Eugene S. Grecheck
Vice President
Nuclear Development

Dominion Energy, Inc. • Dominion Generation
Innsbrook Technical Center
5000 Dominion Boulevard, Glen Allen, VA 23060
Phone: 804-273-2442, Fax: 804-273-3903
E-mail: Eugene.Grecheck@dom.com

Dominion®

October 2, 2008

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Serial No. NA3-08-080R
Docket No. 52-017
COL/MEP

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 015

On July 7, 2008, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). The responses to the following RAIs are provided in Enclosures 1:

- RAI Question ETE-1, GIS and Census Data
- RAI Question ETE-2, Specific Communities
- RAI Question ETE-3, Topographical Map with Elevations
- RAI Question ETE-4, Evacuation Routes, Monitoring Points, and Shelter Locations
- RAI Question ETE-5, PAZ 1 vs PAZ 2
- RAI Question ETE-6, School Evacuation
- RAI Question ETE-7, Traffic Control Point Number Calculations
- RAI Question ETE-8, 100% vs 35% Population for Calculation of ETEs
- RAI Question ETE-9, Peak Tourist Populations of Special Event Scenarios
- RAI Question ETE-10, Snow as Adverse Weather Condition
- RAI Question ETE-11, Algorithm for Intersections and Derivation of Values for Variables
- RAI Question ETE-12, Table F-1 Population Numbers
- RAI Question ETE-13, Special Aid Evacuation
- RAI Question ETE-14, Transit Dependent Individuals
- RAI Question ETE-15, Equation in Section 8.1
- RAI Question ETE-16, Bus Travel Time Assumptions
- RAI Question ETE-17, Transients Using Marinas and Boat Launch Facilities
- RAI Question ETE-18, Peak Transient Population for Park
- RAI Question ETE-19, Transient Population Evacuation
- RAI Question ETE-20, Mobilization for Transients
- RAI Question ETE-21, NAPS Employment
- RAI Question ETE-22, Total Employee Population within EPZ
- RAI Question ETE-23, Transit Service
- RAI Question ETE-24, Dwell Time for Bus Stops
- RAI Question ETE-25, Bus Usage During Summer Time

D089
NRO

- RAI Question ETE-26, Shadow Population Size
- RAI Question ETE-27, Evacuation Time
- RAI Question ETE-28, Link-Node Analysis
- RAI Question ETE-29, Number of Buses per Route
- RAI Question ETE-30, Manpower and Equipment Shortages
- RAI Question ETE-31, Reviewing of TCP/ACP by Government Agencies
- RAI Question ETE-32, Congestion Points
- RAI Question ETE-33, Highway/ Roadway Networks
- RAI Question ETE-34, Separate Evacuation Times
- RAI Question ETE-35, Note in Distribution No. 2 and 3
- RAI Question ETE-36, Cumulative Percent Employees Leaving Work
- RAI Question ETE-37, Percent Scale on "y" Axis Regarding Appendix F Fig. F-5
- RAI Question ETE-38, Voluntary Evacuees
- RAI Question ETE-39, Delay Times Section 7.2
- RAI Question ETE-40, Inbound Bus Speeds
- RAI Question ETE-41, Number of Available Buses for Simultaneous School Evacuation
- RAI Question ETE-42, Permanent Residents vs Transient Population
- RAI Question ETE-43, Confirmation Time
- RAI Question ETE-44, Approach for Evacuation Time Improvement
- RAI Question ETE-45, ETE Plan Reviewed by State/Local Personnel

Enclosure 2 is a CD containing the North Anna ETE report, Revision 1, dated September 2008. The CD also contains a high-resolution version of Figure 1-2 in the ETE report which shows the link-node analysis network for the North Anna EPZ.

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the Enclosures.

Please contact Regina Borsh at (804) 273-2247 (regina.borsh@dom.com) if you have questions.

Very truly yours,

Eugene S. Grecheck

COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President-Nuclear Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 2nd day of October, 2008
My registration number is 7173057 and my
Commission expires: August 31, 2012

Wanda K. Marshall
Notary Public

WANDA K. MARSHALL
Notary Public
Commonwealth of Virginia
7173057
My Commission Expires Aug 31, 2012

Enclosures:

1. Response to RAI Letter Number 015, RAI Questions ETE-1 through ETE-45
2. Compact disk (CD) containing:
   a. North Anna 3 ETE, Revision 1, dated September 2008
   b. High-resolution version of ETE report, Figure 1-2, the link-node analysis network for the North Anna EPZ

Commitments made by this letter:

1. Incorporate proposed changes in a future COLA submission.
2. Revise the North Anna 3 Emergency Plan in response to RAI ETE-4.

cc: U. S. Nuclear Regulatory Commission, Region II
T. A. Kevern, NRC
J. T. Reece, NRC
J. J. Debiec, ODEC
G. A. Zinke, NuStart/Entergy
T. L. Williamson, Entergy
R. Kingston, GEH
K. Ainger, Exelon
P. Smith, DTE

ENCLOSURE 1

Response to NRC RAI Letter 015

RAI Questions ETE-1 through ETE-45

NRC RAI ETE-1

Geographical Information Systems (GIS) shape files of address points in each EPZ county (provided by the Virginia Department of Emergency Management) were used to determine the number of households in the EPZ. The GIS shape files estimate that the population increased from 20,292 in 2000, to 33,423 in 2008. In contrast, the North Anna Environmental Report (ER) for the combined license application (COLA) references the Final Environmental Impact Statement (FEIS) for the early site permit (ESP) population, which utilized the 2000 Census. The population in 2000 for 0-10 miles was estimated at 15,511, and was projected to be 21,000 by 2010, with average annual increases of about 1.9 percent

a. Identify which estimate is correct, and clarify why there is a difference.

b. Describe how population growth beyond 2008 was considered.

c. Explain how the GIS information and census data were integrated into a single population set.

d. Explain how GIS address points were generated, and how old the data is.

e. Explain how residences were distinguished from businesses, using address points from GIS shapefiles.

Dominion Response

a. No direct comparison can be made of the population estimates in the two reports (ETE and FEIS). The 0-10 mile population estimates in the FEIS are for a 10-mile-radius circle, while the ETE population estimate is for the Emergency Planning Zone (EPZ). As shown in revised Figure 3-1 of the ETE report (refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report), the EPZ boundary extends beyond 10 miles in several areas and therefore includes a population greater than the FEIS 10-mile-radius estimate.

   Additionally, the ETE and the FEIS employed different methodologies for estimating population. The FEIS population estimate was generated using U.S. census population blocks, while the ETE population estimate was generated by counting the houses within the EPZ and multiplying by 2.57, the estimated number of persons per household. The ETE population estimate is expected to be conservative (higher than actual) as vacation homes were counted as normal residences.

b. Population growth beyond 2008 was not considered in the ETE report. NUREG-0654, Appendix 4 does not require an ETE to consider population growth in future years. Rather, if in the future the population in the area changes significantly, the NRC recommends that the ETE be updated at that time (see Section 3.8 of NUREG/CR-6863, "Development of Evacuation Time Estimate Studies for Nuclear Power Plants"). Such updating when significant population growth has occurred results in more accurate assessments because changes in the roadway network can be taken into account at that time.

c. Based on discussions with the Virginia Department of Emergency Management, the most up-to-date population information can be obtained from the county GIS address shapefiles. GIS address shapefiles were available for four of the five EPZ counties; shapefiles were not available for Caroline County (PAZ 23). It was assumed that the address points contained in the shapefiles are residential with the exception of those addresses within Lake Anna State Park and addresses identified as major employers. In total, ten addresses were removed from the shapefiles corresponding to these facilities. The total population was estimated by assuming that 2.57 people reside at each address point. Finally, 2000 Census block point data were used for Caroline County. These data were extrapolated to 2008 using county-specific growth rates. These address points were aggregated by PAZ and recorded in Table 3-1 of the ETE report. See also Data Estimates 1, 2, and 3 on page 2-1 of the ETE report.

d. The counties update the GIS address shapefiles as new housing communities are built. The GIS shapefiles used for the ETE were last updated in September 2007.

e. See the response to part c. of this RAI.

Proposed COLA Revision

None.

NRC RAI ETE-2

Section 1-2 states that Figure 1-1, "North Anna Power Station Site Location," identifies communities in the area. Figure 1-1 only shows counties and major roads, and does not show specific communities (by name), other than the City of Richmond. Please clarify.

Dominion Response

Section 1.2 of the ETE report has been revised to clarify the content of Figure 1-1 and to reference Figure 3-1 for the location of communities. Figure 3-1 has been revised to identify specific communities by name.

Proposed COLA Revision

The last two sentences of Section 1.2 of the ETE report have been replaced with the following wording:

> Figure 1-1 displays the area surrounding the North Anna Power Station site including all counties, the major roads and the site location relative to the City of Richmond. A map showing all communities is shown in Figure 3-1.

Figure 3-1 has been revised to show the communities within the EPZ.

Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-3

Guidance in NUREG-0654-FEMA-REP-1 REV. 1, Section I.A, calls for a topographical map which by definition should contain elevations. No information on elevation or land formation, other than water body locations, is provided. Provide a detailed map of the 10-mile plume exposure pathway EPZ, which identifies transportation networks, topographical features (including elevations), and political boundaries.

Dominion Response

It appears that the guidance cited in this RAI references Section 1.A of Appendix 4 of NUREG-0654/FEMA-REP-1 (Rev. 1), which reads as follows:

> A. Site Location and Emergency Planning Zone
>
> A vicinity map showing the plant location shall be provided along with a detailed map of the plume exposure pathway emergency planning zone (EPZ). The map shall be legible and identify transportation networks, topographical features and political boundaries. (See planning element J.10.a.)

