed at two hours would be more accurate and the ETE and text will be modified accordingly. **RAI 13.03-33(b)** ask the applicant to discuss why the average EPZ speed was used rather than speeds specific to the selected routes or areas. In response letter dated November 17, 2008, page 69, the applicant stated they will make changes to the revised ETE report to reflect local evacuation speeds as suggested. **RAI 13.03-33(c)** ask the applicant to discuss the effects of adverse weather when evacuating special needs facilities. In response letter dated November 17, 2008, page 69, the applicant stated they will revise the ETE report to include a discussion of the special facilities adverse weather ETE. The following revisions will be made to the revised ETE Report in response to **RAI 13.03(a, b, c)**:

- Average speeds output by the model at two hours will be used to compute the ETE for special facilities. Page 8-9 will be revised accordingly.
- Text will be added to discuss the ETE for rain for special facilities.

Confirmatory Action NRC 13.03-~~22~~ 23 was created to track these revisions.

In the ETE calculation for buses assigned to pick up ambulatory persons located on page 8-9, there is no time included for travel between facilities although 5 minutes is mentioned in the text above the equation. **RAI 13.03-34** ask the applicant to include the time to travel between facilities in the ETE calculation. In response letter dated November 17, 2008, page 71, the applicant acknowledged the oversight and stated travel time between special facilities would be included in the revised ETE report. The applicant will modify the sample calculation of ETE for bus A on page 8-9 of the revised ETE report to include 10 minutes travel time (five minute travel time between each of the three facilities serviced). The change does not impact the ETE analysis as the calculation provided serves only as an example of how the times were derived.
Confirmatory Action NRC 13.03-~~23~~ 24 was created to track these revisions.

For wheelchair bus runs, the ETE states that “wheelchair buses and vans are often scarce” and regular buses can be used to transport these patients. Wheelchairs would be stacked in the back and evacuees would sit in the front of the bus. **RAI 13.03-35** requested the applicant discuss the assumptions on bus capacity when using this approach. In response letter dated November 17, 2008, page 72, the applicant clarified their assumptions regarding wheelchair bus runs citing the North Carolina school bus safety website which states that school buses generally have 22-24 seats. Based on the standard seat size, each seat can accommodate 2 adults, thus requiring 8 seats for a capacity of 15 patients, leaving 14-16 seats available for wheelchairs, personal items of patients and staff. ~~The staff finds the clarification provided in the applicant’s response to **RAI 13.03-35** acceptable and therefore **resolved**.~~

Based on staff review of the ETE Report, it appears the analysis may include truncated distributions. The longest evacuation time for 100% of the ETE is 4 hours 40 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. Figure 5-3, “Evacuation Trip Generation for Various Population Groups,” identifies a tail that may extend to 300 minutes, or 5 hours. **RAI 13.03-48(a)** ask the applicant to explain how the total evacuation time for 100% of the population as identified in Figure 7-1D, Time to Clear the Indicated Area of 100% of

the Affected Population can have a maximum ETE of 4 hours 40 minutes if the trip generation time may take as long as 5 hours. Distribution No. 4 Prepare to Leave Home on page 5-8 does not agree with Figure F-12 Time to Prepare Home for Evacuation. Figure F-12 indicates that it takes 250 minutes for approximately 100% of people to prepare to leave home; however, it appears this tail could be as long as 360 minutes in the Figure. Distribution No. 4 indicates that 100% of the people are prepared to leave home in 195 minutes. **RAI 13.03-48(b)** requested the applicant discuss the differences in the data between Appendix F and Section 5. **RAI 13.03-48(c)** stated that if necessary, the applicant reconcile Figure 5-2 Evacuation Mobilization Activities and Figure 5-3 Evacuation Trip Generation for Various Population Groups with the comments on the distribution of data for time to prepare to leave home. In response letter dated November 17, 2008, page 92, the applicant provided a detailed discussion regarding distributions and truncations used in the ETE model. The text provided in response to **RAI 13.03-48(a, b, c)** will be added to Section 5 of the revised ETE report. **Confirmatory Action NRC 13.03-~~24~~ 25** was created to track this revision.

In Table 7-1C, "Time to Clear the Indicated Area of 95% of the Affected Population," for R03 (entire EPZ), there is a difference in evacuation time between normal and adverse weather. In Table 7-1D, "Time to Clear the Indicated Area of 100% of the Affected Population," there is no such difference for R03 although there are minor differences in time for some of the other regions. **RAI 13.03-52** requested the applicant discuss why adverse weather does not affect the total evacuation time for the 100% evacuation of R03. In response letter dated November 17, 2008, page 98, the applicant provided reasoning why there was no time difference in R3 between good and adverse weather. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-52** acceptable and therefore **resolved**.~~

13.3.1B.R.5.2 Technical Evaluation of Information Related to Evacuation Times

A total of 300 ETE were computed for the evacuation of the general public within the EPZ. Each evacuation time estimate quantifies the aggregate evacuation time estimated for the population within each of the 25 evacuation regions under one of each 12 evacuation-scenarios (25 x 12 = 300). Schoolchildren and other transit-dependent populations were calculated separately. An acceptable variant of the NUREG-0654 format is used for the presentation of the evacuation times in Appendix J.

Distribution functions for notification of the various categories of evacuees were developed. The distribution functions for the action stages after notification predict what fraction of the population will complete a particular action within a given span of time. There are separate distributions for auto-owning households, school population, and transit-dependent populations. These times are combined to form the trip generation distributions.

There are separate distributions for auto-owning households, school population, and transit-dependent populations.

On-road travel and delay times are calculated. An estimate of the time required to evacuate a particular segment of the non-auto-owning population dependent upon public transportation is developed, in a manner similar to that used for the auto-owning population.

~~**RAI 13.03-7(b)** requested that for Section 8 (page 8-1), the applicant include a reference or more information on the 'experience' used to establish the mobilization time of 90 minutes. The applicant states that the 90 minute mobilization time for transit vehicles is~~

based on discussions with local emergency management personnel at the site as well as at several other sites. **RAI 13.03-49** requested the applicant discuss whether reference to 100% evacuation, throughout the ETE does indeed represent 100% evacuation or if values have been truncated to eliminate those that may take longer to evacuate. The applicant stated that Assumption 2 in Section 2.3 is a general statement, without direct reference to ETE, and that the entire population within a region is considered to evacuate. The applicant also provided clarification regarding assumptions made for those people making up the tail of the evacuation. **RAI 13.03-17(a, b)** requested clarification regarding pedestrian access to distant bus routes. The applicant clarified the information within the ETE study on the expectations of evacuees that are transit dependent. In **RAI 13.03-18** the applicant was ask to discuss why rain was used as the adverse weather condition for the transit dependent population when ice had been identified in the assumptions as the more limiting condition. The applicant explained the counties had indicated at the kickoff meeting that the ice scenario was a low probability event and that rain was deemed the more likely adverse weather condition. In reference to Table 8-5A, "School Evacuation Time Estimates – Good Weather," **RAI 13.03-29** requested that the applicant provide the assumptions for loading the students in 5 minutes and to discuss any further assumptions on the boarding time for school buses. The applicant provided additional assumptions on boarding time which provide the needed information to demonstrate the loading times assumed are practical. The applicant also diagramed the bus loading area to scale showing 44 buses within the parking and loading area of the Apex High School. **RAI 13.03-35** requested the applicant discuss the assumptions on bus capacity when using the approach described on page 8-9. The applicant clarified their assumptions regarding wheelchair bus runs. **RAI 13.03-52** requested the applicant discuss why adverse weather does not affect the total evacuation time for the 100% evacuation of R03. In response letter dated November 17, 2008, page 98, the applicant provided reasoning why there was no time difference in R3 between good and adverse weather.

The staff finds the clarifications provided by the applicant pertaining to the following **RAIs: 13.03-7(b), 13.03-49, 13.03-17(a, b), 13.03-18, 13.03-29, 13.03-35,** and **13.03-52** to be acceptable and therefore **resolved**.

RAI 13.03-5 requested the applicant discuss the basis for using 26 percent for households awaiting the return of a commuter. In response letter dated November 17, 2008, page 9, the applicant acknowledges that the percent of households referenced was incorrect in the original ETE report and will correct the values as specified below:

> "26 percent of households" will be changed to "39 percent of households" on page 2-4 of the revised ETE Report.

Confirmatory Action NRC 13.03-14 was created to track this revision.

RAI 13.03-7(a) asked the applicant to explain the use of Assumption 3.a. in Section 2.3. In response letter dated November 17, 2008, page 14, the applicant acknowledged the assumption is not feasible with the planning basis used in the ETE report. In response the applicant identified correctly that the assumption does not influence the ETE calculations or results. The applicant will remove Assumption 3a from the revised ETE report. **Confirmatory Action NRC 13.03-15** was created to track this revision.

RAI 13.03-06 (a, b) requested that the applicant clarify the use of "keyhole" in the ETE and the assumptions associated with the ERPA evacuations. The applicant clarified the assumptions regarding percentages of residents evacuating from the area and will add an additional table to Appendix H (Table H-1) that identifies percentage of vehicles

within each sub-zone assumed to evacuate for each region. This new table is also being provided in response to RAI 13.03-47, 13.3.1B.R.3.1, and is being tracked as **Confirmatory Action NRC 13.03-04**.

RAI 13.03-08 ask the applicant to discuss the meaning of the term 'No Effect' as used in the Section 2.3 Assumption 11. The applicant stated the "No Effect" in the table on page 2-5 refers to the mobilization time for the general population. The applicant further explained the reasoning behind the assumption that adverse weather has no effect on mobilization time of the general public. In response to **RAI 13.03-08** the applicant will change the last column of the table referenced to read "Mobilization Time for the General Population" in the revised ETE report. **Confirmatory Action NRC 13.03-16** was created to track this revision.

RAI 13.03-02 requested the applicant clarify tables 7-1C and 7-1D, which indicate times of around 4 hours, do not include schools, transit dependents, and special facilities - the latter of which are acknowledged to sometimes exceed the general population in Section 8.4. The applicant noted that the effect of schools, special facilities and the transit-dependent population evacuating over the same timeframe is considered. The ETE for these populations are calculated separately in Section 8. The applicant will revise Section 7 of the ETE report to clarify the 100 percent evacuation is intended to represent the general population. The second paragraph of Section 7 will be revised as follows:

> The ETE for the *general population* (permanent residents, transients and employees commuting to work in the EPZ) for all Evacuation Cases are presented in Tables 7-1A through 7-1D. These tables present the estimated times to clear the indicated population percentages from the Evacuation Regions for all Evacuation Scenarios. The tablulated values of ETE are obtained from the PC-DYNEV simulation model outputs of vehicles exiting the specified evacuation areas. These data are generated at 10-minute intervals, and then interpolated to the nearest 5 minutes. Separate ETE are computed for the special facility (schools and medical facilities) and transit-dependent populations within the EPZ; see Section 8 for details.

Confirmatory Action NRC 13.03-17 was created to track this revision.

RAI 13.03-11(a, b, c, d, e) requested additional information regarding the transit-dependent population. In response to **RAI 13.03-11(a, b, c, d, e)** the following changes will be made in the revised ETE Report:

- Reference to "Table 8-6" on page 8-4 will be changed to "Table 8-7."
- Update Table 6-3 to change the 75% value for "Residents with Commuters in Household" to correctly read 68%.
- Clarify the text of Section 8.4 as detailed in the full response to RAI 13.03-11(b).

Confirmatory Action NRC 13.03-18 was created to track these revisions.

RAI 13.03-12(a, b, c) ask the applicant for the following clarifications regarding the transit dependent ETE. In response to RAI 13.03-12(a, b, c) the following changes will be made in the revised ETE report:

- Change travel time for bus route 2 to 45 minutes in description of route on page 8-7.

- Update Tables 8-7A and B – 45 minutes travel time for Route 2.
- Revise discussion of transit boarding time under "Activity: Board Passengers" on page 8-5.

Confirmatory Action NRC 13.03-19 was created to track these revisions.

RAI 13.03-20 ask the applicant to discuss the basis for using five buses for routes 1 and 5, six buses for routes 2, 3 and 6, and eight buses for route 4 as depicted on page 8-7 and to discuss the basis used to determine the number of buses required for each route. The applicant explained the reasoning for the distribution of buses throughout the urban areas of the EPZ and provided a revised Table 8-6 to include 50 scheduled bus runs. In response to RAI 13.03-20 the applicant will make the following revisions to the ETE Report:

- Revise Table 8-6 to account for an increase in bus runs to 50.
- Add the discussion provided in the RAI response to page 8-7 of the revised report.
- Revise the discussion of the number of buses needed for each r4oute on pages 8-7 and 8-8 of the revised report.

