



Tennessee Valley Authority, 1101 Market Street, Chattanooga, TN 37402

CNL-18-009

January 22, 2018

10 CFR 52.17

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Clinch River Nuclear Site
NRC Docket No. 52-047

Subject: Response to Request for Additional Information Related to Emergency Planning Exemption Requests in Support of Early Site Permit Application for Clinch River Nuclear Site

References:

1. Letter from TVA to NRC, CNL-16-081, "Application for Early Site Permit for Clinch River Nuclear Site," dated May 12, 2016
2. USNRC Request for Additional Information No. 11, Review Section: 13.03 - Emergency Planning, Application Section: Part 6, EP Exemption, dated December 21, 2017 (eRAI-9227)

By letter dated May 12, 2016 (Reference 1), Tennessee Valley Authority (TVA) submitted an early site permit application (ESPA) for the Clinch River Nuclear (CRN) Site in Oak Ridge, TN. Based on the staff's review of ESPA Part 6, *Exemptions and Departures*, additional information necessary to support review of the proposed exemption requests has been requested (Reference 2). TVA's response to the staff's request for additional information is contained in Enclosure 1 to this letter. Enclosure 2 contains markups of ESPA Part 6, indicating the proposed changes to the exemption requests. The ESPA Part 6 markups included in Enclosure 2 will be incorporated in a future revision of the ESPA. For ease of review, Enclosure 3 to this letter provides a clean version of the ESPA Part 6 markups presented in Enclosure 2. Enclosure 4 to this letter provides markups of conforming changes to ESPA Site Safety Analysis Report (SSAR) Part 2.

There are no new regulatory commitments associated with this submittal. If any additional information is needed, please contact Dan Stout at (423) 751-7642.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on this 22nd day of January 2018.

Respectfully,


J. W. Shea
Digitally signed by J. W. Shea
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J. W. Shea
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Enclosures:

1. TVA Response to NRC Request for Additional Information (eRAI 9227) Related to Emergency Planning Exemption Requests in Part 6 of the ESPA
2. Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1-3
3. Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1-3
4. Markups of Conforming Changes to ESPA SSAR Part 2, Tables 1.9-1 and 1.9-2

cc (w/ Enclosures):

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Enclosure 1 to Letter CNL-18-009

**TVA Response to NRC Request for Additional Information (eRAI 9227) Related to
Emergency Planning Exemption Requests in Part 6 of the ESPA**

ENCLOSURE 1

TVA Response to NRC Request for Additional Information (eRAI 9227) Related to Emergency Planning Exemption Requests in Part 6 of the ESPA

NRC Introduction

10 CFR 52.17(b)(2)(i) addresses the required contents of an early site permit application (ESPA) that proposes major features of the emergency plans. For such an application, the applicant may address various requirements in Appendix E to 10 CFR Part 50. ESPA Part 2 (Site Safety Analysis Report (SSAR)), Section 13.3, "Emergency Preparedness," identifies major features Emergency Plan 5A (Site Boundary EPZ) in ESPA Part 5, which reflects various requested emergency planning (EP) exemptions in ESPA Part 6, Table 1-1, "Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) for the Site Boundary EPZ Emergency Plan," and Table 1-2, "Exemptions Requested from 10 CFR 50, Appendix E for the Site Boundary EPZ Emergency Plan."

NRC eRAI-9227, Question 1

Table 1-2 includes exemption request Item No. 17, which addresses the proposed exemption from Section IV.F.2.c of Appendix E to 10 CFR Part 50 (below) that removes the requirements to exercise the offsite (emergency) plans, and the participation in exercises by offsite authorities. This includes removal of the five numbered requirements (i.e., (1) through (5)). Please explain why the words: "each licensee shall:" have been retained in the introductory paragraph. In addition, does the biennial exercise requirement of onsite emergency plans covered in (the revised) Section IV.F.2.b, and hostile action exercise requirement in Section IV.F.2.j, allow for an exemption from the entire requirement in Section IV.F.2.c (including the words "each licensee shall")?