Section II.J.10.a of NUREG-0654/FEMA-REP-1 (Rev. 1) reads as follows:

> 10. The organization's plans to implement protective measures for the plume exposure pathway shall include:
>
> a. Maps showing evacuation routes, evacuation areas, preselected radiological sampling and monitoring points, relocation centers in host areas, and shelter areas; (identification of radiological sampling and monitoring points shall include the designators in Table J-1 or an equivalent uniform system described in the plan);

Neither of these sections of NUREG-0654/FEMA-REP-1 (Rev. 1) suggests the need for "topographical maps". The reference to "topographical features" in the guidance is focused on those features that could affect evacuation planning.

Revised Figure 3-1 of the ETE report (refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report) and the figures in Section 10 satisfy this guidance, appropriately depicting the transportation network, topographical features, and political boundaries.

Proposed COLA Revision

None.

NRC RAI ETE-4

Section J.10.a of the Emergency Plan (page 11-46) states: Appendix 4 of this plan provides maps of the plume exposure pathway EPZ illustrating evacuation routes, evacuation areas, pre-selected radiological sampling and monitoring points, and locations of shelter areas and relocation centers. The only map in Appendix 4 is Figure 3-1, "NAPS Protective Action Zone," which only shows the evacuation areas (i.e., PAZ boundaries). Please clarify.

Dominion Response

A map showing the radiological monitoring locations will be added as Figure II-5 of the Emergency Plan. Section J.10.a of the Emergency Plan will be revised to indicate that evacuation routes, evacuation areas, and locations of assembly areas are presented in Figures 10-1 through 10-4 of the ETE report.

Proposed COLA Revision

The proposed markup of the Emergency Plan is provided at the end of Enclosure 1.

NRC RAI ETE-5

Figure 3-1, Table 3-1, "Permanent Resident Population and Vehicles by PAZ," and Table 3-2, "Summary of Transients by PAZ," start with PAZ 2, rather than PAZ 1. Is the North Anna Power Station (NAPS) site PAZ 1? Please clarify, and indicate where PAZ 1 is identified in the ETE.

Dominion Response

There is presently no PAZ 1 within the EPZ. PAZ 1 was defined for an area outside the plume exposure pathway EPZ. Appendix L (page L-1) indicates that PAZ 1 is not used.

Proposed COLA Revision

None.

NRC RAI ETE-6

Assumption 3.a in Section 2.3 states that schools may be evacuated prior to notification of the general public. Explain how this would work, if notification takes 10 minutes and mobilization of buses takes 90 minutes. In addition, provide information on the "experience" used to establish the mobilization time of 90 minutes for buses.

Dominion Response

Assumption 3.a in Section 2.3 of the ETE report does not influence the ETE calculations or results. As noted in the RAI, this option is not feasible under this ETE planning basis. This assumption was stated to reflect the fact that some local governments plan to initiate evacuation of school children at a lower emergency class than General Emergency. For a more slowly escalating accident than that which forms the planning basis for this ETE (see assumption 1 in Section 2.3), there could be sufficient time to mobilize the buses and evacuate the school children before an Advisory to Evacuate is broadcast to the public.

The 90-minute estimate of mobilization time for transit vehicles is based on discussions with local emergency management personnel at this and other sites.

Proposed COLA Revision

Section 2.3 of the ETE report has been revised to delete Assumption 3.a. Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-7

Assumption 7 in Section 2.3 states that traffic control point numbers and locations depend on the Region to be evacuated and personnel resources available. Is this variable considered in the ETE calculations? If yes, what is the effect if the traffic control points are not properly staffed?

Dominion Response

The ETE calculations do not rely upon any traffic control point (TCP) to be manned. The estimates of capacity which are used by the I-DYNEV model, and are documented in Appendix K of the ETE report, are based upon the factors described in Section 4 and upon the observations made during the road survey. It was assumed that these capacity estimates are not enhanced nor compromised by the establishment of a TCP at an intersection. As detailed in Section 9, the functions to be performed in the field at TCPs are to facilitate evacuating traffic movements and to discourage those movements that would move travelers closer to the power station. Personnel manning TCPs would also serve a surveillance function to inform the EOC of any problems that occur in the vicinity or are related to them by evacuees.

Proposed COLA Revision

None.

NRC RAI ETE-8

Assumption 5 in Section 2.2 states that the key-hole region extends to the EPZ boundary. In Figure 2-1, "Voluntary Evacuation Methodology," the key-hole region appears to stop at 5 miles. Was 100 percent of the population considered when calculating ETEs for the 10-mile EPZ; or was a reduction to 35 percent used, as indicated in Figure 2-1?

Dominion Response

Figure 2-1 of the ETE report is presented as an *example* of the manner in which percentages are assigned to those areas which experience voluntary evacuation. As stated in Assumption 5 in Section 2.2, it was assumed that 100% of the population within the region to be evacuated will, in fact, evacuate. It was further assumed that within the outer radius of this region, 50% of those persons who reside outside the region will elect to evacuate. If there is an area that extends from the outer radius of the evacuating region to the EPZ boundary, then it was assumed that 35% of the occupants of this area will elect to evacuate. It was further assumed that 30% of the population within the shadow region that extends from the EPZ boundary to a distance of 15 miles from NAPS will elect to evacuate. For Region 03, comprising the 10-mile EPZ, 100% of the population was assumed to evacuate.

Table 6-1 presents the PAZs that are included within each of the evacuation regions. It was assumed that 100% of the population within these PAZs will evacuate if the advisory identifies the associated region for evacuation. It was assumed that the population within the remaining PAZs will elect to evacuate according to the percentages identified in Figure 2-1. For keyhole Regions R04-R14 that extend to about 5 miles, 50% of the population in all external PAZs, which are within 5 miles of NAPS, were assumed to voluntarily evacuate; 35% of the population in the remaining external PAZs, which extend beyond 5 miles, will voluntarily evacuate. For keyhole Regions R15-R27 that extend to the EPZ boundary, 50% of the population in the external PAZs will voluntarily evacuate. Appendix H presents maps of each region indicating which PAZs evacuate by crosshatching them.

Proposed COLA Revision

None.

NRC RAI ETE-9

Assumption 6 in Section 2.2 identifies two "special event" scenarios, consisting of the construction period for a new reactor at the NAPS site, with and without refueling at the existing operating reactors (see also, page 3-2). These two scenarios increase the number of workers and vehicles in the area, which could affect an evacuation. Why are peak tourist populations not listed as a special event scenario? In addition, why is Memorial Day weekend not used as a special event scenario, given that the report states that tourist population peaks on Memorial Day weekend?

Dominion Response

The tourist population was assumed to peak on every summer weekend regardless of the weather and the calendar. The working definition of special event used in the ETE is an event that attracts a significant number of non-EPZ residents (i.e., transients) into the EPZ beyond the estimated transient population already considered. Peak tourist populations and Memorial Day weekend were not listed as special event scenarios because they do not meet this definition.

No attempt is made to consider the fluctuation of transient population from one weekend to the next since the weather plays an important role and is not predictable. As shown in Table 6-4 of the ETE report, Scenarios 3 and 4, which are defined as summer weekend scenarios, contain the same high relative value of transients. (Note that the transient population estimate in Scenario 4 was not reduced despite the presence of rain; it is possible for the weather to be clear at the start of a weekend, and then become unfavorable at the time that an accident is postulated to occur at the plant.) Additionally, Appendix I (page I-3) provides a sensitivity study for varying transient population at Lake Anna State Park. Therefore, the ETE adequately addresses peak tourist populations, and it is not necessary to list peak tourist populations as a special event scenario.

Section 3 (page 3-8) states that the peak season for the park is from Memorial Day to Labor Day. Memorial Day is not mentioned as the peak day for transients. Memorial Day weekend is cited because many tourists use it to initiate the summer vacation season. Clearly, if the weather is unfavorable (rainy, cold, cloudy) on that weekend, then the tourists will select another weekend for that purpose. Furthermore, as stated above, the tourist population is assumed to peak on every summer weekend regardless of the weather and the calendar. For these reasons, considering Memorial Day as a special event is not appropriate.

Proposed COLA Revision

None.

NRC RAI ETE-10

Assumption 10 in Section 2.3 states that rain will be used as the adverse weather condition. According to ESP FEIS Section 2.3.1.5, Louisa County experienced 30 snow and ice storms from 1993 to 2003, with the region receiving approximately 16.3 inches of snow annually. Based on these numbers, explain why snow is not considered as the adverse weather condition?

Dominion Response

The ETE report has been revised to include scenarios that account for snow.