Confirmatory Action NRC 13.03-20 was created to track these revisions.

RAI 13.03-30 ask the applicant to explain why the average speed for the evacuation of transit-dependent people was used rather than the speeds that would exist during this timeframe for the evacuation. The applicant agrees that most schools are located in areas that will experience some congestion on the roadways and that speeds used in the analysis should reflect this congestion. The applicant will revise travel times in Tables 8-5A (School Evacuation Time Estimates – Good Weather) and 8-5B (School Evacuation Time Estimates – Rain) to reflect the local speeds as output by the computer model. The applicant will revise the discussion on pages 8-5 and 8-6 in Section 8 Transit Dependent and Special Facility Evacuation Time Estimates to reflect the changes. **Confirmatory Action NRC 13.03-21** was created to track these revisions.

RAI 13.03-33(a, b, c) requested the applicant explain the basis for mobilizing buses in 90 minutes. The following revisions will be made to the revised ETE Report in response to **RAI 13.03(a, b, c)**:

- Average speeds output by the model at two hours will be used to compute the ETE for special facilities. Page 8-9 will be revised accordingly.
- Text will be added to discuss the ETE for rain for special facilities.

Confirmatory Action NRC 13.03-22 was created to track these revisions.

RAI 13.03-34 ask the applicant to include the time to travel between facilities in the ETE calculation provided as an example at the top of page 8-9. The applicant acknowledged the oversight and stated a travel time of 10 minutes between special facilities (five minutes travel time between each of the three facilities serviced) would be included in the revised ETE report. **Confirmatory Action NRC 13.03-23** was created to track these revisions.

Based on staff review of the ETE Report, it appears the analysis may include truncated distributions. **RAI 13.03-48(a, b, c)** requested the applicant clarify the trip generation

~~times and distribution rates presented in specified sections of the ETE Report. The applicant provided a detailed discussion regarding distributions and truncations used in the ETE model. The text provided in response to **RAI 13.03-48(a, b, c)** will be added to Section 5 of the revised ETE report. **Confirmatory Action NRC 13.03-24** was created to track this revision.~~

13.3.1B.R.6 Other Requirements [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.V]

13.3.1B.R.6.1 Technical Information Related to Analysis of Other Requirements

Section 12, "Confirmation Time," of the ETE Report suggests a procedure to confirm that the evacuation process is effective in the sense that the public is complying with the Advisory to Evacuate. The procedure suggested employs a stratified random sample and a telephone survey to determine if a large percentage of households within the evacuation zone have actually been evacuated. The telephone calls would be made by a group of people each dialing a different set of telephone numbers. It is suggested that labor effort could be reduced by the use of automated computer controlled auto-dialing equipment. If the results of the telephone survey were to exceed 20 percent, the survey would be repeated hourly until the confirmation process was completed.

RAI 13.03-53(a) requested that the applicant discuss whether the counties have agreed with the ETE recommended evacuation confirmation methodology or if other county plans for confirmation exist, how they would work with the ETE approach. In response letter dated November 17, 2008, page 99, the applicant stated that no decision has been made regarding the actual methodology to be used and the purpose of the proposed approach was to provide an estimate of the time required to conduct the confirmation using one suggested method. **RAI 13.03-53(b)** ask the applicant to explain what is required if the telephone survey is less than 20%, but still significant (e.g., 15%). In response letter dated November 17, 2008, page 100, the applicant stated that a decision may be made by local response agencies to repeat the survey at a later time and/or to dispatch patrol cars to those areas that are slow to respond to the advisory to evacuate. **RAI 13.03-53(c)** requested the applicant discuss if the time to mobilize confirmatory personnel had been included in the time estimates and whether the time and resources needed to obtain telephone numbers for the EPZ is included. In response letter dated November 17, 2008, page 100, the applicant stated that the use of automated dialing equipment or multiple operators can significantly reduce the time needed to complete confirmation and recommends that a list of telephone numbers within the EPZ be available in the EPC at all times. The response noted that the 2 ½ hours between the Advisory to Evacuate and when the confirmation process would begin would allow operators to arrive at their workplace, obtain a call list and prepare to make the phone calls. ~~The staff finds the clarifications provided in the applicant's response to **RAI 13.03-53(a, b, c)** acceptable and therefore **resolved**.~~

The "Executive Summary" indicates development of the ETE Report was coordinated with emergency management personnel representing state and local governments. However, it was not clear from staff review if the state and local agencies had reviewed the ETE Report. **RAI 13.03-55(a)** ask the applicant to include all comments received from the counties with regard to the telephone survey, traffic management plan, and discussions over manpower and equipment issues. In response letter dated November 17, 2008, page 103, the applicant stated that a draft telephone survey was provided to the counties at the kickoff meeting, comments were provided and addressed at the meeting and a revised telephone survey was sent to the counties. Final approval was

given from each county before commencing with the telephone survey. Each county provided signed certification letters (included in the COL) verifying they approved the ETE document. **RAI 13.03-55(b)** requested the applicant identify comments made by the counties on the traffic management plan and clarify whether state and local police reviewed and approved the changes. The response provided in letter dated November 17, 2008, page 103, states that review of the traffic management plan was an iterative process with comments provided during meetings, conference calls and in emails. The comments were addressed and the traffic management plan was finalized. **RAI 13.03-55(c)** ask for clarification if the priority assigned to each traffic control point in Appendix G has been agreed to by local response agencies. In response letter dated November 17, 2008, page 103, the applicant provided clarification that the priority assigned to each point was developed in conjunction with law enforcement and emergency management personnel from each of the EPZ counties and the signed certification letters verify the counties approved the ETE document, including the traffic management plan. Responses to RAIs 13.03-38 (13.3.1B.R.4.1) and 13.03-55 provide descriptions of interactions with local agencies during development of the ETE Report. ~~The staff finds the clarification provided in the applicant's response to **RAI 13.03-55(a, b, c)** acceptable and therefore **resolved**.~~

13.3.1B.R.6.2 Technical Evaluation of Information Related to Other Requirements

The time required for confirmation of evacuation was estimated. In addition, the development of the ETE Report was coordinated with emergency planners from the state of North Carolina and Chatham, Wake, Harnett, and Lee Counties who are involved in emergency response for the site.

~~Clarification was requested in **RAI 13.03-53(a, b, c)** regarding county agreements on methods of confirming evacuation, telephone surveys, and mobilization, time and resources of confirmation personnel. The applicant provided clarification regarding the confirmation method described in Section 12, actions that may be needed if a significant portion (but less than 20%) of the population is confirmed to not have evacuated, and the time to mobilize the personnel needed for the confirmation process. **RAI 13.03-55(a, b, c)** requested the applicant provide county comments to the telephone survey and traffic management plan, how those comments were incorporated into the ETE and the plan, and clarification as to whether or not the local response agencies agreed to the priority assigned to each traffic control point as depicted in Appendix G. In response the applicant provided clarification regarding comments received from local responders on the telephone survey and traffic management plan.~~

The staff finds the clarification provided by the applicant pertaining to RAIs **13.03-53(a, b, c)** and **13.03-55(a, b, c)** to be acceptable and therefore **resolved**.

13.3.1B.R.7 Conclusion for the HNP ETE Report

The NRC staff has reviewed the evacuation time estimates and the applicant's responses to RAI 13.03-01 through RAI 13.03-58 in regards to Section 13.3 of NUREG-0800 related to the evacuation time estimate analysis. The staff identified the following Open Items ~~and Confirmatory Actions~~ as needing to be resolved before concluding that the ETE Report meets applicable requirements:

In response to **RAI 13.03-21(c)** the applicant acknowledged the large attendance at the Peak Fest and will include a sensitivity study of the festival in Appendix I of the revised ETE Report. ~~Until t~~In **Open Item 13.01-01, t**he applicant was requested to address the

impact that the large attendance at the Peak Fest would have on the Evacuation Time Estimate.

Furthermore, ~~NRC staff receives and reviews the study referenced in response **RAI 13.03-21(c)** regarding the impact of Peak Fest on the evacuation time estimate, this issue is **Open Item 13.03-01**.~~

~~I~~in response dated November 17, 2008, page 51, the applicant verified that school enrollment had increased by 9% since 2004-2005. The applicant identified that this increase would constitute the need for 26 more buses, and stated that it would not affect the ETEs for schools or the general population. However, ~~Although staff found the applicant's response to **RAI 13.03-26(a, b, c)** acceptable, the staff requested that Table 8-2 should be revised to reflect enrollment and bus demands for 2007-2008. The revision, therefore revision of Table 8-2 of the table is tracked as **Open Item 13.03-02**.~~

as a result of the applicants response to **RAI 13.03-26(a,b,c)** , the staff requested that Table 8-2 of the ETE Report be revised to reflect enrollment and bus demands for 2007-2008 prior to the staff concluding that RAI 13.03-26 (a,b,c) is acceptable. Therefore, the revision of Table 8-2 of the ETE Report is being tracked as **Open Item 13.3-02.**

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~~The applicant states they will revise discussion of construction scenario on page 3-2 of the ETE Report to indicate that all vehicles were extrapolated to 2016, with the exception of external traffic and Table 6-4 will be updated. The applicant will rerun construction ETE cases and update Tables 7-1 and J-1 accordingly. This issue is **Confirmatory Action NRC 13.03-01**.~~

~~The applicant provided a revised Table 6-3 which reflects consistent demographic statistics as those presented in Section 8 and Appendix F. As a result of extending the survey to include an overlooked zip code, the applicant will modify text and tables within Section 8 to reflect updated demographic statistics. This issue is **Confirmatory Action NRC 13.03-02**.~~

~~The applicant will make changes within Sections 3, 6, 7, and Appendix J to reflect changes in vehicle estimates. This issue is **Confirmatory Action NRC 13.03-03**.~~

~~The applicant will provided a new table that will be included in Appendix H of the revised ETE report that will identify the voluntary evacuation percentages per sub-zone. This issue is **Confirmatory Action NRC 13.03-04**.~~

~~The applicant will revise item 1 in the first paragraph of page 8-1 to read "(1) residents with no vehicles available; and" in the revised ETE Report. This issue is **Confirmatory Action NRC 13.03-05**.~~

~~The applicant will revise Table 8-2 to reflect the number of buses input into the model as depicted in Table 1 of the response. This issue is **Confirmatory Action NRC 13.03-06**.~~

~~The applicant will make changes to Section 8.2 of the ETE report to clarify the elements of the mobilization times for residents including a discussion of day care centers. This issue is **Confirmatory Action NRC 13.03-07**.~~

~~The applicant will include maps of schools, daycare, and medical facilities within Appendix E of the revised ETE report. This issue is **Confirmatory Action NRC 13.03-08**.~~

~~The response submitted by the applicant to **RAI 13.03-15** provides detailed and sufficient information to assess the ETE of the Transit Dependent Population. The~~

applicant indicates the information provided in the response will be added to the ETE study. This issue is **Confirmatory Action NRC 13.03-09**.

Table 8-4 will be updated in the revised ETE Report based on the information provided in the response to **RAI 13.03-31** and that the discussion in Section 8.3 will be updated accordingly. This issue is **Confirmatory Action NRC 13.03-10**.

The applicant stated the following changes will be made to the revised ETE report:

> Page 3-17, change "60 minutes" to "90 minutes" in the final paragraph
> Page 3-17, change "8,100 vehicles" to "12,150 vehicles."

This issue is **Confirmatory Action NRC 13.03-11**.

The applicant acknowledged the error in the 'prepare to leave activity' and 'travel home' sequence for scenarios (b) and (c) in Figure 5-1 and will modify Figure 5-1 to include those residents who may work during scenarios (b) and (c). **Confirmatory Action NRC 13.03-12** was created to track these revisions.

A new appendix (Appendix N, "ETE for Construction and Build-Out Scenarios") will be added to the ETE that includes time estimates for each of the scenarios identified in the TIA. In conjunction, the applicant will also add to the end of the "Construction" discussion on page 3-2 of the revised ETE report:

> "Appendix N presents ETE for Regions R01, R02 and R03 with the roadway improvements and estimated traffic demand presented in the Traffic Impact Analysis report."