~~F.2.c. Offsite plans for each site shall be exercised biennially with full participation by each offsite authority having a role under the radiological response plan. Where the offsite authority has a role under a radiological response plan for more than one site, it shall fully participate in one exercise every two years and shall, at least, partially participate in other offsite plan exercises in this period. If two different licensees each have licensed facilities located either on the same site or on adjacent, contiguous sites, and share most of the elements defining co-located licensees, then each licensee shall:~~

- ~~(1) Conduct an exercise biennially of its onsite emergency plan;~~
- ~~(2) Participate quadrennially in an offsite biennial full or partial participation exercise;~~
- ~~(3) Conduct emergency preparedness activities and interactions in the years between its participation in the offsite full or partial participation exercise with offsite authorities, to test and maintain interface among the affected State and local authorities and the licensee. Co-located licensees shall also participate in emergency preparedness activities and interaction with offsite authorities for the period between exercises;~~
- ~~(4) Conduct a hostile action exercise of its onsite emergency plan in each exercise cycle; and~~
- ~~(5) Participate in an offsite biennial full or partial participation hostile action exercise in alternating exercise cycles.~~

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TVA Response to NRC Request for Additional Information (eRAI 9227) Related to Emergency Planning Exemption Requests in Part 6 of the ESPA

TVA Response

The words "each licensee shall" were not intended to be retained and should be identified as part of the requested exemption using strikethrough text. An updated markup of the specific exemptions listed in Early Site Permit Application (ESPA) Part 6, Table 1-2 is provided in Enclosure 2 of this letter. These changes will be incorporated in a future revision of the ESPA.

Additionally, the biennial exercise requirement of onsite emergency plans provided by the revised Section IV.F.2.b, and the hostile action exercise requirement provided in Section IV.F.2.j remain fully applicable to the licensee emergency plans. Those portions of Section IV.F.2.c, which are only applicable to offsite plans and authorities in the event of a co-located facility (enumerated items (1) through (5) of Section IV.F.2.c), are not applicable to the conditions of the Clinch River Nuclear (CRN) Site ESPA which is not a co-located facility. Although no plans exist to use the CRN Site for multiple facilities, if in the future the CRN Site became a co-located facility with two different licensees, those portions of F.2.c applicable to each licensee would be addressed elsewhere in F.2; specifically in Sections IV.F.2.b and IV.F.2.j.

NRC eRAI-9227, Question 2

Table 1-2 includes the following exemption request Item No. 18, which addresses proposed changes (exemptions) to Section IV.F.2.d of Appendix E to 10 CFR Part 50. The proposed change removes the requirements of Section IV.F.2.d Appendix E to 10 CFR Part 50.

F.2.d. ~~Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in the ingestion pathway portion of exercises at least once every exercise cycle. In States with more than one nuclear power reactor plume exposure pathway EPZ, the State should rotate this participation from site to site. Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in a hostile action exercise at least once every cycle and should fully participate in one hostile action exercise by December 31, 2015. States with more than one nuclear power reactor plume exposure pathway EPZ should rotate this participation from site to site.~~

a. SSAR Section 13.3.3.2, "Ingestion Exposure Pathway," states that "[t]he ingestion exposure pathway EPZ for the CRN Site will be described in the COLA." While the deferral to addressing the ingestion pathway EPZ until the COLA stage is allowed for a major features emergency plan, the deletion of the requirements in Section IV.F.2.d appears premature, in that it addresses ingestion pathway exercises, which have not been addressed in the ESP application. That is, if the ingestion pathway EPZ is addressed at the COLA stage, then the exemption request for the ingestion pathway EPZ should also be addressed at the COLA stage, rather than at the ESP application stage. Please explain why it is appropriate to consider an exemption for an area that is not addressed in the application, and deferred to the COLA.

b. If the requested exemption to Section IV.F.2.d is appropriate, address the following: The proposed changes to Section IV.F.2.d (above) removes the ingestion pathway and hostile action exercise requirements applicable to the State. The adjacent Table 1-2 column (Item 18), entitled "Basis for Exemption," includes the following: "Refer to basis for 10 CFR 50, Appendix E, Section IV.2" (i.e., Table 1-2, Item 2, Section IV.2 of Appendix E to 10 CFR Part 50). It is unclear whether the "Basis for Exemption" for Section IV.2, which addresses offsite response organizations (OROs) and the Comprehensive Emergency Management Plan (CEMP), should also apply to Section IV.F.2.d. This is because the deleted Section IV.F.2.d requirement