Proposed COLA Revision

The following sections, tables, and figures of the ETE report have been revised as described above:

Table 1-1	ETE Study Comparisons
Section 2.2	Study Methodological Assumptions
Section 2.3	Study Assumptions
Section 4	Estimation of Highway Capacity
Section 5	Estimation of Trip Generation Time
Table 5-1	Trip Generation Histograms for the EPZ Population
Figure 5-2	Mobilization Activities
Table 6-2	Evacuation Scenario Definitions
Table 6-3	Percent of Population Groups Evacuating for Various Scenarios
Table 6-4	Vehicle Estimates by Scenario
Table 7-1A	Time to Clear the Indicated Area of 50 Percent of the Affected Population
Table 7-1B	Time to Clear the Indicated Area of 90 Percent of the Affected Population
Table 7-1C	Time to Clear the Indicated Area of 95 Percent of the Affected Population
Table 7-1D	Time to Clear the Indicated Area of 100 Percent of the Affected Population
Appendix F	Telephone Survey
Appendix J	Evacuation Time Estimates for All Evacuation Regions and Scenarios
Table J-1A	ETE for 50% of Population
Table J-1B	ETE for 90% of Population
Table J-1C	ETE for 95% of Population
Table J-1D	ETE for 100% of Population
Figure J-8	Evacuation Time Estimates – Scenario 8 for Region R03 (Entire EPZ)
Figure J-11	Evacuation Time Estimates – Scenario 11 for Region R03 (Entire EPZ)

Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-11

While the algorithm for intersections and a description of variables is provided in Section 4, a description of how the values for each variable were derived is not provided. Address the following questions:

a. *Provide a general description of other important algorithms used in the PC-DYNEV traffic simulation model.*

b. *Describe how the values of the variables in the intersection algorithm in Section 4 were derived, such as the mean duration of GREEN time.*

c. *The variable F1 and F2 are defined as the various known factors that influence the turn-movement-specific mean discharge headway h_m. These various known factors-which relate to be roadway geometrics, turn percentages, the extent of conflicting traffic streams, the control treatment, and others (see page 4-2) – are not specifically provided. Please clarify, and provide actual known factors used.*

d. *Explain how the equation used in the intersection algorithm is affected by traffic control at intersections.*

e. *Explain how the PC-DYNEV model addresses traffic through intersections, when considering traffic control or the equation presented.*

Dominion Response

a. Appendices B through D of the ETE report provide additional detail on the I-DYNEV system and its use in computing ETEs. Further detail on the PC-DYNEV simulation model can be found in NUREG/CR-4873, "Benchmark Study of the I-DYNEV Evacuation Time Estimate Computer Code", and NUREG/CR-4874, "The Sensitivity of Evacuation Time Estimates to Changes in Input Parameters for the I-DYNEV Computer Code". These two reports document studies undertaken to assess the validity of the DYNEV model for use in calculating ETEs. The discussions in these NUREG/CRs are at a level of technical detail and complexity which we believe lies outside the needs of an ETE report. Additional references to papers describing other algorithms are identified in the footnote on page 4-2 of the ETE report.

b. The values of the variables in the intersection algorithm in Section 4 of the ETE report were derived by applying the I-DYNEV system as an analysis tool rather than as a single "pass-through" calculation of an ETE. This tool was used to identify points of congestion and locations where traffic control points (TCPs) could be helpful to the evacuating public. Detailed results of the simulation were analyzed to identify locations where the green time was specified to realistically service the competing traffic volumes under evacuation conditions. The model was executed iteratively to provide assurance that the allocation of "effective green time" appropriately represents the operating conditions of an evacuation.

c. The variables F1 and F2 formally represent the factors that influence the turn movement specific flow rates through an intersection. These factors are detailed in Chapters 16 and 17 of the 2000 Highway Capacity Manual (HCM); Exhibit 16-17

summarizes the factors influencing saturation flow rate. These two chapters contain detailed technical discussions which extend over more than 250 pages. This level of detail is not appropriate for an ETE report.

Chapter 31 of the HCM provides further discussion of simulation models and their relationship with the HCM. Note that models such as DYNEV are described as "operational simulation models" in the sense that they do not replicate the procedures of the HCM, but describe the operational performance of traffic in a manner that is consistent with the HCM analysis. Thus, there is no Level of Service (LOS) calculation embodied within such simulation models which describe the flow process throughout the analysis network over time and compute flow statistics known as "measures of effectiveness." It is the calibration of these operational models (and of DYNEV, in particular) that relates to the procedures of the HCM. As stated on page 31-2 of the HCM, traffic simulation models use numerical techniques on a digital computer to create a description of how traffic behaves over extended periods of time for a given transportation facility or system.

d. The iterative procedure described in the response to part b. of this RAI does not attempt to "optimize" traffic operations at an intersection, but rather represents a reasonably efficient operation under evacuation conditions. The establishment of a TCP at an intersection could well provide greater operational performance than is represented by the calibrated DYNEV model. Thus, if all TCPs are manned in a timely manner by experienced personnel, it is *possible* that the ETEs predicted by the model might be somewhat longer than achievable in the real world under these ideal circumstances. ETEs are intended to represent reasonable, but not optimal expectations. Therefore, no allowance was made for TCP operations. The access control points (ACPs) were assumed to restrict and divert travelers who wish to travel through the EPZ, after 90 minutes following the Advisory to Evacuate.

e. When there are competing traffic movements at an intersection or juncture, the real estate within the intersection must be time-shared by these competing movements in order to afford safe passage. This is the situation during normal conditions as well. This process is implemented in the simulation model by the analyst determining the allocation of effective green time as described in the responses to parts b. and d. of this RAI. Thus, depending upon circumstances, one or more of the competing traffic flows may be delayed at the intersection as it would be in the real world, thereby influencing the travel time of evacuees. Figures 7-3 through 7-6 of the ETE report illustrate the resulting queuing that can take place as a result of this time sharing process when the traffic demand exceeds the intersection capacity at the indicated locations and times.

Proposed COLA Revision

None.

NRC RAI ETE-12

Table F-1, "Survey Sampling Plan," indicates that the EPZ zip code populations total 71,195. The population numbers appear to be by zip code only, and not reflecting only the EPZ population. Please clarify, and explain how the population numbers in Table F-1 relate to the population numbers in Section 3.

Dominion Response

Table F-1 of the ETE report and the accompanying text in Appendix F text describe how the number of households to survey in each zip code area (i.e., the sample size) was determined. The second column of the table shows that the total population for all of the zip codes of interest was 71,195 in 2000. In most cases however, only a portion of the zip code area is also within the EPZ. These coincident populations were not shown in Table F-1, but were calculated to determine the required sample size within each zip code.

To clarify the population estimates and the determination of sampling size, Table F-1 has been revised with an expanded version provided below. The third column of the revised Table F-1 indicates the population within a zip code that is also within the EPZ. The total for this column is 19,501, which was the total estimated population of the EPZ in 2000.

Table F-1. Survey Sampling Plan North Anna Telephone Survey

Zip Code	Zip Code Population 2000	EPZ POP In ZIP FOR 2000	Households in EPZ	Required Sample
22534	2,061	2,061	696	52
22546	9,843	4	1	0
22553	26,161	4,894	1,731	131
22567	2,447	45	18	1
22960	3,497	308	122	9
23015	3,787	1,446	499	38
23024	6,480	3,674	1,447	109
23093	9,785	1,448	563	42
23117	7,134	5,621	2,222	168
Total	**71,195**	**19,501**	**7,299**	**550**
Avg HH Size:			**2.67**	

The estimated 2008 EPZ population is identified in Table 3-1 as 33,423.

Proposed COLA Revision

Table F-1 of the ETE report has been revised as shown above. Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-13

In Table 1-1, "ETE Study Comparisons," the transit dependent population definition does not include any individuals with special needs. While there are no special care facilities in the EPZ, there could be people that need special aid to evacuate. Clarify if this Subgroup of the population exists.

Dominion Response

It is expected that a subgroup of individuals with special needs does exist within the EPZ as it would in any meaningful geographical area. The county radiological emergency response plans address special needs populations in the following sections of the plans: V.D.1, V.F, VII.A, VIII.F.1 and IX.C.1. The ETE concluded that the time to evacuate the special needs population lies within the ETE identified in Tables 7-1A through 7-1D of the ETE report.

Proposed COLA Revision

None.

NRC RAI ETE-14

Section 8 "Transit-Dependent and Special Facility Evacuation Time Estimates", contains information on the process for the evacuation of transit-dependent individuals, but does not discuss how they are expected to get to the pick-up points. Explain how transit dependent individuals are expected to get from their residences to the bus routes, and if this time was factored into the ETE.

Dominion Response

Transit-dependent individuals would be expected to walk to the routes. The estimated number of persons is 478. This total was conservatively estimated to require 16 bus runs (assuming 30 persons will board each bus run on average). On this basis, assuming conservatively that each time the bus stops it will pick up only one person, then the bus will make a total of 30 "flag" stops along its route. Assigning an estimate of 1 minute of delay for each stop, which takes into account the bus slowing, stopping, boarding, seating, and then accelerating, yields a total estimate of 30 minutes for delay, which was included in the ETE calculations.

As described on Page 8-6 of the ETE report, it was estimated that the first bus will arrive at the start of the route, two hours after the advisory to evacuate. The mobilization time estimates (Table 5-1, Distribution D) indicate that virtually all evacuees will have completed their preparatory activities in that time frame. Therefore, the vast majority of the transit-dependent population will be able to complete their preparation activities and walk to the routes by the time the first bus on the route arrives. 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.

Proposed COLA Revision

None.

NRC RAI ETE-15

Section 8.1 contains an equation used to calculate the number of persons ("P") requiring public transit or ride-share. Explain why the term "(0.59 x 0.39)" in the equation is squared.

Dominion Response

The term is squared to account for the fact that the proportion of households with only two cars available is being calculated, where both cars are used by commuters, neither of whom returns to the house. The probability that one commuter will not return to the house is 0.59 x 0.39. The probability that both commuters will not return home (treated as independent events) is that product squared.

Proposed COLA Revision

None.

NRC RAI ETE-16

In Section 8-4, Activity G-C states that for the second wave bus evacuation, the bus travel time back to the EPZ (to the start of the route) is estimated to be 20 minutes for good weather and 25 minutes for rain. What are the bases for these assumptions?

Dominion Response

The basis for the 20-minute estimate is the average distance of reception centers from the start of the routes divided by a reasonable speed for the returning buses. This average distance is less than 10 miles. Assuming a return speed of 30 mph, which is counter flow relative to the evacuating traffic, yields an estimate of 20 minutes. The additional 5 minutes for rain reflects the expectation that these bus speeds would be somewhat slower under rain conditions.

Proposed COLA Revision

None.