Confirmatory Action NRC 13.03-13 was created to track these revisions

The applicant acknowledges that the percent of households referenced in Section 2.3 Assumption 3.b. was incorrect in the original ETE report and will correct the values as specified below:

> "26 percent of households" will be changed to "39 percent of households" on page 2-4 of the revised ETE Report.

Confirmatory Action NRC 13.03-14 was created to track this revision.

The applicant will remove Assumption 3.a. in Section 2.3 from the revised ETE report. **Confirmatory Action NRC 13.03-15** was created to track this revision.

The applicant will change the last column of table on page 2-5referenced to read "Mobilization Time for the General Population" in the revised ETE report. **Confirmatory Action NRC 13.03-16** was created to track this revision.

The applicant will revise Section 7 of the ETE report to clarify the 100 percent evacuation is intended to represent the general population. The second paragraph of Section 7 will be revised as follows:

The ETE for the *general population* (permanent residents, transients and employees commuting to work in the EPZ) for all Evacuation Cases are presented in Tables 7-1A through 7-1D. These tables present the estimated times to clear the indicated population percentages from the Evacuation Regions for all Evacuation Scenarios. The tablulated values of ETE are obtained from the PC-DYNEV simulation model outputs of vehicles exiting the specified evacuation areas. These data are generated at 10-minute intervals, and then interpolated to the nearest 5-minutes. Separate ETE are computed

for the special facility (schools and medical facilities) and transit-dependent populations within the EPZ; see Section 8 for details.

Confirmatory Action NRC 13.03-17 was created to track this revision.

In response to **RAI 13.03-11(a, b, c, d, e)** the following changes will be made in the revised ETE Report:

- Reference to "Table 8-6" on page 8-4 will be changed to "Table 8-7."
- Update Table 6-3 to change the 75% value for "Residents with Commuters in Household" to correctly read 68%.
- Clarify the text of Section 8.4 as detailed in the full response to RAI 13.03-11(b).

Confirmatory Action NRC 13.03-18 was created to track these revisions.

In response to **RAI 13.03-12** the following changes will be made in the revised ETE report:

- Change travel time for bus route 2 to 45 minutes in description of route on page 8-7.
- Update Tables 8-7A and B – 45 minutes travel time for Route 2.
- Revise discussion of transit boarding time under "Activity: Board Passengers" on page 8-5.

Confirmatory Action NRC 13.03-19 was created to track these revisions.

In response to RAI **13.03-20** the applicant will make the following revisions to the ETE Report:

- Revise Table 8-6 to account for an increase in bus runs to 50.
- Add the discussion provided in the RAI response to page 8-7 of the revised report.
- Revise the discussion of the number of buses needed for each r4oute on pages 8-7 and 8-8 of the revised report.

Confirmatory Action NRC 13.03-20 was created to track these revisions.

The applicant will revise travel times in Tables 8-5A (School Evacuation Time Estimates – Good Weather) and 8-5B (School Evacuation Time Estimates – Rain) to reflect the local speeds as output by the computer model. The applicant will revise the discussion on pages 8-5 and 8-6 in Section 8 Transit Dependent and Special Facility Evacuation Time Estimates to reflect the changes. **Confirmatory Action NRC 13.03-21** was created to track these revisions.

The following revisions will be made to the revised ETE Report in response to **RAI 13.03**:

- Average speeds output by the model at two hours will be used to compute the ETE for special facilities. Page 8-9 will be revised accordingly.
- Text will be added to discuss the ETE for rain for special facilities.

Confirmatory Action NRC 13.03-22 was created to track these revisions.

RAI 13.03-34 ask the applicant to include the time to travel between facilities in the ETE calculation provided as an example at the top of page 8-9. The applicant acknowledged the oversight and stated a travel time of 10 minutes between special facilities (five minutes travel time between each of the three facilities serviced) would be included in the revised ETE report. **Confirmatory Action NRC 13.03-23** was created to track these revisions.

The applicant provided a detailed discussion regarding distributions and truncations used in the ETE model. The text provided in response to **RAI 13.03-48** will be added to Section 5 of the revised ETE report. **Confirmatory Action NRC 13.03-24** was created to track this revision.

Upon resolution of these items, the ETE Report will be consistent with and will meet the requirements of 10 CFR 50, Appendix E.IV.

13.3.1C.R Evacuation Time Estimate (ETE) Analysis

13.3.1C.R.1

The Shearon Harris Nuclear Power Plant Units 1, 2, and 3 (HNP) Emergency Response Plan (HNP Emergency Plan) includes an analysis of the time required to evacuate the plume exposure pathway emergency planning zone (EPZ) and for taking other protective actions for various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations. The report titled "Harris Nuclear Plant Development of Evacuation Time Estimates," dated August 2007 (ETE Report) was provided as a separate document in the COL application. The ETE Report and the associated RAI responses provide the basis for the following discussion and analyses.

The staff reviewed the ETE Report against current NRC requirements and guidance and for consistency with other parts of the COL Application, including the Final Safety Analysis Report (FSAR). Citations in the report were verified by comparison to the cited document text. General descriptions of the HNP region, population, and highways were verified using internet searches and aerial photographs.

13.3.1B.R.1 Regulatory Basis for the ETE Analysis

The staff considered the following regulatory requirements and guidance in the review of the evacuation time estimate analysis:

[**10 CFR 52.79(a)(21) refers to Appendix E to 10 CFR 50**] Section IV. “Content of Emergency Plans,” of Appendix E to 10 CFR 50 requires that the nuclear power reactor operating license applicant provide an analysis of the time required to evacuate and for taking other protective actions for various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations.

The staff evaluated the ETE Report against Appendix 4, “Evacuation Time Estimates within the Plume Exposure Pathway Emergency Planning Zone,” to NUREG-0654/FEMA-REP-1. Appendix 4 contains detailed guidance that the staff used in determining whether the ETE analysis meets the applicable regulatory requirements in Appendix E to 10 CFR 50.

13.3.1B.R.2 Introductory Materials [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.I]

13.3.1B.R.2.1 Technical Information in Introductory Materials

Section 1, "Introduction," of the ETE Report provides an overview of the process used to estimate the ETE and presents a comparison to a 2002 ETE study conducted for the plant. A description, including a map (Figure 1-1, "Harris Nuclear Plan Site Location"), of the EPZ and surrounding area was provided. Additional information regarding provision of a map which identifies topographical features, including elevations, was requested in **RAI 13.03-04**. In response letter dated November 17, 2008, page 9, the applicant explained that the reference to topographical features in NUREG 0654 was interpreted as those features that could affect evacuation planning, not actual elevations which would be depicted as topographic contours.

The study estimates and assumptions of the ETE are provided in Section 2, “Study Estimates and Assumptions,” of the report. Population estimates in the ETE were based on data from the 2000 US census projected to the year 2007. County-specific growth-rate projections were estimated by comparing 2000 census data and 2005 census

estimates. County emergency management officials provided employment data that was used to estimate the population of employees who commute into the EPZ to work. County emergency management offices also provided information that was used to estimate special facilities populations.

Roadway capacity estimates are based on field surveys and application of Highway Capacity Manual 2000 published by the Transportation Research Board of the National Research Council (Highway Capacity Manual). Population mobilization times are based on a statistical analysis of data acquired from a telephone survey, as is the relationship between resident population and evacuating vehicles (vehicle occupancy factors). Those without access to private vehicles will be transported in waves to reception centers by county busses, with 50% sharing rides with family, neighbors, and friends. The analysis included elements such as voluntary evacuation of people within the EPZ but outside of regions for which evacuation is occurring, and “shadow” evacuations of people outside of the EPZ, when computing the ETE. These two evacuation elements are generally considered as a potential impediment to overall evacuation. The assumptions on evacuation were based on simultaneous evacuation of inner and outer sectors.

Additional assumptions regarding the development of population estimates, including pass-through populations and regional employees, are provided in Section 3, "Demand Estimation," and Appendix E, "Special Facility Data." Assumptions regarding transit-dependent and special populations are in Section 8, "Transit-Dependent and Special Facility Evacuation Time Estimates." Development of trip generation times from survey responses is described in Section 5, "Estimation of Trip Generation Time."

An outline of the approach for estimating the time to evacuate is presented in Section 1, with a link-node map (Figure 1-2, "Harris Link-node Analysis Network") of the evacuation routes that was developed for the analyses. **RAI 13.03-41** requested that the map be revised to include annotation of the nodes (numbered in some manner) to support the review and that a roadway map be provided that includes sector and quadrant boundaries. In response letter dated November 17, 2008, page 80, the applicant provided an updated PDF file of Figure 1-2.

Further details on the methodology are provided in Section 3, Section 4, "Estimation of Highway Capacity," Section 5, and Section 6, "Demand Estimation for Evacuation Scenarios," as well as in Appendix C, "Traffic Simulation Model: PC-DYNEV," and Appendix D, "Detailed Description of Study Procedure." Details of the link-node map are presented in Appendix K, “Evacuation Roadway Network Characteristics.”

A total of 12 "Scenarios" representing different seasons, time of day, day of week and weather were considered in the analysis. The analysis included one special event scenario: the construction period of a new nuclear plant using peak workforce population projections for proposed units 2 and 3. In **RAI 13.03-21(a, b, c, d)**, the staff requested additional information as to why no peak tourist events were considered as a special scenario (specifically Peak Fest, which is held every May) and for an explanation of resources used to determine special events. In response to **RAI 13.03-21(a, b, c, d)** in letter dated November 17, 2008, page 42, the applicant provided clarification regarding designating new plant construction as a special event, justification for their determination of special events, and justification for their determination of special events. In response to **RAI 13.03-21(c)** the applicant acknowledged the large attendance at the Peak Fest and will include a sensitivity study of the festival in Appendix I of the revised ETE Report.

13.3.1B.R.2.2 Technical Evaluation of Introductory Materials

The ETE Report describes the method of analyzing the evacuation times. A general description of the evacuation model was provided including the assumptions used in the evacuation time estimate analysis.

The ETE Report includes a map showing the proposed site and plume exposure pathway EPZ, as well as transportation networks, topographical features, and political boundaries. The boundaries of the EPZ, in addition to the evacuation subareas within the EPZ, are based on factors such as current and projected demography, topography, land characteristics, access routes, and jurisdictional boundaries.

The ETE Report describes the method of analyzing the evacuation times. A general description of the IDYNEV modeling system was provided. The IDYNEV system consists of several sub-models: a macroscopic traffic simulation model, an intersection capacity model, and 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 traffic assignment and distribution model, which 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.

The staff finds the responses provided by the applicant pertaining to **RAIs 13.03-04, 13.03-41, and RAI 13.03-21 (a,b, and d)** to be acceptable and therefore **resolved**. In response to **RAI 13.03-21(c)**, the applicant acknowledged the large attendance at the Peak Fest and stated that a sensitivity study of the festival in Appendix I will be included in the revised ETE Report. This issue was identified by the staff as **Confirmatory Action NRC 13.03-01.** Furthermore, the staff requested that the applicant discuss the impact, if any, that the additional information referenced in the response to RAI 13.03-21(c) regarding the Peak Fest would have on the Evacuation Time Estimate study. This issue has been identified by the staff as **Open Item 13.03-01**.

13.3.1B.R.3 Demand Estimation [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.II]

13.3.1B.R.3.1 Technical Information Related to Demand Estimation

Section 3 of the ETE Report provides an estimate of the number of people who could need to be evacuated in an event. The populations considered in this section include residents, employees, transients, and medical facilities. Appendix E provides separate tables for schools, day care facilities, medical and assisted living facilities, major employers, recreational areas, and lodging located within the EPZ. (A separate analysis for transit-dependent and special facility populations is contained in Section 8.) Employees who work within the EPZ but who live outside of the EPZ and commute to jobs within the EPZ are assumed to evacuate along with the permanent resident population. Other transient groups include visitors to local recreational areas, shopping centers, and parks, and those residing in non-permanent residential units (e.g., hotels, apartments, campgrounds). Vehicles traveling through the EPZ (external-external trips) at the time of an event are assumed to continue to enter the EPZ during the first 60 minutes. Subsequently, no “pass-through” vehicles will likely enter the EPZ and those remaining evacuate with the residents and other transients. Figures summarizing the various population groups are provided in the ETE in the format suggested by NUREG-0654 Appendix A. **RAI 13.03-1(a, b, c, d)** requested information regarding the population estimates. Additional information was requested in **RAI 13.03-1(a)** regarding

the differences in population numbers between the ETE Report and the Environmental Report (ER) and FSAR. The applicant provided clarification in a letter dated November 17, 2008, page 4, on the different methodologies used in the ETE Report and the ER and FSAR to determine the population numbers. Because different population estimate methodologies were used for the stated documents, there are variations in the population numbers.