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TVA Response to NRC Request for Additional Information (eRAI 9227) Related to Emergency Planning Exemption Requests in Part 6 of the ESPA

addresses offsite exercise requirements for the State, in contrast to the deleted Section IV.2 requirement to provide an analysis of the time required to evacuate various sectors and distances within the plume exposure pathway emergency planning zone (EPZ) for transient and permanent populations. Please clarify whether the reference to Section IV.2 under "Basis for Exemption" for Section F.2.d (in Item 18 of Table 1-2) is correct, and revise, if appropriate.

TVA Response

- a. TVA has removed the requested exemptions related to the ingestion exposure pathway EPZ for the CRN Site from the ESPA, including exemption request Item No. 18 (Appendix E, Section IV.F.2.d) of Table 1-2. Additional conforming changes have been made to Items No. 1, 7 and 8 (10 CFR 50.47(b)(10)) of Table 1-1, No. 13 (Appendix E, Section IV.F.2.a(i)) of Table 1-2, and No. 1 and 2 (10 CFR 50.33(g), 50.47(b) or 50.47(c)(2)) of Table 1-3.

The ingestion exposure pathway EPZ for the CRN Site will be addressed at the Combined License Application (COLA) stage. An updated markup of the specific exemptions listed in ESPA Part 6, Tables 1-1, 1-2, and 1-3 are provided in Enclosure 2 of this letter, and this markup will be incorporated in a future revision of the ESPA. A clean version of the markup is provided in Enclosure 3 of this letter. Enclosure 4 to this letter provides markups of conforming changes to ESPA Site Safety Analysis Report (SSAR) Part 2, Tables 1.9-1 and 1.9-2.

- b. The requested exemption to the portion of Section IV.F.2.d related to ingestion pathway exercises has been withdrawn. The requested exemption to the portion of Section IV.F.2.d related to offsite participation in hostile action exercises remains; however, the Basis for Exemption in Table 1-2 Item No. 18 has been updated to more clearly reflect the lack of need for formal offsite radiological emergency response planning (including exercises) with a Site Boundary EPZ.

ENCLOSURE 2 to Letter CNL-18-009

Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1-3

ENCLOSURE 2

Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3

ESPA, Part 6, Section 1.1, Table 1-1, 1-2 and 1-3 are being revised as indicated on the following pages. Bold text with strikethroughs indicates text to be deleted. Text not in bold with strikethroughs represent exemptions being sought and are part of a previous submittal. Underlines indicate text to be added. (Note: Only a portion of the section and tables are shown.)

1.1 SUMMARY DESCRIPTION

A review of regulatory requirements was undertaken as part of the Clinch River Nuclear (CRN) Site Early Site Permit Application (ESPA) to identify potential exemptions from portions of 10 CFR 50.33(g), 50.47(b) and (c)(2), and 10 CFR Part 50, Appendix E, to the extent that these regulations apply to specific provisions of onsite and offsite emergency planning. The regulations, as written, do not take into account (1) the enhanced safety expected to be inherent in the design of Small Modular Reactors (SMRs) or (2) the application of the significant body of risk information available to inform the technical basis for the Plume Exposure Pathway (PEP) Emergency Planning Zone (EPZ) size. Pursuant to 10 CFR 52.7, "Specific Exemptions," which is governed by 10 CFR 50.12, "Specific Exemptions," Tennessee Valley Authority (TVA) requests exemptions from the following for the CRN Site SPA:

- Certain standards in 10 CFR 50.47(b) regarding onsite and offsite emergency response plans for nuclear power reactors;
- Certain requirements of 10 CFR 50.33(g) and 10 CFR 50.47(c)(2) to establish PEP **and ingestion exposure EPZs** for nuclear power plants; and
- Certain requirements of 10 CFR Part 50, Appendix E, which establish the elements that make up the content of emergency plans.