NRC RAI ETE-17

The report states in Section 3 (under Transient Population, page 3-7) that data on the number of transients using the marinas and boat launch site facilities was not available. Further, it assumed 10 vehicles/launch site and 25 vehicles/marina (with 2 people/vehicle); yielding a total of 410 transients in 205 vehicles for marinas and boat launch sites. (See also, Section 2.1, page 2-1.) Please provide a basis for this assumption, and explain why the population for marinas and boat launches used in the report are inconsistent with those presented in the ESP FEIS.

Dominion Response

Table 3-2 of the ETE report has been revised to change the transient population to match the FEIS transient population. The changes in the transient population are shown below.

Comparison of Estimated Transient Population Distributions				
	ETE Report Revision 0		**ETE Report Revision 1**	
PAZ*	**Transients**	**Transient Vehicles**	**Transients**	**Transient Vehicles**
2	NO TRANSIENTS		NO TRANSIENTS	
3				
4				
5				
6				
7				
8				
9	50	25	390	195
10	NO TRANSIENTS		NO TRANSIENTS	
11	82	41	792	396
12	100	50	780	390
13	54	27	54	27
14	1192	496	5242	2184
15	NO TRANSIENTS		NO TRANSIENTS	
16	2000	800	2000	800
17	NO TRANSIENTS		NO TRANSIENTS	
18	50	25	790	395
19	NO TRANSIENTS		NO TRANSIENTS	
20				
21				
22				
23				
24				
25	50	25	390	195
26	NO TRANSIENTS		NO TRANSIENTS	
TOTAL:	**3,578**	**1,489**	**10,428**	**4,582**

Proposed COLA Revision

Table 3-2 of the ETE report has been revised as described above. Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-18

In Section 3 under Transient Population (page 3-7), it states that for Lake Anna State Park there are 1000 people and 400 vehicles (2.5 persons/vehicle) in the park on average during peak season, and the number of transients in the park during peak holiday weekends increases dramatically. Explain why peak transient population for the park at peak times and daily averages are inconsistent with those presented in the ESP FEIS.

Dominion Response

The numbers provided in the FEIS are based on yearly visitation data provided by the Virginia Department of Conservation and Recreation. Sections 3, 5, 6, and Appendices I and J of the ETE report have been revised to use the same estimates.

Proposed COLA Revision

Sections 3, 5, 6, and Appendices I and J of the ETE report have been revised as described above. Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-19

Section 5 "Estimation of Trip Generation Times", describes the processes leading up to evacuation for the different population groups. Section 7 "General Population Evacuation time Estimates", contains information on evacuation times. There is no discussion in either of these sections on how the transient population on the lake will be evacuated. Describe the logistics associated with evacuation of the lake area.

Dominion Response

It is reasonable to expect that people who are boating on the lake will leave in the same manner as they would under normal conditions:

- Those who normally anchor their boats in marinas will return their boats to the marina, anchor them, and then leave by car. There is ample parking at the marinas.
- Those day-trippers who bring their boats to the lake by trailer, using the boat ramps to launch, will reverse the process and evacuate with the boat on the trailer.

The trip generation distribution for transients shown in Figure 5-3 and Table 5-1 of the ETE report applies to boaters as well.

Proposed COLA Revision

None.

NRC RAI ETE-20

Figure 5-1 "Events and Activities Preceding the Evacuation Trip" (page 5-5) shows the mobilization for transients goes straight from notification (1-2) to evacuation (5). Explain the reasoning that supports the report's assumption that transients would not return to their "residences" prior to evacuation; e.g., those staying in hotels may return to gather their belongings prior to evacuation. Explain how this would affect the time for the transient population to evacuate.

Dominion Response

There are relatively few motels in the area and most of these are in the immediate vicinity of the lake. If the emergency occurs during the daytime, it is reasonable to expect that at least some of those who stay overnight at motels will leave their personal belongings in their respective rooms. Others who want to have access to their belongings during the day (or are on their last day), will have their belongings with them. Those of the former group have two choices:

- Evacuate immediately, leaving their belongings in the room for subsequent retrieval; or
- Return to the motel to gather up their belongings and then evacuate.

The mobilization distribution for transients extends over a period of 2+ hours. It is reasonable to expect that those who elect to return to the motel to pick up their belongings will be able to do so and then to begin their evacuation trip within this time frame.

Proposed COLA Revision

None.

NRC RAI ETE-21

The report estimates total employment at the North Anna Power Station (NAPS) to be 900 people (see page 3-11). Table 2-10 of the ESP FEIS shows that Dominion Virginia Power (presumably NAPS) employs 1318+. Please clarify.

Dominion Response

FEIS Section 2.8 states that there are approximately 720 employees at NAPS. The work force estimate presented in FEIS Table 2-10, is 1318+ employees. This included an allowance for the increase in the work force due to refueling outages.

The ETE estimated a total routine employment for North Anna Units 1 and 2 of approximately 900 persons. However, as described in Section 3 of the ETE report under "Employees," the estimated workforce at NAPS during normal operation (peak shift) is 800.

In the ETE, the increase in workers due to refueling outages is treated as a special event, adding 500 workers to the workforce during normal operation (peak shift) of 800. Thus, the ETE total for the operating units would therefore be 800 + 500 = 1300 employees. This ETE value of 1300 is appropriate for comparison with the ESP FEIS and is in good agreement with the FEIS estimate.

Proposed COLA Revision

None.

NRC RAI ETE-22

In Section 3 (page 3-11), data from the three major employers in the NAPS EPZ (with greater than 50 employees) were used to represent the EPZ employee population (i.e., 900 + 156 + 210 = 1266). Clarify whether this number represents the total employee population within the EPZ, and explain how this relates to RAI ETE-21.

Dominion Response

Based on discussions with local agencies, the employees at small local businesses are, to the greatest extent, residents of the EPZ. Since they have already been accounted for in that classification, it would be incorrect to count them again as employees.

As stated in the RAI, three major employers were identified within the EPZ (NAPS, Impac Klearfold, and Tri-Dim Filters). The sum (900 + 156 + 210 = 1266) represents the total employment at major employers within the EPZ.

While there is additional employment in the EPZ at smaller businesses, these employees are already counted as EPZ residents in the ETE.

Proposed COLA Revision

None.

NRC RAI ETE-23

Section 8 (page 8-1) states that transit service may be needed for residents, employees, and transients. It appears that only residents have been factored into those who need transit service. Clarify if employees and transients are expected to need transit service.

Dominion Response

Since there is no mass transit servicing the area (other than taxis), it is reasonable to expect that virtually all transients and employees will have private vehicles available for evacuation. The ETE study therefore assumes that employees and transients will not require transit resources for evacuation.

Proposed COLA Revision

The first paragraph of Section 8 of the ETE report has been revised to read as follows:

> This section details the analyses applied and the results obtained in the form of evacuation time estimates for transit vehicles (buses). The demand for transit service reflects the needs of two population groups: (1) residents with no vehicles available; and (2) residents of special facilities such as schools and child-care facilities.

Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-24

Section 8.4, "Evacuation Time Estimates for Transit-Dependent People" (page 8-5) states that the dwell time for stop is 5 minutes. Explain the basis for the assumption that it takes the same amount of time to load high school children, elementary school children, and the general population on a bus.

Dominion Response

By observation, school children are generally more agile than adults, particularly senior citizens, and that boarding time is at least comparable to adults. Exhibit 27-9 of the Highway Capacity Manual (HCM) indicates that 2.0 seconds per person is a reasonable time for boarding a bus while alighting service times are indicated at 1.7 to 2.0 seconds per person. Example No. 1 on pages 27-36 of the HCM assumes a more conservative 3.0 seconds per passenger for boarding and 2.0 seconds for alighting per passenger. In recognition of the fact that some evacuees may be carrying bulky packages, an estimate of 2-4 seconds per passenger was adopted as identified on page 8-5. Applying the upper bound of this range to an upper bound estimate of 60 passengers per bus including standees yields a total boarding time of 4 minutes. This was rounded up to 5 minutes for conservatism.

Proposed COLA Revision

None.

NRC RAI ETE-25

Section 7.4 (page 7-5) states that summer implies that public schools are not in session. In contrast, Table 6-3, "Percent of Population Groups Evacuating for Various Scenarios," shows 10 percent of school buses used for evacuation in scenarios 1 and 2; and in Table 6-4, "Vehicle Estimates By Scenario," shows 25 percent of school buses used for evacuation in scenarios 1 and 2. Please clarify. In addition, explain whether these buses are being used to transport the general population, or some number of summer school children.

Dominion Response

The 10% estimate of school buses for the summer scenarios 1 and 2 takes into account the prospect that such school buses may be deployed to transport children to summer school. The figure of 25 buses (not percent) in Table 6-4 of the ETE report is 10% of the full complement of 252 buses estimated for the winter scenarios 6 and 7 in that same table. Therefore, these data are consistent.

Proposed COLA Revision

None.

NRC RAI ETE-26

Section 7.1 states that the report assumes traffic volumes emitted within the Shadow Evacuation Region correspond to 30 percent of the residents there, plus a proportionate number of employees in that region. An estimate for the population in the Shadow Evacuation Region is given in Appendix I (see Table I-2, "Evacuation Time Estimates for Shadow Sensitivity Study"), without information as to how the shadow population size was determined. Please discuss how the shadow population size was determined.

Dominion Response

Table I-2 of the ETE report contained incorrect values and has been revised as shown below. The associated calculations were performed with the correct data.