RAI 13.03-1(b) ask for clarification if migrant workers were considered in the ETE transient population estimates because migrant workers had been addressed in the ER and FSAR, but not specifically mentioned in the ETE Report. The applicant responded in letter dated November 17, 2008, page 5 that the four EPZ county plans were reviewed and none of them mentioned a migrant worker population. The response further stated the during the road survey conducted for the ETE analysis, no major farms were observed. Therefore, they did not include migrant workers in the transient population estimates. Through further Staff review of the ER and FSAR, it was discovered that these two documents derived their migrant worker population estimates by using the state average provided in the USDA 2002 Census of Agriculture for North Carolina rather than from actual known populations identified within the vicinity of HNP. Staff review of the county-specific data found the 2002 census indicated very low migrant worker populations for Wake (101), Chatham (4), Harnett (61), and Lee (21) Counties.

The transient populations identified within the HPN EPZ included users of Jordan Lake State Recreation Area and Harris Lake facilities with a total peak use estimate of 14,254 persons. In addition, there are three major hotels and three bed and breakfasts with a total capacity of 472 people. Therefore the entire transient population at peak use is estimated to be 14,726.

RAI 13.03-1(c) ask the applicant to describe the provisions for updating the ETE to account for population growth and changes in infrastructure in the EPZ over the life of the HNP. The response letter dated November 17, 2008, page 5, stated that the ETE analysis will remain valid until the population within the EPZ increases by greater than 10% and that an ETE update should be performed every five years to ensure the adequacy of other evacuation assumptions.

Section 3 contains a discussion of the special event scenario for peak construction in the year 2016. **RAI 13.03-1(d)** ask for clarification of the specific populations considered in this scenario and if different from those used in the 2007 scenarios, how comparison of the 2007 and 2016 provides meaningful information. The response to **RAI 13.03-1(d)** submitted by the applicant in letter dated January 8, 2009, page 4, provides detailed and sufficient information to assess the specific populations used in an updated 2016 scenario. The applicant indicates the information provided in the response will be added to the ETE Report and that Tables 6-4, 7-1 and J-1 will be updated accordingly in the revised Report. **Confirmatory Action NRC 13.03-02** was created to track these revisions.

Figures 3-2, “Permanent Residents by Sector,” and 3-3, “Permanent Resident Vehicles by Sector,” both contain a note: “3 Miles to EPZ Boundary.” (The note also appears on Figures 3-4, 3-5, 3-6, and 3-7.) **RAI 13.03-13** ask for clarification as to the meaning of the note as it was not evident from the figures themselves. In response dated November 17, 2008, page 27, the applicant explained the notation referred to the main body of the figure showing the detailed population from a distance of 3 miles to the EPZ boundary, hence the notation.

Employees who work within the EPZ, but who live outside of the EPZ and commute to jobs within the EPZ, are assumed to evacuate along with the permanent resident population. In **RAI 13.03-16**, the staff requested clarification of discrepancies in commuter values presented on page 8-3 versus the values presented in Table 6-3, "Percent of Population Groups for Various Scenarios." In response dated November 17, 2008, page 31, the applicant stated that a zip code was overlooked during the telephone survey and that revisions to Section 8 of the ETE Report will be made to reflect results from the telephone survey. In response to **RAI 13.03-16** the applicant provided a revised Table 6-3 which reflects consistent demographic statistics as those presented in Section 8 and Appendix F. As a result of extending the survey to include an overlooked zip code, the applicant will modify text and tables within Section 8 to reflect updated demographic statistics. **Confirmatory Action NRC 13.03-03** was created to track these revisions. **RAI 13.03-14** questioned why the employee values used in Table 6-3 for the various summer scenarios are reduced considering the large number of campsites and recreational areas identified in Section 3 of the Report. In response dated November 17, 2008, page 28, the applicant provided a sufficient explanation of the reasoning for the values presented including a rough estimate of the reduction of employees due to summer vacations. **RAI 13.03-22** questioned the basis for such a small number of employees estimated to work within the EPZ. In response letter dated November 17, 2008, page 44, the applicant explained that many residents travel outside of the EPZ to work. Based on the telephone survey, only 23% of the employed EPZ residents work within the EPZ. The response also described the methodology used to estimate the number of employees commuting into the EPZ.

RAI 13.03-10 requested a clarification on Table 6-4, "Vehicle Estimates by Scenario," regarding what data the table represents. In response dated November 17, 2008, page 21, the applicant clarified that Table 6-4 represents a 100% evacuation of the entire EPZ. In response to **RAI 13.03-10**, the applicant will make changes within Sections 3, 6, 7, and Appendix J to reflect changes in vehicle estimates. **Confirmatory Action NRC 13.03-04** was created to track these revisions. **RAI 13.03-45(a)** ask the applicant to provide the assumption with regard to trip generation times and loading of the network for the shadow evacuation values used in Table 6-4. The applicant stated in response dated November 17, 2008, page 87, that the shadow vehicles are loaded on the transportation network using the same trip generation times as EPZ residents with Commuters – Distribution C in Table 5-1. **RAI 13.03-45(b)** requested in explanation as to how the 30% increase of vehicles depicted in Table I-2 of Appendix I was distributed through the EPZ. In response dated November 17, 2008, page 87, the applicant provided clarification regarding the shadow evacuation methodology used in the model. Staff requested in **RAI 13.03-47** that the applicant discuss allocation of the voluntary evacuation population within Table 6-3. The applicant clarified in response letter dated November 17, 2008, page 90, that Tables 6-3 and 6-4 represent an evacuation of the full EPZ and do not address voluntary evacuations. The response to **RAI 13.03-47** included a new table: Table H-1, "Percent of Sub-Zone Population Evacuating for Each Region" which will be provided in Appendix H of the revised ETE. **Confirmatory Action NRC 13.03-05** was created to track this revision.

Section 8 of the ETE report includes separate calculations for special populations and transit-dependent individuals. The transit-dependent population considered included residents, employees, and transients that do not have a vehicle available, persons in households that do have vehicles that would not be available at the time the evacuation is ordered, and residents of special facilities such as schools, hospitals, and day cares. Telephone survey results (reported in Appendix F) were used to estimate the portion of

the population requiring transit service. The study assumed that half of the transit-dependent people would ride-share with others, but that as indicated in Table 8-1, "Transit Dependent Population Estimates," a residual 1,645 persons would require about 55 buses for evacuation. Based on staff review, it appears that in Table 8-1 only residents were factored into those needing transit. Therefore, **RAI 13.03-23** requested the applicant discuss if employees and transients are expected to need transit service. In response dated November 17, 2008, page 47, the applicant stated the lack of mass transit service in the area indicates virtually all transients and employees will have private vehicles available. In response to **RAI 13.03-23**, the applicant will revise the language of item 1 in the first paragraph of page 8-1 to read "(1) residents with no vehicles available; and" in the revised report. **Confirmatory Action NRC 13.03-06** was created to track this revision. Results of the ETE for transit vehicles is provided for both good weather and adverse weather conditions, including an ETE for a "second wave" of buses needed along the more populous evacuation routes.

Special populations are discussed in detail in Appendix E, "Special Facility Data." The appendix includes special facility population information for schools, day care facilities, medical and assisted living facilities, and major employers. According to ETE Report Table 8-2, "School Population Demand Estimates," there are 21 schools in Wake County and one school in Chatham County. Based on Staff review of available data, it appeared that there may be schools within the EPZ that were not included in the ETE analysis. **RAI 13.03-25** lists eight schools that appear to be located within the EPZ but were not included in Appendix E or Table 8-2, and requested the applicant to verify if they are within the EPZ and if so, the affect the schools may have on the ETE. In the response letter dated November 17, 2008, page 49, the applicant provided a map showing the schools in question are outside the EPZ boundary. **RAI 13.03-26(a, b, c)** stated that student populations shown in Table 8-2 differ from published values and ask for a discussion of the resources used to identify the school populations, if the larger student populations should be included in the special facility transit demand analysis and to provide information to support the evacuation time for the additional students. In response dated November 17, 2008, page 51, the applicant verified that school enrollment had increased by 9% since 2004-2005. The applicant identified that this increase would constitute the need for 26 more buses, and stated that it would not affect the ETEs for schools or the general population.

RAIs 13.03-27(a, b, c) requested information to support the data provided in Table 8-2. The issues were generally related to the number of buses required for evacuation of all schools simultaneously and driver availability. The applicant responded in letter dated November 17, 2008, page 54, that the counties had indicated sufficient bus and driver resources were available to evacuate all schools in a single wave. **RAI 13.03-28** ask the applicant to clarify the estimate of the buses needed and whether or not teachers were included as part of the school population to be evacuated. In the response dated November 17, 2008, page 56, the applicant assumed one teacher per bus and recognized that the rounding down of buses in Table 8-2 did not match the data used for inputs in to the DYNEV model, provided with the response as Table 1, "Harris EPZ – School Bus Loading". As a result of the response to **RAI 13.03-28**, Table 8-2 will be revised to reflect the number of school buses input into the model as depicted in Table 1 of the response. **Confirmatory Action NRC 13.03-07** was created to track this revision.

According to Appendix E, there are 45 day care centers in Wake County; however, the appendix does not provide complete data regarding the current enrollment or employee numbers. The main text of the ETE does not specifically address the day care

populations or their evacuation. **RAI 13.03-03** ask the applicant to discuss how the evacuation of day care children was addressed in the ETE analysis. In letter response dated November 17, 2008, page 8, the applicant stated that it was assumed daycare children are picked up by their parents and that the activity was accounted for in the mobilization times for residents. In response to **RAI 13.03-03**, the applicant will make changes to Section 8.2 of the revised ETE Report to discuss day care centers. **Confirmatory Action NRC 13.03-08** was created to track this revision. In addition, **RAI 13.03-32** requested that a map be provided to indicate the location of special facilities (schools, day care, or medical) within the EPZ. In response letter dated November 17, 2008, page 65, the applicant provided three new figures that indicate the locations of these facilities: Figure E-1, "Schools within the Harris EPZ," Figure E-2, "Daycare Facilities within the Harris EPZ," and Figure E-3, "Medical Facilities within the Harris EPZ." In response to **RAI 13.03-32**, the applicant will include the new maps within Appendix E of the revised ETE Report. **Confirmatory Action NRC 13.03-09** was created to track these revisions.

It was not clear if Table 8-1, "Transit Dependent Population Estimates," included individuals with special needs. **RAI 13.03-15** requested the applicant discuss whether data from registration cards was used in the ETE calculation for transit-dependent persons. The response submitted by the applicant in letter dated January 8, 2009, page 11, provided detailed information regarding recent communication with the counties concerning registered the homebound special needs population within the EPZ and sufficient information to assess the ETE of the transit dependent population. The applicant indicates the information provided in the response to **RAI 13.03-15** will be added to the ETE study on page 8-9 under a new subheading titled "Special Needs population". **Confirmatory Action NRC 13.03-10** was created to track these revisions.

There are 27 medical and assisted living facilities in Wake County and one in Lee County found within the EPZ with capacity of 775 residents (current census is 597 residents) and approximately 500 staff. There are no correctional facilities within the EPZ boundaries. Table 8-4, "Special Facility Transit Demand," indicates that 23 ambulance runs are required. However, the table does not include current census information for six of the 27 facilities. **RAI 13.03-31(a, b, c)** ask the applicant to address ambulance needs based on capacity rather than census and identify assumptions used to determine sufficient ambulance availability. In the response letter dated November 17, 2008, page 63, the applicant provided justification regarding their assumptions for ambulance demand for special facilities. The applicant provided justification for their assumption that the special facility evacuation can be accomplished in a single wave, but also provided details regarding the special facility ETE for a second wave, if needed. The applicant stated that not all residents of a facility would require ambulance transportation. Based on available data, approximately 6.4% of facility occupants are bedridden. The ambulance needs for those facilities that could not be documented were projected based on the provided data. In response to **RAI 13.03-31(a, b, c)**, Table 8-4 will be revised to reflect ambulance demand for all special facilities and the special facilities discussion in Section 8.3 will be revised accordingly. **Confirmatory Action NRC 13.03-11** was created to track these revisions.

RAI 13.03-19(a, b, c, d) requested clarification regarding the methodology used to determine the actual number of transit-dependent persons requiring bus service. In response, the applicant explained the reasoning for full bus capacity, timing between bus runs and explained actions that would be taken if buses did catch up with one another, and for the number of waves needed for the transit dependent evacuation.

Page 3-17 of the ETE Report discusses the “pass-through” demand of vehicles entering the EPZ during an evacuation. **RAI 13.03-44** ask that the applicant provide the basis for the estimated 8,100 pass-through (external to external) trips and how it relates to the background traffic already on the roadway network. In response letter dated November 17, 2008, page 85, the applicant provided clarification regarding flow rates used in the ETE as well as background traffic assumed on the roadway when the evacuation begins. Based on the clarification provided in response to **RAI 13.03-44** the applicant further stated the following changes will be made to the revised ETE report:

> Page 3-17, change “60 minutes” to “90 minutes” in the final paragraph
> Page 3-17, change “8,100 vehicles” to “12,150 vehicles.”

Confirmatory Action NRC 13.03-12 was created to track these revisions.

Figures summarizing the various population groups are provided in the ETE Report in the format suggested in Appendix 4, "Evacuation Time Estimates within the Plume Exposure Pathway Emergency Planning Zone,” of NUREG-0654/FEMA-REP-1. The figures include: Figure 3-2, "Permanent Residents by Sector," Figure 3-3, "Permanent Resident Vehicles by Sector," Figure 3-4, "Transient Population by Sector," Figure 3-5, "Transient Vehicles by Sector," Figure 3-6, "Employee Population by Sector," and Figure 3-7, "Employee Vehicles by Sector."

13.3.1B.R.3.2 Technical Evaluation of Information Related to Demand Estimation

The ETE Report provides an estimate of the number of people who may need to evacuate. Three population segments are considered: permanent residents, transients, and persons in special facilities. The permanent population is adjusted for growth, and the population data is translated into two groups: those using automobiles and those without automobiles. The number of vehicles used by permanent residents is estimated using an appropriate automobile occupancy factor. In addition, evacuation time estimates for simultaneous evacuation of the entire plume exposure pathway EPZ were determined.

Estimates of transient populations are developed using local data including peak tourist volumes and employment data. Estimates for special facility populations (schools, medical care, and day care) are also provided.

The subareas, for which evacuation time estimates were determined, encompass the entire area within the plume exposure EPZ. The maps are generally adequate for the purpose, and the level of detail is approximately the same as United States Geological Survey (USGS) quadrant maps. The assumptions on evacuation are based on simultaneous evacuation of inner and outer sectors.

The staff finds the clarifications provided by the applicant pertaining to the following **RAIs: 13.03-01(a, b, c), 13.03-13, 13.03-14, 13.03-22, 13.03-45 (a, b), 13.03-25, 13.03-27(a, b, c), and 13.03-19(a, b, c, d)** to be acceptable and therefore **resolved**.

[Insert a brief summary for each Confirmatory Action explaining the commitment that the applicant has made to the staff. Make reference to the original RAI number rather than re-stating the original RAI question. Look at the Technical Evaluation portion of the “Introductory Materials” and the latest guidance document for additional details]

Furthermore, as a result to the applicants response to **RAI 13.03-26(a,b,c)** , the staff requested that Table 8-2 of the ETE Report be revised to reflect enrollment and bus demands for 2007-2008 prior to the staff concluding that RAI 13.03-26 (a,b,c) is acceptable. This issue is **Open Item 13.3-02.**

13.3.1B.R.4 Traffic Capacity [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.III]

13.3.1B.R.4.1 Technical Information Related to Traffic Capacity

Section 4 of the ETE Report describes estimation of highway capacity. The methods used are generally taken from the Highway Capacity Manual published by the Transportation Research Board of the National Research Council. Clarification of capacity estimation and trip generation was requested in **RAI 13.03-09(a, b, c, d, e, f)** with regard to the values for each intersection variable. **RAI 13.03-09(a)** requested the applicant provide a general description of other important algorithms used in the PC-DYNEV traffic simulation model, in particular, routines describing traffic control and vehicle routing. In response letter dated November 17, 2008, page 17, the applicant refers to additional references which are identified in the original ETE report for further information on algorithms used. While these references do not in fact discuss the algorithms, they do provide information on measures of effectiveness for the algorithms in the model and are sufficient to support the response to the RAI. **RAI 13.03-09(b)** requested the applicant provide the values of the parameters in the equations, where applicable, including Mean Duration of Green Time and Mean Queue Discharge as described on page 4-1, clarify if values were estimated or field verified and discuss if the equation is applicable for manned intersections. The discussion provided in response letter dated November 17, 2008, page 18, identified how the variables were derived by applying the I-DYNEV system and how the model allocates effective green time for intersections. **RAI 13.03-09(c)** ask the applicant to explain how the Capacity Estimate on Approaches to Intersections equation on page 4-1 is affected by traffic control at intersections and to discuss if the modeling addressed traffic through intersections considering traffic control or the equation presented. In response letter dated November 17, 2008, page 18, the applicant provided discussion on the relationship between traffic control points (TCPs) and modeling of intersections. In **RAI 13.03-09(d)**, the applicant was asked to discuss the assumptions and inputs for the nodes and segments with respect to the field survey. The response submitted by the applicant in letter dated January 8, 2009, page 7, provides detailed and sufficient information on assumptions and inputs used in the analysis of the roadway network. The information provided clarifies the use of field data in the assessment of evacuation times as presented in the ETE study. **RAI 13.03-09(e)** noted the definition of “F” on page 4-2 is defined as various known factors influencing “hm” and requested the applicant identify the important “F”-factors for the turn movement “hm”. The response submitted by the applicant in letter dated January 8, 2009, page 9, provided detailed and sufficient information on capacity reduction factors used in the analysis of the roadway network. The information provided clarifies the use of the equations presented in the ETE study. **RAI 13.03-09(f)** ask the applicant to discuss the level of detail to which the traffic management strategy is represented in the modeling. In response letter dated November 17, 2008, page 20, the applicant provided an adequate discussion on the allocation of effective green time for traffic controlled intersections.

In **RAI 13.03-24** the applicant was ask to discuss the reasoning behind transients not returning to their “residence” prior to evacuation as shown in Section 5, Figure 5-1, Events and Activities Preceding the Evacuation Trip. Staff further noted that those in hotels may return to gather their belongings therefore the applicant was ask to also

discuss how this would affect the time for the transient population to evacuate. In response letter dated November 17, 2008, page 17, the applicant clarified the assumptions regarding transient population mobilization and stated the mobilization distribution for transients extends over a period of 2 ½ hours and those who elect to return to the motel to pick up belongings would be able to do so within this time frame.

Section 4, page 4-4, states "based on empirical data collected on freeways, we have employed a value of R=0.85." In **RAI 13.03-43** the applicant was ask to provide additional information, such as a reference, for the basis of this empirical data, to clarify if the R factor applied only to freeways or was also applied to the rural roads of the EPZ, and to explain the basis for applying this factor to other than freeways, if applicable. In response letter dated November 17, 2008, page 83, the applicant provided clarification regarding the reduction factor used in modeling including a statement that the advisability of such a capacity factor is based upon empirical studies that identified a fall-off in the service flow rate when congestion occurs at 'bottlenecks" or "choke points" on a freeway system.

For the trip generation time events and activities in Figure 5-1, Events and Activities Preceding the Evacuation Trip, it appears that for scenarios (b) and (c), the assumption is 100% of the public is at home when the sirens sound. **RAI 13.03-50** requested an explanation for the basis for not having a 'prepare to leave activity' and 'travel home' sequence for these scenarios. In response letter dated November 17, 2008, page 50, the applicant acknowledged the error and will modify Figure 5-1 to include those residents who may work during scenarios (b) and (c). **Confirmatory Action NRC 13.03-13** was created to track these revisions.

In the distribution of data tables in Section 5, there is a note that states the survey data was normalized to the "Don't Know" response. **RAI 13.03-51** ask the applicant to provide additional information to explain the normalization process. In response letter dated November 17, 2008, page 97, the applicant provided clarification regarding the normalization of the "Don't Know" response within the telephone survey by stating it is accepted practice in conducting surveys of this type to accept the answers of a respondent who offers a "don't know" response. The "don't know" responses are, in effect, ignored and the distributions are based upon the positive data acquired.

Section 2.1, Data Estimate 3, states that roadway capacity was estimated for each segment based on the field surveys and on the HCM. Section 4, page 4-5, states the two-lane roadway capacity is 1700 pc/hr as identified in Chapter 20 of the HCM. The HCM identifies these capacities for 'ideal conditions which include physical and operational conditions. Chapter 20 of the HCM does identify 1700 pc/hr as the capacity of a 2-lane roadway when the roadway meets the Base Conditions of Chapter 12 such as 12-foot lane widths and 6-foot shoulders. Operational conditions would include such items as time spent following other vehicles. Clarification was requested in **RAI 13.03-42** if the field survey confirmed that lane widths meet the conditions for 'ideal'. The applicant was asked to discuss the operational considerations applied to the roadway capacity estimate and if necessary, to explain the affect on the ETE if the capacity is determined to be lower than the value used. In response letter dated November 17, 2008, page 81, the applicant provided clarification regarding information provided in Appendix K which provides the downward adjustments to the capacity estimate of 1,700 pc/hr when the base conditions were not realized.

The roadway network is identified on multiple figures including Figure 1-2 Harris Link-Node Analysis Network. According to the North Carolina Department of Transportation and the North Carolina Turnpike Authority, a new Interstate (I-540) is under construction and planned to traverse immediately west of Apex. I-540, which is planned to be open to traffic in the fall of 2011, will link Apex, Holly Springs, and Fuquay-Varina. **RAI 13.03-39** requested the applicant discuss why this new Interstate was not considered in the modeling of the roadway network and to identify the affects this roadway may have on the ETE. In response letter dated November 17, 2008, page 77, the applicant provided clarification regarding what portions of the highway that have already been opened and stated that there is ongoing controversy over financing the remainder of the highway and that its completion is uncertain.

Appendix K that provides road characteristics, lists lane widths as 1 or 2 inferring two lane and highways. The actual width of the lane is not provided. It is not mentioned whether lane widths were measured, most likely during the field survey, and if they were one consistent width. Section 1.3, page 1-5, states that unusual roadway characteristics were identified in the field survey including: narrow bridges, sharp curves, poor pavement, flood warning signs, inadequate delineations, etc. This information is not discussed in other areas within the document. Identify the narrowest section or other areas that are not uniform. **RAI 13.03-40** requested the applicant discuss how this information was used in the ETE calculations, provide the value that was used for the "Full Lane" lane width in Appendix K identify where the narrowest roadway sections exist within the roadway network and discuss how this was factored into the calculation. In response letter dated November 17, 2008, page 78, the applicant provided clarification regarding the field information obtained during the roadway survey and the representation of this information within the ETE study and Appendix K.

The proposal to increase the level of the Harris Reservoir by approximately 20 feed could potentially affect the evacuation time. This additional depth will have an impact on the surrounding infrastructure and roadway network, the effect of which is difficult to define without details on the improvements to accompany the increase in size of the reservoir. **RAI 13.03-57(a, b, c, d, e, f)** ask for additional information to clarify any affect on the ETE. **RAI 13.03-57(a)** ask the applicant to identify the proposed water surface elevation and limits of the area in which the reservoir is to be raised. In response letter dated November 17, 2008, page 106, the applicant provided information on the proposed water surface elevation as well as the area where the reservoir is to be raised. **RAI 13.03-57(b)** requested discussion of whether the roadway alignments will remain the same. In response letter dated November 17, 2008, page 107, the applicant discussed the two roadway alignments that are expected to change as a result of the reservoir. **RAI 13.03-57(c)** requested the applicant discuss whether electrical power lines within the area will need to be raised to provide adequate roadway clearance or if any new roadways will be constructed to avoid power line replacement. In response letter dated November 17, 2008, page 107, the applicant provided clarification that if any roads are improved, electrical power lines will be adjusted to the required height as necessary and that roadway/power line improvements are not anticipated to impact evacuation times**. RAI 13.03-57(d)** requested a discussion of whether infrastructure adjacent to the reservoir will require reconstruction and if so, will the size of the facilities be the same as current or add additional capacity that could then impact the evacuation times. In response letter dated November 17, 2008, page 107, the applicant discussed a possible capacity increase for boat ramps but that the increase would not impact the existing evacuation times. **RAI 13.03-57(e)** requested the applicant discuss whether the

higher water level will cause nearby roadways to be susceptible to flooding during adverse weather conditions. In response letter dated November 17, 2008, page 107, the applicant discussed the possibility of flooding on roadways due to the increased height of the reservoir. Roadways susceptible to flooding during adverse weather would be addressed as part of the final design of roadway improvements. This is a design element and as such it is appropriate to defer this to the designers responsible for the roadway. **RAI 13.03-57(f)** ask the applicant to discuss whether the higher water level will create any new areas that may be land-locked by water and require additional time to evacuate. In response letter dated November 17, 2008, page 107, the applicant clarifies that there would be no new land-locked areas as a result of raising the level of the reservoir.