Table I-2. Evacuation Time Estimates for Shadow Sensitivity Study					
Shadow Data			**Evacuation Region**		
Percent Shadow Evacuation	**Number of Shadow Residents**	**Number of Shadow Resident Vehicles**	**2-mile Region**	**5-mile Region**	**Entire EPZ (R03)**
15	4,807	2,664	5:00	5:00	5:10
30 (Base)	9,614	5,328	5:00	5:00	5:10
60	19,229	10,665	5:00	5:00	5:10

The shadow population was estimated using the same methodology that was used for permanent residents within the EPZ, as outlined on Page 3-2. It was assumed that 2.57 persons per household applies in the shadow region. GIS shapefiles were used to identify the number of address points in the shadow region. Multiplying by the average household size resulted in the population of 32,048 people within the shadow region. It is assumed that all the address points in the shadow region are residential households.

Proposed COLA Revision

Table I-2 has been revised as described above. Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-27

Section 7.3 (page 7-3) states that it is reasonable to expect that some evacuees may delay or lengthen their mobilization activities and evacuate at a later time as a result, and that these ETE estimates do not (and should not) be distorted to account for these relatively few stragglers ["laggards"]. Clarify if the ETE results presented in Table 7-1D, "Time to Clear the Indicated Area of 100 Percent of the Affected Population," actually includes 100 percent of the population, or whether the evacuation tail was truncated and "laggards" were not included. In addition, it appears the ETE results may have been truncated, because the longest evacuation time in Table 7-1D for 100 percent of the ETE is 5.5 hours. However, Distribution No.4 in Section 5 (page 5-8) indicates that 360 minutes (6 hours) is the time for 100 percent of the population to prepare to leave home. Please clarify how the maximum evacuation time for 100 percent of the public can be less than the time required to prepare to evacuate.

Dominion Response

In distribution number 4 tabulated on page 5-8 of the ETE report, 99% of the population is ready to evacuate after an elapsed time of 4 hours and it remains at 99% (when expressed as an integer) until 5:45 (hr:min); it "jumps" to 100% at 6 hours. Interpolating these figures over that final 2 hours yields a cumulative population of 99.5% after 5 hours. This is shown in Figure 5-3 where the trip generation curve for residents with commuters ends at 5 hours (300 minutes). Furthermore, Table 5-1 shows that the last 4% of resident commuters have their trips generated between 4 and 5 hours. These are the distributions that were input to I-DYNEV and used to compute evacuation times. The ETE calculations were conducted on 100% of the population. As shown in Table 7-1D of the revised ETE report, the model produces an ETE of 6:10 for the most limiting scenario (midday-midweek-snow) of Region R03.

As described in Section 7.3, the flow rate of evacuating vehicles declines rapidly towards the end of the evacuation such that there is a trickle of vehicles moving towards the EPZ boundary over the last 1½ hours. This is seen by the fact that the curves of Figure 7-7 are essentially horizontal past an ETE of 4 hours (zero slope indicates zero flow rate.) Consequently, the time to evacuate 100% of the population is indistinct and difficult to quantify. More to the point, the use of the ETE for 100% of the evacuating population, as a basis for developing a protective action recommendation may yield a biased estimate. Therefore, in the example presented on page 7-8, the use of the 95th percentile value of ETE is presented rather than the 100th percentile value. Local governments may also consider the use of the 90th percentile value as a basis for developing the protective action recommendation.

Proposed COLA Revision

None.

NRC RAI ETE-28

While Appendix K contains road characteristics for the links and nodes, there is no reference for them on the map in Figure 1-2, "North Anna Link-Node Analysis Network."

a. *Provide a map that includes references for the road characteristic in Appendix K; e.g., additional maps and/or a larger scale map.*

b. *Explain why the existing node network on Figure 1-2 is significantly different than the evacuation networks on Figures 10-1 through 10-4.*

c. *The evacuation routes shown on Figures 10-1 through 10-4 are not consistent. Clarify which figure(s) is correct.*

d. *Explain if and how the evacuation maps on Figures 10-1 through 10-4 were used to develop the nodal network.*

e. *Identify the number of bridges used in ETE modeling discussed in Appendix C "Traffic Simulation Model: PCDYNEV".*

f. *Explain whether the directions used in the ETE modeling, discussed in Appendix B and C, align with the directions that would be anticipated during an evacuation.*

g. *Describe what road width was used for "Full Lanes" on the tables in Appendix K. In addition, address whether lane widths were measured during the field survey; and if so, was there one consistent width identified. If not, explain.*

Dominion Response

a. A large-scale (4 ft. by 3 ft.) version of Figure 1-2 of the ETE report is provided in electronic format in Enclosure 2 to this letter. The nodes are numbered and links can be cross-referenced with Appendix K.

b. As stated in Section 10 (page 10-1), Figures 10-2 through 10-4 present the major evacuation routes for the five counties in the EPZ. There is no implication that evacuees are restricted to these major routes. The evacuation network, which is based in large part upon a field survey conducted during preparation of the ETE, includes many other roads that are capable of servicing evacuating traffic. This greater "granularity" used in representing the physical highway network can be important if congestion arises in such a manner that prompts evacuees upstream to divert to another route that may not be delineated on Figures 10-2 through 10-4. Such flexibility on the part of evacuees is entirely consistent with human behavior given that the evacuees would prefer to move on other routes rather than wait patiently until the congestion becomes resolved on a major route.

c. There is no inconsistency. Figures 10-2, 10-3 and 10-4 portray a section of the same graphical map. Figure 10-1 does not show evacuation routes.

d. As described in the response to part b. of this RAI, the link-node network was developed on the basis of a field survey. Figures 10-2 through 10-4 were used for displaying the major evacuation routes.

e. The number of bridges on the evacuation network was not specifically identified. Bridges were treated, for ETE purposes, as links in the highway network. Their properties were recorded in Appendix K, but are not otherwise delineated.

f. The word "directions" is interpreted with the term "evacuation routing." As described in Appendix B, the TRAD model "assigns" traffic to the most efficient evacuation routes consistent with "user equilibrium" theory. Vehicles are not constrained to travel along specific paths nor in specific directions. The general directions of flow specific to the model, applied to each "origin" centroid, reflect the requirement that evacuees travel in directions away from the power station.

g. In Appendix K, the term "full lanes" is used to identify the number of lanes that extend over the entire length of the roadway segment or link; it does not pertain to lane width. Many network links are widened with additional lanes near the downstream intersection (e.g., left-turn bays, right-turn bays, additional through lanes). These additional lanes are all properly represented by the input stream for the I-DYNEV system. Lane widths certainly do vary from one link to the next and even within one link as do shoulder width, grade, and horizontal curvature. In accordance with NUREG-0654, Appendix 4, Section III.B, the estimation of capacity (expressed as saturation flow rate in the fifth column of the table in Appendix K) is based on the narrowest section of the roadway segment. The free-flow speed shown in Appendix K is based upon observation of traffic movements during the field survey; these estimates do not necessarily comport with the speed advisory signing. Lane widths were observed but not measured during the field survey.

As geometric features change along a highway, the modeling process subdivides the highway into sequential links, each with its own reasonably consistent set of attributes, including lane width. The objective is to be able to assign estimated values of saturation flow rates and free speed for each link.

Proposed COLA Revision

None.

NRC RAI ETE-29

Figure 8-2 "Proposed Transit Dependent Bus Routes" (page 8-9), specify the number of buses on each route, but do not include the number or location of the bus stops along the routes. Provide maps that show the bus stop locations, and describe the effect they have on the ETE calculations.

Dominion Response

The number and locations of bus stops along the routes is not a requirement for the ETE. These implementation specifics, if any stops are designated, are the responsibility of the county emergency management plan. It is recommended to the county that buses on these routes honor "flag stops" so that people who need transit assistance along the side of the road can wave the bus to stop so that they can be picked up. This approach would obviate the need for specified bus stops, be more convenient for evacuees, and reduce walking effort and time.

The process of a bus slowing to a stop to pick up passengers and then accelerating back to speed introduces a delay into the bus' travel time. This delay was estimated at 1 minute per stop. A total of 30 minutes was allowed for all stops that a bus is expected to make along a route before leaving the route to travel to the reception center. This 30 minutes of pick-up time is shown in the fifth and twelfth columns of Table 8-6A of the ETE report.

Proposed COLA Revision

None.

NRC RAI ETE-30

Explain how the traffic management strategy (plan) identified in Section 9 and Appendix G was integrated into the ETE calculation. Are the evacuation time estimates dependant upon the various traffic control points (TCPs) and access control points (ACPs) being in place? In addition, Appendix G (page G-1) states the following:

> *"Manpower and equipment shortages are likely to arise; as such, prioritization of TCP and ACP was established to make the most efficient use of manpower and equipment in the event of an emergency. The use of ITS [Intelligent Transportation Systems] technologies, as outlined in Section 9, will also aid in overcoming manpower shortages."*

To what extent have these likely manpower and equipment shortages been reflected in the ETE calculations; and if not, what effect will they have on the ETE calculations?

Dominion Response

The ETE are not dependent on the establishment of TCPs and ACPs. Therefore, manpower and equipment shortages have no effect on the ETE calculations. See also the response to RAI ETE-7.

Proposed COLA Revision

None.

NRC RAI ETE-31

Appendix 4, "Evacuation Time Estimates (summary)," states on page ES-4 that the (ETE) plan should be reviewed by State and local law enforcement personnel. In addition, the first recommendation in Section 13, "Recommendations," states the following: "The traffic management plan should be reviewed by state and county emergency planners with local and state law enforcement agencies (See Section 9 and Appendix G). Specifically,

- *The number and locations of Traffic Control Points (TCP) and Access Control Points (ACP) should be reviewed in detail.*

- *The indicated resource requirements (personnel, traffic control devices) should be reconciled with current assets."*

Please identify State and county governmental agencies/officials affected by the ETE that have (and have not) reviewed and concurred with the ETE traffic control and management strategy (plan), including resource and equipment allocations, and locations of traffic control points (TCPs) and access control points (ACPs). For those agencies that have not concurred, describe any effect that the absence of traffic/access control support from those agencies would have on the ETE calculations, including if traffic control associated with those agencies is not in place during the evacuation. Also, identify TCPs and ACPs that would not be staffed as a result of the absence of support from those agencies that have not concurred. (See also, ETE-45.)