A Transportation Impact Analysis (TIA) report was prepared by the applicant to evaluate the impact of raising the level of the reservoir by 20 feet and improving some of the road/interchanges near the plant to accommodate construction traffic. The ETE Report does not reference the TIA. **RAI 13.03-58** requested the applicant discuss if the transportation network, as analyzed in the ETE, considers any improvements or modifications identified in the TIA and any impact on the ETE as a result of the TIA. In response letter dated December 3, 2008, page 2, the applicant provides a detailed assessment of potential impacts of improvements identified in the TIA. A new appendix (Appendix N, "ETE for Construction and Build-Out Scenarios") will be added to the ETE that includes time estimates for each of the scenarios identified in the TIA. The ETE values in the appendix support a conclusion that the improvements will reduce the ETE by a small amount when complete. In conjunction, the applicant will also add to the end of the "Construction" discussion on page 3-2 of the revised ETE report:

> "Appendix N presents ETE for Regions R01, R02 and R03 with the roadway improvements and estimated traffic demand presented in the Traffic Impact Analysis report."

Confirmatory Action NRC 13.03-14 was created to track these revisions.

Section 9, "Traffic Management Strategy," presents a traffic control and management strategy that is designed to expedite the movement of evacuating traffic. The traffic management strategy is based on a field survey of critical locations, computer analysis of the evacuation traffic flow environment, consultation with emergency management and enforcement personnel, and prioritization of traffic control points. This section also proposes the use of Intelligent Transportation Systems (ITS) technologies to benefit the evacuation process (such as dynamic message signs, highway alert radio, automated traveler information systems, and GPS units).

RAI 13.03-36 requested the applicant provide a discussion of how the traffic management plan discussed in Section 9 and detailed in Appendix G, "Traffic Management," was integrated into the ETE modeling, if intersections were modeled as indicated in Appendix G or if intersections were modeled as having signalization control, and whether or not the ETE provided in Table 7-1D, Time to Clear the Indicated Area of 100% of the Affected Population, was calculated based upon these traffic controls being in place. In response letter dated November 17, 2008, page 17, the applicant stated that conservatively, the ETE calculations do not rely upon any of the traffic control measures in Appendix G and provided clarification regarding the traffic management plan.

Section 9, page 9-2, explains the importance of establishing traffic control in a prioritized manner. Page 9-2 also states that the traffic control plans were developed in conjunction with county emergency management and law enforcement and that concern was expressed over the manpower and equipment shortages. **RAI 13.03-38** requested the applicant discuss if these concerns were provided as comments to the traffic control plan and if these were resolved. The applicant was also asked to clarify if the law enforcement who reviewed the ETE report have agreed and understand the priority of traffic control placement. In response letter dated November 17, 2008, page 75, the applicant stated the draft traffic management plan was sent to law enforcement and emergency planning representatives for each of the EPZ counties and that the plan was refined through meetings, conference calls, and emails during which the potential manpower and equipment shortages were carefully reviewed. The response also provided clarification regarding prioritization of traffic signals.

Section 4 of the ETE Report describes the modeling of intersections and states on page 4-1 that critical intersections will often be provided by traffic control personnel. **RAI 13.03-46** ask the applicant how intersections that are controlled by traffic personnel are modeled and further ask the applicant to explain any assumptions on traffic speed, service flow, capacity, and queue discharge through a manned intersection. In response letter dated November 17, 2008, page 89, the applicant stated that traffic control points are modeled as traffic signals with a reasonable allocation of effective green time to each of the competing traffic streams. (Refer to RAI 13.03-09, 13.3.1B.R.4.1, for further information.)

The ETE Report discusses intelligent transportation systems (ITS), dynamic message signs, and highway advisory radio in Section 9. It is not clear if the use of such systems was considered in the ETE or if the results are dependent upon their use. Appendix G provides traffic control tactics for traffic control points, which have been developed in conjunction with the county emergency management representatives and law enforcement personnel. Section 1.3 Analytical Tools, page 1-8, states that the analyst can identify bottlenecks and develop countermeasures that are designed to expedite the movement of vehicles. In **RAI 13.03-54** the staff requested additional information regarding whether any such adjustments were integrated into the traffic management plan and if so, to identify any adjustments that were made to expedite the movement of vehicles and improve evacuation times. In response letter dated November 17, 2008, page 101, the applicant stated that the ETE study did not identify a need for specific actions to improve evacuation times and that if any such actions had been identified, they would be addressed in state and local emergency plans. In addition, the applicant provided clarification regarding countermeasures integrated into the traffic management plan.

Section 2.3 Assumption 8 states that traffic control points outside of the EPZ should be established to facilitate evacuation flow to the reception centers. **RAI 13.03-37** requested the applicant discuss if the ETE includes such traffic control in the modeling and if local authorities have agreed to implement the traffic control outside of the EPZ as suggested. In response letter dated November 17, 2008, page 74, the applicant stated that the ETE do not depend on traffic control at traffic control points and provided further clarification regarding the traffic management plan and traffic control points. (Refer also to responses associated with RAI 13.03-9(c) and 13.03-36, 13.3.1B.R.4.1).

Section 10, “Evacuation Routes,” provides a discussion of the evacuation routes. Maps of the evacuation routes are provided for each county within the EPZ. Reception centers are shown on Figure 10-1, “General Population Reception Centers,” and in the individual evacuation route maps for each county (Figures 10-2, 10-3, 10-4, and 10-5). **RAI 13.03-56** ask the applicant to provide textual information regarding the location, types, and capacities of the facilities to be used in an evacuation. In response letter dated November 17, 2008, page 105, the applicant responded that the type and capacities of the reception centers do not impact the ETE, but that Figure 6 of each county plan lists the reception and care center details requested in the RAI.

Section 11, “Surveillance of Evacuation Operations,” briefly describes methods that could be utilized for traffic surveillance during an evacuation. These options include traffic control personnel located at Traffic and Access Control Points, ground patrols undertaken along well-defined paths to ensure coverage of highways that serve as major evacuation routes, aerial surveillance of evacuation operations using helicopter or fixed-wing aircraft, and cellular phone calls from motorists to provide direct reports of road blockages. The report also suggested that tow trucks with a supply of gas, be deployed at strategic locations within, or just outside, the EPZ.

13.3.1B.R.4.2 Technical Evaluation of Information Related to Traffic Capacity

The ETE Report describes the location of reception centers for registering and monitoring evacuees.

The ETE Report provides a complete review of the evacuation road network that is slightly enhanced from those in the older ETE Report for HNP Unit 1. Analyses are made of travel times and potential locations for congestion. The evacuation time estimates are not dependent on the establishment of traffic control points and access control points. Therefore, manpower and equipment shortages have no effect on the evacuation time estimate calculations. In addition, all evacuation route segments and their characteristics, including capacity are described.

A traffic control and management strategy that is designed to expedite the movement of evacuating traffic is described. The traffic management strategy is based on a field survey of critical locations and consultation with emergency management and enforcement personnel.

The ETE Report included assumptions for determining the number of vehicles needed, as well as the methodology, for determining the transport-dependent population. The applicant also analyzed travel times and potential locations for serious congestion along the evacuation routes.

The staff finds the clarifications provided by the applicant pertaining to the following **RAIs: 13.03-09(a, b, c, d, e, f), 13.03-24, 13.03-43, 13.03-51, 13.03-42, 13.03-39, 13.03-40, 13.03-57(a, b, c, d, e, f), 13.03-36, 13.03-38, 13.03-46, 13.03-54, 13.03-37 and 13.03-56** to be acceptable and therefore **resolved**.

13.3.1B.R.5 Analysis of Evacuation Times [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.IV]

13.3.1B.R.5.1 Technical Information Related to Analysis of Evacuation Times

Sections 4, 5, and 6 of the ETE Report describe the methods used to estimate the evacuation times. Section 4 describes estimation of highway capacity and the methods used are generally taken from the Highway Capacity Manual. Section 5 provides

estimates of the distributions of elapsed times associated with mobilization activities undertaken by the public to prepare for the evacuation trip ("trip generation times"). The elapsed time associated with each activity is represented as a statistical distribution reflecting differences between members of the public. The quantification of these activity-based distributions relies largely on the results of a telephone survey. Section 2.3 Assumption 3.b. states that 26 percent of households will await the return of a commuter. However, Appendix F, Telephone Survey, page F-7 indicates that 57 percent of households will await the return of other family members. **RAI 13.03-5** requested the applicant discuss the basis for using 26 percent for households awaiting the return of a commuter. In response letter dated November 17, 2008, page 9, the applicant acknowledges that the percent of households referenced was incorrect in the original ETE report and will correct the values as specified below:

> "26 percent of households" will be changed to "39 percent of households" on page 2-4 of the revised ETE Report.

Confirmatory Action NRC 13.03-15 was created to track this revision.

RAI 13.03-7 (a, b) requested clarification regarding mobilization and evacuation assumptions for schools. Section 2.3 assumption 3.a. states "schools may be evacuated prior to notification of the general public." If notification is to take place in 10 minutes and mobilization of buses takes 90 minutes, it is not clear how this assumption can be valid. **RAI 13.03-7(a)** asked the applicant to explain the use of this assumption. In response letter dated November 17, 2008, page 14, the applicant acknowledged the assumption is not feasible with the planning basis used in the ETE report. In response the applicant identified correctly that the assumption does not influence the ETE calculations or results. The applicant will remove Assumption 3.a. from the revised ETE report. **Confirmatory Action NRC 13.03-16** was created to track this revision. Information on the "experience" used to establish the mobilization time of 90 minutes for buses is also not provided. **RAI13.03-7(b)** requested that for Section 8 (page 8-1), the applicant include a reference or more information on the 'experience' used to establish the mobilization time of 90 minutes. In response letter dated November 17, 2008, page 14, the applicant states that the 90 minute mobilization time for transit vehicles is based on discussions with local emergency management personnel at the site as well as at several other sites. Discussion with local emergency management on mobilization times for these vehicles is an adequate approach and provides an adequate basis for use of the time identified. .

Section 6 defines the various evacuation cases (a combination of a scenario and a region) for which time estimates were made. A scenario is defined as a combination of circumstances, including time of day, day of week, season, and weather conditions. Scenarios define the number of people in each of the affected population groups and their respective mobilization time distributions. A region is defined to be a grouping of contiguous evacuation zones, which forms either a "keyhole" sector-based area, or a circular area within the plume exposure pathway EPZ that is evacuated due to a radiological emergency. The HNP EPZ contains 14 separate sub-zones, with boundaries generally defined by major roads, county lines, or water bodies, and 25 evacuation regions. The sub-zone boundary definitions are provided in Appendix L.

The use of the "keyhole" in the ETE is not clear. **RAI 13.03-6(a)** requested the applicant clarify Section 2.2 Assumption 5 and whether the keyhole evacuation extend to 10 miles or stop at 5 miles as indicated in the referenced Figure 2-1, "Voluntary Evacuation

Methodology." In addition the RAI requested the applicant discuss if 100% of the population is considered when calculating the ETEs for the 10-mile EPZ or if 35% is used between the 5- and 10-mile rings as indicated in Figure 2-1. Section 2.3 Assumption 2 states that it is assumed that everyone within the group of ERPA forming a Region will evacuate. ERPAs extend to 10 miles from the plant. However, Figure 2-1, Voluntary Evacuation Methodology, indicates that the area to be evacuated 100% extends to 5 miles from the plant. **RAI 13.03-6(b)** ask the applicant to clarify if 100% of the people out to 10 miles are included in the ETE calculation and if so, Figure 2-1 may need to be modified to be representative of the evacuation assumptions. In response letter dated November 17, 2008, page 12, the applicant clarified the assumptions regarding percentages of residents evacuating from the area and will add an additional table to Appendix H(Table H-1) that identifies percentage of vehicles within each sub-zone assumed to evacuate for each region. This new table is also being provided in response to RAI 13.03-47, 13.3.1B.R.3.1, and is being tracked as **Confirmatory Action NRC 13.03-05**.