Dominion Response

This RAI addresses issues that are considered as part of the county emergency plans. The ETE are not dependent on the establishment of TCPs and ACPs. Therefore, manpower and equipment shortages have no effect on the ETE calculations. See also the response to RAI ETE-7.

The following governmental agencies/officials were provided the ETE in October of 2007, with the traffic control and management strategy (plan), including resource and equipment allocations and locations of TCPs and ACPs for review and comment:

- Virginia Department of Emergency Management (VDEM)
- Virginia Department of Transportation (VDOT)
- Virginia State Police (VSP)
- Emergency Management and Local Law Enforcement Agencies for the five risk jurisdictions within the 10-mile EPZ of North Anna Power Station
    - Spotsylvania County
    - Louisa County
    - Caroline County
    - Orange County
    - Hanover County

Comments were received from VDEM on November 2, 2007 and have been addressed. These questions and Dominion's responses are presented with the response to RAI ETE-45.

Comments were received from VDOT on November 8, 2007 and have been addressed. These questions and Dominion's responses are presented with the response to RAI ETE-45.

VDEM sent the draft revision to the ETE report for review and comment opportunity to the following risk area local government emergency management on July 31, 2008:

- Spotsylvania County
- Louisa County
- Caroline County
- Orange County
- Hanover County

The Division Chief of Spotsylvania County requested clarification on two items. These are addressed in the response to RAI ETE-45.

There were no non-concurring agencies. Further, the ETE calculations do not rely upon any TCPs to be established. The estimates of capacity which are used by the I-DYNEV model, and are documented in Appendix K of the ETE report, are based upon the factors described in Section 4 and upon the observations made during the road survey. It is assumed that these capacity estimates are not enhanced nor compromised by the establishment of a TCP at an intersection. As detailed in Section 9, the functions to be performed in the field at TCPs are to (1) facilitate evacuating traffic movements; and (2) discourage those movements that would move travelers closer to the power station.

Proposed COLA Revision

None.

NRC RAI ETE-32

Provide congestion points (or bottlenecks) for the maps in Figures 7-2 through 7-6.

Dominion Response

Congestion points are shown only in Figures 7-3 through 7-6 of the ETE report. The ETE report has been revised to add a new table on page 7-7 that identifies the locations of the congestion paths shown in Figures 7-3 through 7-6. Evacuation routes experiencing Level of Service (LOS) F are identified in revised Figures 7-3 through 7-6 with a location number. This number can be cross-referenced with new table to identify the intersection and the delay per vehicle on that link.

Proposed COLA Revision

Page 7-7 and Figure 7-3 through 7-6 of the ETE report have been revised as described above. Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-33

Section 1.3 (page 1-5) states that during field surveys of the highway network (both within and outside the EPZ), characteristics of each section of the highway were identified and recorded. These included unusual characteristics, such as narrow bridges, sharp curves, poor pavement, flood warning signs, inadequate delineations, etc. In addition, Section 4 (page 4-4) states that sections of roadway with adverse geometrics are characterized by lower free-flow speeds and lane capacity.

a. Identify the location and nature of highway sections with unusual characteristics, and describe how this information was reflected in ETE calculations.

b. Identify where the narrowest roadway sections exist within the roadway network, and describe how this was factored into the ETE calculations.

c. Section 4 (page 4-4) states that "based on empirical data collected on freeways, we have employed a value of R=0.85." Describe the empirical data that supports the value of R=0.85, including how the value was determined. In addition, explain why use of freeway data is applicable to the rural roads of the EPZ.

Dominion Response

a. As identified on page 20-3 of the Highway Capacity Manual, the capacity of a two-lane highway is 1700 passenger cars per hour for each direction of travel. For freeway sections, a value of 2250 vehicles per hour per lane was assigned. The road survey identified several segments which are characterized by adverse geometrics; these were reflected in reduced values for both capacity and speed and can be identified by reviewing Appendix K of the ETE report. Link capacity is an input to I-DYNEV which calculates the ETE. The locations of these sections can be identified by reference to the large-scale map showing link-node diagram with the nodes identified thereon (see the response to RAI ETE-28).

b. See the response to part a. of this RAI.

c. 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. Zhang and Levinson[1] describe a research program that collected data from a computer-based surveillance system (loop detectors) installed on the Interstate Highway System, at 27 active bottlenecks in the twin cities metro area in Minnesota over a 7-week period. When flow breakdown occurs, queues are formed which discharge at lower flow rates than the maximum capacity prior to observed breakdown. These queue discharge flow (QDF) rates vary from one location to the next and also vary by day of week and time of day based upon local circumstances. The cited reference presents a mean QDF of 2016 passenger cars per hour per lane (pcphpl). This figure compares with the nominal capacity estimate of 2250 pcphpl estimated for the ETE and identified in Appendix K

[1] Lei Zhang and David Levinson, "Some Properties of Flows at Freeway Bottlenecks," Transportation Research Record 1883, 2004.

for freeway links. The ratio of these two numbers is 0.896 which translates into a capacity reduction factor of 0.90. The data collected in the cited reference indicates that the variation of QDF at a location is generally in the range of +/- 5% about the average QDF. That is, the lower tail of this distribution would be equivalent to a capacity reduction factor of 0.90 - 0.05 = 0.85, which is the figure used.

The ETE report takes a conservative view in estimating the capacity at bottlenecks when congestion develops (this capacity is the QDF rate discussed above). One could argue that a more representative value for this capacity reduction factor could be 0.90 as discussed above. Given the emergency conditions, a conservative stance was justified. Therefore, a factor of 0.85 was applied *only when flow breaks down*, as determined by the simulation model.

Rural roads, like freeways, are classified as "uninterrupted flow" facilities. (This is in contrast with urban street systems which have closely spaced signalized intersections and are classified as "interrupted flow" facilities.) As such, traffic flow along rural roads is subject to the same effects as freeways in the event traffic demand exceeds the nominal capacity, resulting in queuing and QDF rates. As a practical matter, rural roads rarely break down at locations away from intersections. The breakdowns on rural roads which are experienced on this network occur at intersections where other model logic applies. Therefore, the application of a factor of 0.85 is appropriate on rural roads.

Proposed COLA Revision

None.

NRC RAI ETE-34

The text that accompanies the tables in Appendix J provides the assumptions for all 27 regions and 12 evacuation scenarios. The ETEs are presented in time required to evacuate a region of 50, 90, 95, and 100 percent of the population. The same information is included in Section 7, which also includes information on voluntary and shadow evacuations, congestion patterns, and evacuation rates. While the ETE report format is similar to that in Appendix 4 of NUREG- 654/FEMA-REP-1 (Rev. 1), it does not provide separate evacuation times for permanent residents and transients. Please explain the absence of these separate evacuation times.

Dominion Response

NUREG-0654, Appendix 4, Table 2 provides an example of how the data may be presented, and is labeled as such. The evacuating vehicles driven by transients mix with the evacuating vehicles driven by residents and by employees. The major difference among these three classifications of evacuees is their respective mobilization times which are documented in Section 5 of the ETE report. Given that the vehicles driven by these categories of evacuees are physically indistinguishable from one another, it is simply not feasible to separate the ETE for each category.

Proposed COLA Revision

None.

NRC RAI ETE-35

In Section 5, the time tables included in Distribution No. 2 and Distribution No. 3 (on pages 5-6 and 5-7, respectively) include a NOTE, which says 'The survey data was normalized to distribute the "Don't know" response.' Please explain this note, including the process used to normalize the data.

Dominion Response

Attachment A in Appendix F of the ETE report is a documentation of the survey instrument used to gather the data that served as a basis for estimating mobilization times. A review of the survey instrument reveals that several questions have a "don't know" entry for a response. It is accepted practice in conducting surveys of this type to accept the answers of a respondent who offers a "don't know" response for one or two questions. To address the issue of occasional "don't know" responses from a large sample, the practice is to assume that the distribution of these responses is the same as the underlying distribution of the positive responses. In effect, the "don't know" responses are ignored and the distributions are based upon the positive data that is acquired.

Proposed COLA Revision

None.

NRC RAI ETE-36

In Section 5, the table for Distribution No. 2 (page 5-6) shows that for 65 minutes, the cumulative percent employees leaving work is 96 percent. The table also shows 93 percent for 70 minutes, which is less than the percentage of employees leaving work at 65 minutes. Please clarify whether this is an error, or if something happens at 70 minutes to affect this value.

Dominion Response

The correct entry for elapsed time of 65 minutes is 92 percent. The table on page 5-6 of the ETE report has been revised to correct this value.

Proposed COLA Revision

The table on page 5-6 of the ETE report has been revised as described above. Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-37

Appendix F, Figure F-5, "School Children in Households" (page F-6), presents the distribution of school children identified by the telephone survey. The percent scale on the "y" (vertical) axis only adds up to 72 percent, rather than 100 percent. Please clarify.

Dominion Response

Figure F-5 of the ETE report has been revised to correct these items.

Proposed COLA Revision

Figure F-5 of the ETE report has been revised as described above. Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-38

Section 6, Table 6-3, "Percent of Population Groups Evacuating for Various Scenarios" (page 6-5), shows the percent of population groups evacuating for various scenarios, including the shadow population identified in Section 2.2. It does not show the voluntary evacuees, and it is not clear from the table how this group has been addressed. Please describe where those who voluntarily evacuate are included in Table 6-3.

Dominion Response

Table 6-3 of the ETE report presents the percent of population groups that evacuate for each scenario, which applies throughout the EPZ. The number of voluntary evacuees varies by evacuation region – not by scenario. Therefore, voluntary evacuees are not included in Table 6-3. Similarly, Table 6-4 presents vehicle estimates for Region 03 (the entire EPZ) for all scenarios. These estimates do not include voluntary evacuees for the same reason given above.

Table 6-1 identifies those PAZs that define each of the 27 evacuation regions. For a given region, an empty cell along a row in this Table represents a PAZ which is not included within the region, but which contributes voluntary evacuees to the evacuating traffic environment. The number of voluntary evacuees depends on the population within the PAZ and upon the region that is being evacuated.

For example, consider PAZ 16. This PAZ, shown in Figure 6-1, lies between the 5-mile ring and the EPZ boundary to the west of NAPS. If Region R04 were evacuated, then PAZ 16 (which is external to R04 - see row for R04 in Table 6-1), would contribute 35% of its population as voluntary evacuees according to Figure 2-1. On the other hand, if Region R15 were to be evacuated, then PAZ 16 (which is external to R15 - see Table 6-1) would contribute 50% of its population as voluntary evacuees according to Figure 2-1. The reason for this increased percentage is that evacuating Region R15 extends to the EPZ boundary; since PAZ 16 also extends to the EPZ boundary, it is assumed that 50% of its population would voluntarily evacuate even though advised to take shelter.

Now, if Region R15 is advised to evacuate under the conditions of Scenario 1, then the percentages for that scenario that appear in Table 6-3 will also apply to the population within PAZ 16. The trip generation distributions (Section 5) for the voluntary evacuees that originate their trips within PAZ 16 are the same as though the PAZ were advised to evacuate; the *number* of evacuees, however, would be either 35% or 50% of the total, as explained above.

In summary, the number of voluntary evacuees in any given evacuation region/scenario combination ("case") is taken into proper account for each *"empty"* cell in Table 6-1. The necessary computations to calculate the number of generated trips within each PAZ are performed by the UNITES software. The output of this software, for each case, is the input stream to the I-DYNEV system.

Proposed COLA Revision

None.

NRC RAI ETE-39

Section 7.2 states that Figures 7-3 through 7-6 illustrate the patterns of traffic congestion that arise for the case when the entire EPZ (Region R03) is advised to evacuate during the summer, weekend, midday period under good weather conditions (Scenario 3). These figures (maps), which show congestion areas in red and the absence of congestion in white, do not show delay times. Please provide more information on delay times.

Dominion Response

The delay experienced by evacuees varies by location and over time. A new table presenting the average delay per vehicle at the indicated locations within the EPZ and the times indicated in Figures 7-3 through 7-6 has been added to page 7-7 of the ETE report.

Proposed COLA Revision

A new table has been added to page 7-7 of the ETE report showing the average delay per vehicle at the locations indicated in Figures 7-3 through 7-6.

Labels identifying congestion areas have been added to Figure 7-3, which also apply to Figures 7-4 through 7-6.

Refer to Enclosure 2 to this letter for a copy of Revision 1 of the ETE report.

NRC RAI ETE-40

Explain how the inbound bus speeds discussed in Section 8.4 (page 8-7) can be achieved when the buses will have to transverse traffic control points and access control points.

Dominion Response

The average travel distance from the reception centers to the EPZ boundary is slightly less than 10 miles. The implied average speed associated with the estimated travel time of 20 minutes is therefore less than 30 miles per hour. Since this return trip by the buses will be running counter to the evacuating flow (i.e., the buses will be traveling in the low traffic flow direction), these estimated speeds are certainly reasonable based upon observations made during the road survey. The establishment of access control points (ACPs) and traffic control points (TCPs) is meant to *facilitate* the movement of traffic rather than to hinder it; their presence should not have an adverse impact on the return travel of buses to the EPZ.

Proposed COLA Revision

None.

NRC RAI ETE-41

Section 8.4 (page 8-4) contains the statement: "In the event dispatch from the depots to the various facilities and to the bus routes is somewhat inefficient, or there is a short fall of available buses or bus drivers, there may be a need for buses to return to the EPZ from the EACs...to complete a second wave..." A similar statement is made in Section 8.4 page 8-7. The ETE does not appear to address whether there are enough buses available to evacuate all schools simultaneously. Please provide information to address this issue. (See also, ETE-13 and ETE-40.)

Dominion Response

As stated on page 8-5 of the ETE report, based on discussions with the EPZ counties, there are adequate buses to evacuate the school children in a single wave. The detailed ETE for schools are given in Table 8-4. Second-wave ETE are provided for the transit dependent bus routes in Table 8-6.

Proposed COLA Revision

None.

NRC RAI ETE-42

Figure 7-7, "Evacuation Time Estimates - Summer, Weekend, Midday, Good Weather (Scenario 3)" (page 7-18), which shows ETEs for vehicles evacuating the EPZ in Scenario R03, is similar to the format in Figure 4 of Appendix 4 to NUREG-0654/FEMAREP-1, Rev. 1. Figure 7-7 does not, however, separate the permanent residents from the transient population. Provide additional information that separately addresses the permanent residents and the transient populations.

Dominion Response

Please refer to the response to RAI ETE-34.

Proposed COLA Revision

None.

NRC RAI ETE-43

Section 12, "Confirmation Time," addresses the time needed to confirm that the evacuation process is effective, i.e., the public is complying with the advisory to evacuate. Please address the following questions:

a. *On page 12-1 it states that "[a]lthough the counties within the EPZ may use their own procedures for confirmation, we suggest an alternative or complementary approach." This statement suggests that the confirmation process and times discussed in Section 12 are an alternative for other that may be specific to the counties. Discuss whether the counties have agreed with the ETE plans for confirmation of evacuation, including the existence of other county plans. If other county plans exist, discuss how they would work with the ETE plan.*

b. *On page 12-1, it states that "[s]hould the number of telephone responses (i.e., people still at home) exceed 20 percent, then the telephone survey should be repeated after an hour's interval until the confirmation process is completed." Explain what is required if the telephone survey response is less than 20 percent, but still significant.*

c. *Provide an estimate of the time needed to confirm that the evacuation is complete as discussed in Section 12 "Confirmation time".*

Dominion Response

a. Officials typically employ a range of visual based surveillance techniques to ascertain confirmation of evacuation: tours through the area by law enforcement vehicles equipped with public address systems, aerial surveillance using light aircraft at relatively low altitudes equipped with public address systems, etc. However, there have been accounts of people who have refused to respond to evacuation advisories because of concern for the security of their properties or for other human factors reasons. If these people retreat to the interior of their homes, such visual based approaches will not be effective. However, telephone calls either to land lines or to cell phones registered in the area could enhance the process. These observations led to the recommendation. This telephone confirmation procedure in no way inhibits or contradicts these other visual-based approaches considered by the counties since different personnel and technologies are employed.

b. The follow-up telephone survey is a suggested practice but is not required, and is not currently utilized by the Commonwealth of Virginia or the five risk counties. Currently, the Commonwealth of Virginia and the risk jurisdictions utilize state and local law enforcement personnel to conduct "sweeps" of the evacuated areas using a public address system and visual aids that are provided annually to all residents residing in the 10-mile EPZ. Residents are given instructions in the annual emergency informational calendar to place the sign in a window or on a door that indicates that they have been notified or that they require assistance.

c. The amount of time needed to confirm that the evacuation is complete is estimated to be two to eight hours, depending on the region evacuated.

Proposed COLA Revision

None.

NRC RAI ETE-44

Section 13 provides specific recommendations for actions that could be taken to significantly improve evacuation time. In regard to such recommendations, Section 1.3 (under the subsection entitled "Analytical Tools") discusses execution of the PC-DYNEV simulation model to provide a detailed description of traffic operations on the evacuation network. The ETE further states that "[t]his description enables the analyst to identify bottlenecks and to develop countermeasures that are designed to expedite the movement of vehicles." Please clarify whether this iterative approach was used; and if so, explain how it was used and reflected in the ETE.

Dominion Response

This iterative approach was used. Please refer to the response to RAI ETE-11.

Proposed COLA Revision

None.

NRC RAI ETE-45

Have State and local organizations/personnel - that are involved in emergency response and have responsibilities associated with the ETE - reviewed the entire ETE plan, including the traffic and access control plan? Provide any comments received, and discuss how those comments were resolved and reflected in the ETE document. In addition, Section 13, recommendation 7 states (in bold) that "[t]he decision makers should reference Table J-1C which lists the time needed to evacuate 95 percent of the population, when preparing recommended protective actions." What is the basis for this statement?

Dominion Response

As stated in the response to RAI ETE-31, the ETE report has been forwarded on two occasions to the appropriate state and local government authorities for questions and comments.

VDOT had two questions.

VDOT Question 1:
Is this information on Traffic Control Points and Access Points in addition to the existing ones in the in the RAD plan 2002 or instead of those currently listed?

Response to VDOT Question 1:
Most of the TCPs in the ETE report are identical to those in RAD 2002. Because RAD 2002 was not an input to the ETE report, there may be some differences.

VDOT Question 2:
Who are the traffic guides?

Response to VDOT Question 2:
The ETE report specifically uses the term "traffic guide" in order to not limit who will perform this function. In our experience, the traffic control points are typically broken down by jurisdiction with the law enforcement officers for each jurisdiction controlling the intersections within their jurisdiction. State Police typically handle the state highways and interstates. In the event of a manpower shortage, VDOT employees, firemen, fire police or other personnel who are deemed suitable for controlling traffic can be used. The traffic control points are prioritized; those that are Priority 1 will have the most benefit to the evacuation process while those that are Priority 3 will have less impact. The traffic control points should be manned accordingly.