Section 2.3 Assumption 11 states that rain and ice are used for the adverse weather scenarios and the table indicates that "No Effect" is included for mobilization time. However, Section 8 frequently indicates that time is increased for activities during mobilization – such as, Section 8.4 Activity: Mobilize Drivers, "Mobilization time is slightly longer, 100 minutes, when raining". **RAI 13.03-08** ask the applicant to discuss the meaning of the term 'No Effect' as used in the assumption. In response letter dated November 17, 2008, page 15, the applicant stated the "No Effect" in the table on page 2-5 refers to the mobilization time for the general population. The applicant further explained the reasoning behind the assumption that adverse weather has no effect on mobilization time of the general public. In response to **RAI 13.03-08** the applicant will change the last column of the table referenced to read "Mobilization Time for the General Population" in the revised ETE report. **Confirmatory Action NRC 13.03-17** was created to track this revision.

Section 2.3 Assumption 2 states that it is assumed that everyone within the group of ERPA forming a Region will evacuate. However, Section 7.3 states that these ETE estimates do not and should not be distorted to account for stragglers. **RAI 13.03-49** requested the applicant discuss whether reference to 100% evacuation, throughout the ETE does indeed represent 100% evacuation or if values have been truncated to eliminate those that may take longer to evacuate. In response letter dated November 17, 2008, page 95, the applicant stated that Assumption 2 in Section 2.3 is a general statement, without direct reference to ETE, and that the entire population within a region is considered to evacuate. The applicant also provided clarification regarding assumptions made for those people making up the tail of the evacuation.

Section 7, "General Population Evacuation Time Estimates (ETE)," provides results of the General Population ETE that cover the 25 regions within the HNP EPZ and the 12 Evacuation Scenarios discussed in Section 6. Appendix J provides the ETE results for all regions and scenarios and provides plots of all evacuation scenarios for evacuation Region 3. Results are presented for 50%, 90%, 95%, and 100% of the population within a region to evacuate from that region. Results are provided for good and adverse (rainy or icy) conditions. A variant of the NUREG-0654 format is used for the presentation of ETE results. The maximum times are presented, as well as, the times to achieve lower percentages. Times are reported separately for general population (Section 7 and Appendix J), schools (Section 8), and transit-dependent population

(Section 8). The general population includes both permanent residents and transients. The ETE report uses figures to illustrate the patterns of traffic congestion that arise for the case when the entire EPZ is advised to evacuate during the summer, midweek, midday period under good weather conditions. These figures display congestion patterns after 1, 2, 3, and 3 ¼ hours after evacuation advisory. Appendix I presents a series of sensitivity tests that were performed to determine the sensitivity of the results to trip generation time. Individual tests included studies related to the shadow region, changes in the average number of evacuating vehicles per household, and traffic control tactics.

In the Executive Summary, Tables 7-1C, "Time to Clear the Indicated Area of 95% of the Affected Population," and 7-1D, "Time to Clear the Indicated Area of 100% of the Affected Population," are described as the times needed to clear the indicated regions of 95 and 100 percent of the population. **RAI 13.03-02** requested the applicant clarify that these tables, which indicate times of around 4 hours, do not include schools, transit dependents, and special facilities - the latter of which are acknowledged to sometimes exceed the general population in Section 8.4. In response letter dated November 17, 2008, page 17, the applicant noted that the effect of schools, special facilities and the transit-dependent population evacuating over the same timeframe is considered. The ETE for these populations are calculated separately in Section 8. The applicant will revise Section 7 of the ETE report to clarify the 100 percent evacuation is intended to represent the general population. The second paragraph of Section 7 will be revised as follows:

> The ETE for the *general population* (permanent residents, transients and employees commuting to work in the EPZ) for all Evacuation Cases are presented in Tables 7-1A through 7-1D. These tables present the estimated times to clear the indicated population percentages from the Evacuation Regions for all Evacuation Scenarios. The tablulated values of ETE are obtained from the PC-DYNEV simulation model outputs of vehicles exiting the specified evacuation areas. These data are generated at 10-minute intervals, and then interpolated to the nearest 5 minutes. Separate ETE are computed for the special facility (schools and medical facilities) and transit-dependent populations within the EPZ; see Section 8 for details.

Confirmatory Action NRC 13.03-18 was created to track this revision.

The routes for individuals requiring public transit are identified in Section 8. Additional information regarding the transit-dependent population was requested in **RAI 13.03-11(a, b, c, d, e)**. **RAI 13.03-11(a)** ask the applicant to discuss if the ETE developed for school in session includes consideration that the same buses will be used to evacuate transit dependent individuals. In response letter dated November 17, 2008, page 23, the applicant responded that the ETE developed for schools that are in session assume that schools receive first priority in the assignment of bus resources and that any subsequent use of the same buses to evacuate transit dependent individuals would not influence the ETE for school evacuation. **RAI 13.03-11(b)** ask if the same buses are used, to explain the effect on the ETE for the transit dependent residents under this scenario. In response letter dated November 17, 2008, page 23, the applicant stated that if there are not sufficient buses to support the evacuation of all school children and all transit-dependent persons in one wave, buses will be prioritized for school evacuation and then return for a second wave. **RAI 13.03-11(c)** stated that unloading the bus in 5 minutes as shown in Tables 8-7A and 8-7B and discussed in Section 8.4 seems optimistic for

individuals who are likely carrying belongings. In response letter dated November 17, 2008, page 24, the applicant clarified that Exhibit 27-9 in HCM 2000 states typical alighting service time is 1.7-2.0 seconds per person and that assigning a conservative factor of 5 to account for carrying luggage yields a rate of up to 10 seconds per person and 5 minutes for 30 people to leave a bus. Page 7-4 says summer implies school is not in session, but tables 6-3 and 6-4 show 10% of school buses evacuating in Scenarios 1 and 2. **RAI 13.03-11(d)** ask the applicant to discuss why 10% of the school buses are planned for use in Scenarios 1 and 2. In response letter dated November 17, 2008, page 24, the applicant stated that for Scenarios 1 and 2 the buses are evacuating summer school students and the percentages in Table 6-3 were discussed with the counties during the review process. **RAI 13.03-11(e)** requested the applicant discuss the basis for the 75% value used for "Residents with Commuters in Household" as shown in Table 6-3. In response letter dated November 17, 2008, page 24, the applicant stated the value has been corrected in the revised report and now read 68% which matches the data presented in Figure F-6. In response to **RAI 13.03-11(a, b, c, d, e)** the following changes will be made in the revised ETE Report:

- Reference to "Table 8-6" on page 8-4 will be changed to "Table 8-7."
- Update Table 6-3 to change the 75% value for "Residents with Commuters in Household" to correctly read 68%.
- Clarify the text of Section 8.4 as detailed in the full response to RAI 13.03-11(b).

Confirmatory Action NRC 13.03-19 was created to track these revisions.

In Table 8-7A Transit Dependent Evacuation Time Estimates – Good Weather, the initial route time of 45 minutes would occur during the period when Figure 7-4, Congestion Patterns at 2 Hours after the Evacuation Advisory, indicates many of these roadways would have Level of Service F, which is very congested. This is also described as the peak congestion period in Section 7.2. Buses would be traveling through traffic control points, such as TCP E11A, that would be established to discourage thru traffic. **RAI 13.03-12(a, b, c)** ask the applicant for the following clarifications regarding the transit dependent ETE: **RAI 13.03-12(a)** ask the applicant to explain how the route times were derived considering distance and speed. In response letter dated November 17, 2008, page 25, the applicant responded that upon reconsideration, the time estimate will be modified to 45 minutes and will make changes to travel times reflected in the ETE for the transit dependent population. **RAI 13.03-12(b)** requested the applicant discuss if passing through TCPs was considered in the travel speed and to discuss the basis for using 45 minutes for route 1 and 30-minute route times for the remaining routes. In response letter dated November 17, 2008, page 26, the applicant stated the TCPs are created to facilitate and guide evacuating traffic – not to impede their progress. As such, it is assumed that the inbound speeds of transit vehicles and emergency response vehicles are not affected by the implementation of TCPs. **RAI 13.03-12(c)** requested the applicant provide a basis for using 10 minutes for pick up time in Table 8-7A and to clarify how many stops this includes along each route. These same questions are applicable to Table 8-7B (Transit Dependent Evacuation time Estimates – Rain). The 10 minutes conflicts with Section 8.4 [Activity: Board Passengers (C→D)] that indicates 15 minutes for normal weather and 20 minutes for adverse weather. In response letter dated November 17, 2008, page 26, the applicant provided new calculations or the time

required for a bus to decelerate, accelerate, stop and board passengers. In response to RAI 13.03-12(a, b, c) the following changes will be made in the revised ETE report:

- Change travel time for bus route 2 to 45 minutes in description of route on page 8-7.
- Update Tables 8-7A and B – 45 minutes travel time for Route 2.
- Revise discussion of transit boarding time under "Activity: Board Passengers" on page 8-5.

Confirmatory Action NRC 13.03-20 was created to track these revisions.

The routes for individuals requiring public transit are identified in Figure 8-2 Proposed Transit Dependent Bus Routes. It appears from Figure 8-2, that much of the EPZ is not serviced by bus routes (there are no bus routes serving sub-zones A, B, C, D, J, L, and M), but there is no mention of how transit-dependent individuals get from their residences to these bus routes. **RAI 13.03-17(a)** ask the applicant to discuss the means by which individuals are assumed to travel to the transit route stops and discuss how the time required for this activity is included in the ETE. The response submitted by the applicant in letter dated November 17, 2008, page 34 states that given the evacuees in question have no access to private transportation, then those who are ambulatory and within an accessible distance would walk to the routes and that since there will be multiple bus runs on each route, those who take longer to get to the route will still have the opportunity to board a later bus run. **RAI 13.03-17(b)** ask the applicant to discuss how the large distances between transit-dependent residents and the bus routes was considered in the ETE calculation. The response submitted by the applicant in letter dated January 8, 2009, page 15 clarifies the bus routes were designed to service the populated areas of the EPZ and that the few transit-dependent people who will not be able to access a bus route will need to register as "special needs" persons to be picked up at home.

In **RAI 13.03-18** the applicant was ask to discuss why Table 8-7B, "Transit Dependent Evacuation Time Estimates – Rain," was developed for the transit-dependent adverse weather condition when ice was identified in Section 2.3 Assumption 11 as the more limiting adverse weather condition and to discuss if using ice for the adverse weather would increase the ETEs provided in Table 8-7B. In response letter dated November 17, 2008, page 36, the applicant explained the counties had indicated at the kickoff meeting that the ice scenario was a low probability event and that rain was deemed the more likely adverse weather condition. .

RAI 13.03-20 ask the applicant to discuss the basis for using five buses for routes 1 and 5, six buses for routes 2, 3 and 6, and eight buses for route 4 as depicted on page 8-7, Analysis of Bus Route Operations and to discuss the basis used to determine the number of buses required for each route. In response letter dated November 17, 2008, page 39, the applicant explained the reasoning for the distribution of buses throughout the urban areas of the EPZ and provided a revised Table 8-6 to include 50 scheduled bus runs. In response to RAI 13.03-20 the applicant will make the following revisions to the ETE Report:

- Revise Table 8-6 to account for an increase in bus runs to 50.
- Add the discussion provided in the RAI response to page 8-7 of the revised report.

- Revise the discussion of the number of buses needed for each r4oute on pages 8-7 and 8-8 of the revised report.

Confirmatory Action NRC 13.03-21 was created to track these revisions.

In reference to Table 8-5A, "School Evacuation Time Estimates – Good Weather," **RAI 13.03-29** requested that the applicant provide the assumptions for loading the students in 5 minutes and to discuss any further assumptions on the boarding time for school buses. For Apex High School, population 2215 students, this would require 44 buses. Seventy-passenger school buses are usually around 35-40 feet long. Assuming 10 feet between buses, this would require almost one-half mile of buses lined up for students to then board and evacuate. The logistics of such a movement indicate a 5-minute loading time would be challenging. In response letter dated November 17, 2008, page 59, the applicant provided additional assumptions on boarding time which provide the needed information to demonstrate the loading times assumed are practical. The applicant diagramed the bus loading area to scale showing 44 buses within the parking and loading area of the Apex High School. The proximity of the buses to the school, as provided in the diagram, should facilitate boarding within the time periods assumed in the ETE study.