VDEM had twelve questions.

VDEM Question 1 is based on information on Page ES-2 of ETE Revision 0.
"Evacuees who do not have access to a private vehicle will either ride-share with relatives, friends or neighbors, or be evacuated by buses provided as specified in the county evacuation plans. Those in special facilities will likewise be evacuated with public

transit, as needed: bus, van, or ambulance, as required. Separate ETE are calculated for the transit-dependent evacuees and for those evacuated from special facilities."
Question: Do these plans exist?

Response to VDEM Question 1:
The routes identified in Table 8-5 and Figure 8-2 to service the transit dependent portion of the population were designed to service the densely populated portions of the EPZ. Transit dependent persons likely reside in towns and cities where a vehicle may not be needed. The results of the telephone survey were used to estimate the number of transit dependent people in the EPZ (See Page 8-3).

Each county within the EPZ can identify the transit dependent people within its portion of the EPZ. This can be done through forms distributed with the evacuation calendars each year. Those who are transit dependent can return the form indicating that they have no transportation and how many people live in the household. Based on that information, detailed bus routes and bus pickup locations should be identified in the County Plans to service those needing transit services. The routes and ETE calculations for the transit dependent portion of the EPZ developed by KLD in Section 8 are based on computed evacuation travel speeds. Emergency Management Plans at the local level are required by law for nuclear power stations.

VDEM Question 2 is based on information on Page ES-4 of ETE Revision 0.
"Tables 7-1C and 7-1D are compilations of Evacuation Time Estimates (ETE). These data are the times needed to clear the indicated regions of 95 and 100 percent of the population occupying these regions, respectively. These computed ETE include consideration of mobilization time, and of estimated voluntary evacuations from other regions within the EPZ and from the shadow region."
Question: Why italics?

Response to VDEM Question 2:
The previous ETE study for the North Anna Power Station defined ETE as the time when those vehicles being evacuated cleared the EPZ boundary. Based on this definition, the ETE for an evacuation of the 2 mile area is longer than the ETE of the Full EPZ because the vehicles in the 2 mile radius have to travel at least an additional 8 miles before clearing the EPZ boundary. This result is not desirable. KLD defines ETE as the elapsed time from the Advisory to Evacuate to the time at which the last evacuated vehicle crosses the boundary of the region being evacuated. The phrase "clear the indicated regions" is italicized within the report to bring attention to the change in definition of ETE since the previous ETE report.

VDEM Question 3 is based on information on Page ES-4 of ETE Revision 0.
One of the bulleted items includes the following statement:
"These computed ETE include consideration of mobilization time and of estimated voluntary evacuations from other regions within the EPZ and from the shadow region."
Comment: This sentence does not make sense.

Response to VDEM Question 3:
Explanation:
• The computed ETE was defined above.

• Mobilization time is the elapsed time from the Advisory to Evacuate until the evacuation trip begins for each evacuee.
• Voluntary evacuations are those who elect to evacuate despite being advised to shelter in place. As indicated in Figure 2-1, we assume that 50% of the people within the evacuation radius, but not in the evacuated region, will choose to evacuate, while 35% of those people outside of the radius to be evacuated, but within the EPZ will choose to evacuate. Also, 30% of the people within the shadow region outside the EPZ will also evacuate although advised to shelter.

VDEM Question 4 is based on information in Table 6-2 of ETE Revision 0.
Question: It appears that some scenarios are missing. Is this because these 12 were the most probable, or that the other scenarios were not different enough from one of the other already listed scenarios?

Response to VDEM Question 4:
The scenarios are designed, in aggregate, to represent conditions throughout the year. Clearly, there can be an infinite number of scenarios defined for the North Anna EPZ. The scenarios used were presented at the kickoff and progress meetings and refined to provide a representative sample of the potential scenarios for the North Anna EPZ. Page 7-4 indicates that not all scenarios are defined, but those that have not been included are bound by the scenarios that were considered. Note that in Revision 1 of the ETE report, two additional scenarios were added to account for snow.

VDEM Question 5 regards the use of an acronym:
I-DYNEV
Question: With or without hyphen? Both are in here.

Response to VDEM Question 5:
I-DYNEV and IDYNEV are one and the same.

VDEM Question 6 is based on information on Page 2-1 of ETE Revision 0.
"Population estimates are based upon GIS shapefiles of address points within each county in the EPZ. These shapefiles are updated regularly and were provided by the Virginia Department of Emergency Management. It is assumed that the address points are all residential homes with the exception of the address points for NAPS, the NAPS training center, and those addresses within Lake Anna State Park. The number of households was multiplied by the average household occupancy of 2.57 persons (obtained in the telephone survey) to estimate the 2008 population within the EPZ. GIS shapefiles of address points were not available for Caroline County; 2000 Census data was used and extrapolated to 2008 based on county growth rates."
Question: Does this underestimate the exact number of people inside the EPZ during daylight hours and overestimate at night due to number of people in addresses that are businesses?

Response to VDEM Question 6:
It was decided amongst KLD and the Virginia Department of Emergency Management that using the county address points would be the most accurate way to estimate the

2008 population within the EPZ. There are very few commercial addresses within the EPZ; the permanent resident population is slightly overestimated as a result of this.

VDEM Question 7 is based on the second item in Section 2.1 of ETE Revision 0.
"Estimates of employees who commute into the EPZ to work are based upon data obtained from major employers by Dominion Generation."
Question: What addresses are these people linked to if all addresses are assumed to be residential?

Response to VDEM Question 7:
The employees who commute into the EPZ were loaded at three locations as indicated on Page 3-11: the North Anna Power Station, Impac Klearfold in Louisa, and Tri-Dim Filters in Louisa. None of these addresses were included as residential addresses in the population estimates.

VDEM Question 8 is based on information on Page 2-5 of ETE Revision 0.
"Access Control Points (ACP) will be staffed approximately 90 minutes after the siren notifications, to divert traffic attempting to enter the EPZ. Earlier activation of ACP locations could delay returning commuters. It is assumed that no vehicles will enter the EPZ after this 90 minute mobilization time period."
Question: This does not appear to be reflected when dealing with commuters. It seems that those households awaiting commuters wait up to 4 hours before leaving.

Response to VDEM Question 8:
The ACP are designed to exclude vehicles that enter the EPZ as external-external trips (trips that have their origin and destination outside of the EPZ), so that they avoid exposure to radiation. As indicated in Section 9 of the report, the TCP and ACP are not designed to prohibit traffic from traveling in a specified direction as some vehicles may have legitimate reasons to travel in a direction discouraged by the traffic management plan (i.e. returning commuters and emergency response vehicles).

VDEM Question 9 is based on information on Page 2-5 of ETE Revision 0.
"Traffic Control Points (TCP) within the EPZ will be staffed over time, beginning at the Advisory to Evacuate. Their number and location will depend on the Region to be evacuated and personnel resources available. It is assumed that drivers will act rationally, travel in the directions identified in the plan (as documented in the public information material), and obey all control devices and traffic guides."
Comment (paraphrased): Is this a reasonable assumption?

Response to VDEM Question 9:
It is a reasonable expectation based on extensive observation of emergency evacuations. Those who behave otherwise are relatively few in number.

VDEM Question 10 is based on information on Page 5-1 of ETE Revision 0.
Using the different bullets/number in one small space is very visually difficult to read.

Response to VDEM Question 10:
The intent is clear. No changes made.

VDEM Question 11 is based on information on Page 5-1 of ETE Revision 0.
"Time distribution of commuters departing place of work (Event 3). Also applies to employees who work within the EPZ and who live outside, and to Transients within the EPZ."
Comment: Maybe outside of the EPZ, not just outside. . .

Response to VDEM Question 11:
Those who work in the EPZ and live within the EPZ are counted as permanent residents. The distribution used for these people are the households with returning commuters distribution (Distribution C). Distribution A applies only to those people who work within the EPZ, but live outside of the EPZ.

VDEM Question 12 is based on information on Page 11-1 of ETE Revision 0.
"In a low-speed traffic environment, any vehicle disablement is likely to arise due to a low-speed collision, mechanical failure or exhausting its fuel supply. In any case, the disabled vehicle can be pushed onto the shoulder, thereby restoring traffic flow. Past experience in other emergencies indicates that evacuees who are leaving an area often perform activities such as pushing a disabled vehicle to the side of the road without prompting."
Comment: This discusses the removal of the disabled vehicles from the route, but does not discuss the status of the passengers and how they will continue further along the evacuation route.

Response to VDEM Question 12:
Past evacuations have demonstrated that people are usually helpful and assist others who are in distress. It is reasonable to expect that passengers of disabled vehicles will be able to be accommodated by passing evacuating vehicles.

The reasoning behind the statement regarding Table J-1C of the ETE report is given in the explanation offered in recommendation No. 7 on page 13-1:

> "Specifically, the additional time needed for the last 5 percent of the population to evacuate can be as much as 40 percent longer than the time needed to evacuate 95 percent of the population."

<u>Spotsylvania County had two comments:</u>

Comment 1 from Spotsylvania County:
Chancellor High School does not appear in the list of evacuation centers (Table 8-3).

Response to Comment 1 from Spotsylvania County:
Chancellor High School was inadvertently omitted. However, the ETE calculations are not affected by this omission.

Comment 2 from Spotsylvania County:
There are scenarios for good weather and for rain, but none for snow.

Response to Comment 2 from Spotsylvania County:
Two snow scenarios have been added to the ETE report. Please see the response to RAI ETE-10 for further detail.

Proposed COLA Revision

Snow scenarios have been added to the ETE report. Please see the response to RAI ETE-10 for further detail.