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 on page 8-5 in Section 8.4, "Evacuation Time Estimates for Transit-Dependent People," 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. RAI 13.03-30 ask the applicant to explain why the average speed for the evacuation was used rather than the speeds that would exist during this timeframe for the evacuation. In response letter dated November 17, 2008, page 62, the applicant agrees that most schools are located in areas that will experience some congestion on the roadways and that speeds used in the analysis should reflect this congestion. The applicant will revise travel times in Tables 8-5A (School Evacuation Time Estimates – Good Weather) and 8-5B (School Evacuation Time Estimates – Rain) to reflect the local speeds as output by the computer model. The applicant will revise the discussion on pages 8-5 and 8-6 in Section 8 Transit Dependent and Special Facility Evacuation Time Estimates to reflect the changes. **Confirmatory Action NRC 13.03-22** was created to track these revisions.

In reference to Section 8.4, page 8-8, "Evacuation of Ambulatory Persons from Special Facilities," **RAI 13.03-33(a, b, c)** requested the applicant explain the basis for mobilizing buses in 90 minutes. Page 8-9 states that the average speed output by the model at 90 minutes is 22.9 mph. Use of the model is a good approach for establishing the speeds; however, mobilization time for the buses is 90 minutes, and loading of the buses is at least 30 minutes as indicated on page 8-9, totaling 2 hours. **RAI 13.03-33(a)** ask the applicant to discuss why the 2-hour speed, which is the peak congestion period as stated in Section 7, was not used. In response letter dated November 17, 2008, page 69, the applicant replied that use of the model-derived speed at two hours would be more accurate and the ETE and text will be modified accordingly. **RAI 13.03-33(b)** ask the applicant to discuss why the average EPZ speed was used rather than speeds specific to the selected routes or areas. In response letter dated November 17, 2008, page 69, the applicant stated they will make changes to the revised ETE report to reflect local

evacuation speeds as suggested. **RAI 13.03-33(c)** ask the applicant to discuss the effects of adverse weather when evacuating special needs facilities. In response letter dated November 17, 2008, page 69, the applicant stated they will revise the ETE report to include a discussion of the special facilities adverse weather ETE. The following revisions will be made to the revised ETE Report in response to **RAI 13.03(a, b, c)**:

- Average speeds output by the model at two hours will be used to compute the ETE for special facilities. Page 8-9 will be revised accordingly.
- Text will be added to discuss the ETE for rain for special facilities.

Confirmatory Action NRC 13.03-23 was created to track these revisions.

In the ETE calculation for buses assigned to pick up ambulatory persons located on page 8-9, there is no time included for travel between facilities although 5 minutes is mentioned in the text above the equation. **RAI 13.03-34** ask the applicant to include the time to travel between facilities in the ETE calculation. In response letter dated November 17, 2008, page 71, the applicant acknowledged the oversight and stated travel time between special facilities would be included in the revised ETE report. The applicant will modify the sample calculation of ETE for bus A on page 8-9 of the revised ETE report to include 10 minutes travel time (five minute travel time between each of the three facilities serviced). The change does not impact the ETE analysis as the calculation provided serves only as an example of how the times were derived. **Confirmatory Action NRC 13.03-24** was created to track these revisions.

For wheelchair bus runs, the ETE states that "wheelchair buses and vans are often scarce" and regular buses can be used to transport these patients. Wheelchairs would be stacked in the back and evacuees would sit in the front of the bus. **RAI 13.03-35** requested the applicant discuss the assumptions on bus capacity when using this approach. In response letter dated November 17, 2008, page 72, the applicant clarified their assumptions regarding wheelchair bus runs citing the North Carolina school bus safety website which states that school buses generally have 22-24 seats. Based on the standard seat size, each seat can accommodate 2 adults, thus requiring 8 seats for a capacity of 15 patients, leaving 14-16 seats available for wheelchairs, personal items of patients and staff.

Based on staff review of the ETE Report, it appears the analysis may include truncated distributions. The longest evacuation time for 100% of the ETE is 4 hours 40 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. Figure 5-3, "Evacuation Trip Generation for Various Population Groups," identifies a tail that may extend to 300 minutes, or 5 hours. **RAI 13.03-48(a)** ask the applicant to explain how the total evacuation time for 100% of the population as identified in Figure 7-1D, Time to Clear the Indicated Area of 100% of the Affected Population can have a maximum ETE of 4 hours 40 minutes if the trip generation time may take as long as 5 hours. Distribution No. 4 Prepare to Leave Home on page 5-8 does not agree with Figure F-12 Time to Prepare Home for Evacuation. Figure F-12 indicates that it takes 250 minutes for approximately 100% of people to prepare to leave home; however, it appears this tail could be as long as 360 minutes in the Figure. Distribution No. 4 indicates that 100% of the people are prepared to leave home in 195 minutes. **RAI 13.03-48(b)** requested the applicant discuss the differences in the data between Appendix F and Section 5. **RAI 13.03-48(c)** stated that if necessary, the applicant reconcile Figure 5-2 Evacuation Mobilization Activities and

Figure 5-3 Evacuation Trip Generation for Various Population Groups with the comments on the distribution of data for time to prepare to leave home. In response letter dated November 17, 2008, page 92, the applicant provided a detailed discussion regarding distributions and truncations used in the ETE model. The text provided in response to **RAI 13.03-48(a, b, c)** will be added to Section 5 of the revised ETE report. **Confirmatory Action NRC 13.03-25** was created to track this revision.

In Table 7-1C, "Time to Clear the Indicated Area of 95% of the Affected Population," for R03 (entire EPZ), there is a difference in evacuation time between normal and adverse weather. In Table 7-1D, "Time to Clear the Indicated Area of 100% of the Affected Population," there is no such difference for R03 although there are minor differences in time for some of the other regions. **RAI 13.03-52** requested the applicant discuss why adverse weather does not affect the total evacuation time for the 100% evacuation of R03. In response letter dated November 17, 2008, page 98, the applicant provided reasoning why there was no time difference in R3 between good and adverse weather.

13.3.1B.R.5.2 Technical Evaluation of Information Related to Evacuation Times

A total of 300 ETE were computed for the evacuation of the general public within the EPZ. Each evacuation time estimate quantifies the aggregate evacuation time estimated for the population within each of the 25 evacuation regions under one of each 12 evacuation-scenarios (25 x 12 = 300). Schoolchildren and other transit-dependent populations were calculated separately. An acceptable variant of the NUREG-0654 format is used for the presentation of the evacuation times in Appendix J.

Distribution functions for notification of the various categories of evacuees were developed. The distribution functions for the action stages after notification predict what fraction of the population will complete a particular action within a given span of time. There are separate distributions for auto-owning households, school population, and transit-dependent populations. These times are combined to form the trip generation distributions.

There are separate distributions for auto-owning households, school population, and transit-dependent populations.

On-road travel and delay times are calculated. An estimate of the time required to evacuate a particular segment of the non-auto-owning population dependent upon public transportation is developed, in a manner similar to that used for the auto-owning population.

The staff finds the clarifications provided by the applicant pertaining to the following **RAIs: 13.03-7(b), 13.03-49, 13.03-17(a, b), 13.03-18, 13.03-29, 13.03-35,** and **13.03-52** to be acceptable and therefore **resolved**.

13.3.1B.R.6 Other Requirements [10 CFR 50, Appendix E.IV and NUREG-0654, Appendix 4.V]

13.3.1B.R.6.1 Technical Information Related to Analysis of Other Requirements

Section 12, "Confirmation Time," of the ETE Report suggests a procedure to confirm that the evacuation process is effective in the sense that the public is complying with the Advisory to Evacuate. The procedure suggested employs a stratified random sample and a telephone survey to determine if a large percentage of households within the evacuation zone have actually been evacuated. The telephone calls would be made by a group of people each dialing a different set of telephone numbers. It is suggested that

labor effort could be reduced by the use of automated computer controlled auto-dialing equipment. If the results of the telephone survey were to exceed 20 percent, the survey would be repeated hourly until the confirmation process was completed.

RAI 13.03-53(a) requested that the applicant discuss whether the counties have agreed with the ETE recommended evacuation confirmation methodology or if other county plans for confirmation exist, how they would work with the ETE approach. In response letter dated November 17, 2008, page 99, the applicant stated that no decision has been made regarding the actual methodology to be used and the purpose of the proposed approach was to provide an estimate of the time required to conduct the confirmation using one suggested method. **RAI 13.03-53(b)** ask the applicant to explain what is required if the telephone survey is less than 20%, but still significant (e.g., 15%). In response letter dated November 17, 2008, page 100, the applicant stated that a decision may be made by local response agencies to repeat the survey at a later time and/or to dispatch patrol cars to those areas that are slow to respond to the advisory to evacuate. **RAI 13.03-53(c)** requested the applicant discuss if the time to mobilize confirmatory personnel had been included in the time estimates and whether the time and resources needed to obtain telephone numbers for the EPZ is included. In response letter dated November 17, 2008, page 100, the applicant stated that the use of automated dialing equipment or multiple operators can significantly reduce the time needed to complete confirmation and recommends that a list of telephone numbers within the EPZ be available in the EPC at all times. The response noted that the 2 ½ hours between the Advisory to Evacuate and when the confirmation process would begin would allow operators to arrive at their workplace, obtain a call list and prepare to make the phone calls.

The "Executive Summary" indicates development of the ETE Report was coordinated with emergency management personnel representing state and local governments. However, it was not clear from staff review if the state and local agencies had reviewed the ETE Report. **RAI 13.03-55(a)** ask the applicant to include all comments received from the counties with regard to the telephone survey, traffic management plan, and discussions over manpower and equipment issues. In response letter dated November 17, 2008, page 103, the applicant stated that a draft telephone survey was provided to the counties at the kickoff meeting, comments were provided and addressed at the meeting and a revised telephone survey was sent to the counties. Final approval was given from each county before commencing with the telephone survey. Each county provided signed certification letters (included in the COL) verifying they approved the ETE document. **RAI 13.03-55(b)** requested the applicant identify comments made by the counties on the traffic management plan and clarify whether state and local police reviewed and approved the changes. The response provided in letter dated November 17, 2008, page 103, states that review of the traffic management plan was an iterative process with comments provided during meetings, conference calls and in emails. The comments were addressed and the traffic management plan was finalized. **RAI 13.03-55(c)** ask for clarification if the priority assigned to each traffic control point in Appendix G has been agreed to by local response agencies. In response letter dated November 17, 2008, page 103, the applicant provided clarification that the priority assigned to each point was developed in conjunction with law enforcement and emergency management personnel from each of the EPZ counties and the signed certification letters verify the counties approved the ETE document, including the traffic management plan. Responses to RAIs 13.03-38 (13.3.1B.R.4.1) and 13.03-55 provide descriptions of interactions with local agencies during development of the ETE Report.

13.3.1B.R.6.2 Technical Evaluation of Information Related to Other Requirements

The time required for confirmation of evacuation was estimated. In addition, the development of the ETE Report was coordinated with emergency planners from the state of North Carolina and Chatham, Wake, Harnett, and Lee Counties who are involved in emergency response for the site.

The staff finds the clarification provided by the applicant pertaining to RAIs **13.03-53(a, b, c)** and **13.03-55(a, b, c)** to be acceptable and therefore **resolved**.

13.3.1B.R.7 Conclusion for the HNP ETE Report

The NRC staff has reviewed the evacuation time estimates and the applicant's responses to RAI 13.03-01 through RAI 13.03-58 in regards to Section 13.3 of NUREG-0800 related to the evacuation time estimate analysis. The staff identified the following Open Items as needing to be resolved before concluding that the ETE Report meets applicable requirements:

In response to **RAI 13.03-21(c)** the applicant acknowledged the large attendance at the Peak Fest and will include a sensitivity study of the festival in Appendix I of the revised ETE Report. In **Open Item 13.01-01, t**he applicant was requested to address the impact that the large attendance at the Peak Fest would have on the Evacuation Time Estimate.

Furthermore, in response dated November 17, 2008, page 51, the applicant verified that school enrollment had increased by 9% since 2004-2005. The applicant identified that this increase would constitute the need for 26 more buses, and stated that it would not affect the ETEs for schools or the general population. However, as a result of the applicants response to **RAI 13.03-26(a,b,c)** , the staff requested that Table 8-2 of the ETE Report be revised to reflect enrollment and bus demands for 2007-2008 prior to the staff concluding that RAI 13.03-26 (a,b,c) is acceptable. Therefore, the revision of Table 8-2 of the ETE Report is being tracked as **Open Item 13.3-02.**