The requested exemptions allow for the development and implementation of emergency plans that are commensurate with the significantly reduced risk associated with SMR technology. The current 10 CFR Part 50 regulatory requirements for emergency planning provide an appropriate planning basis for the current operating plants. However, some of these requirements are not necessary to protect the health and safety of the public in the vicinity of an SMR facility due to the decreased potential consequences associated with such a facility. The requested exemptions would require the SMR design selected for the Combined License Application (COLA) to meet the established criteria at the selected EPZ boundary. The criteria are consistent with and based upon the U.S. Environmental Protection Agency (EPA) Protective Action Guides (PAG) 1 rem dose criteria for early phase protective actions in the unlikely event of a severe accident. The intermediate and late phase EPA PAGs are not relevant to sizing of the PEP EPZ, and further references to the EPA PAGs in this document and Site Safety Analysis Report (SSAR) Section 13.3 are to the early phase EPA PAG.

ENCLOSURE 2**Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3**

Note: Bold text with strikethroughs indicates text to be deleted. Text not in bold with strikethroughs represent exemptions being sought and are part of a previous submittal. Underlines indicate text to be added.

Table 1-1 (Sheet 1 of 4)
Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) for the Site Boundary EPZ Emergency Plan

Item	Regulation in 10 CFR 50.33(g), 50.47(b) or 50.47 (c)(2)	Basis for Exemption
1	<p>10 CFR 50.33(g): If the application is for an operating license or combined license for a nuclear power reactor, or if the application is for an early site permit and contains plans for coping with emergencies under § 52.17(b)(2)(ii) of this chapter, the applicant shall submit radiological emergency response plans of State and local governmental entities in the United States that are wholly or partially within the plume exposure pathway emergency planning zone (EPZ), as well as the plans of State governments wholly or partially within the ingestion pathway EPZ. If the application is for an early site permit that, under 10 CFR 52.17(b)(2)(i), proposes major features of the emergency plans describing the EPZs, then the descriptions of the EPZs must meet the requirements of this paragraph.</p> <p>Generally, Generally, the plume-exposure-pathway EPZ for nuclear power reactors shall consist of an area about 10 miles (16 km) in radius and the ingestion-pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas-cooled reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.</p>	The criteria established in SSAR Section 13.3, provide for adequate protection of public health and safety by providing an EPZ that encompass the areas in which the plume exposure doses could exceed the EPA PAG, and for where there is a substantial reduction in risk of significant early health effects. Because there are no offsite consequences from any credible event in excess of the criteria provided in SSAR Section 13.3, defined EPZs and formal offsite radiological emergency response plans are not necessary.

ENCLOSURE 2

Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1-3

Note: Bold text with strikethroughs indicates text to be deleted. Text not in bold with strikethroughs represent exemptions being sought and are part of a previous submittal. Underlines indicate text to be added.

Table 1-1 (Sheet 4 of 4)
Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) or 50.47 (c)(2)
Regulation in 10 CFR 50.33(g), 50.47(b) or 50.47 (c)(2)

Item	Basis for Exemption
7	<p>10 CFR 50.47(b)(10): A range of protective actions has been developed for the plume exposure pathway EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering, and, as appropriate, the prephylactic use of potassium iodide (KI), as appropriate. Evacuation time estimates have been developed by applicants and licensees. Licensees shall update the evacuation time estimates on a periodic basis. <u>Guidelines for the choice of Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion-exposure pathway EPZ are appropriate to the locale have been developed protective actions for the ingestion exposure pathway EPZ</u> appropriate to the locale have been developed.</p>
8	<p>10 CFR 50.47(c)(2): Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion-pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas cooled nuclear reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.</p>

ENCLOSURE 2**Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3**

Note: **Bold** text with **strike-throughs** indicates text to be deleted. Text not in bold with strike-throughs represent exemptions being sought and are part of a previous submittal. Underlines indicate text to be added.

Table 1-2 (Sheet 6 of 10)

Item	Regulation in Appendix E to 10 CFR Part 50	Basis for Exemption
13	F.2.a(i) For an operating license issued under this part, this exercise must be conducted within two years before the issuance of the first operating license for full power (one authorizing operation above 5 percent of rated power) of the first reactor and shall include participation by and shall include participation by each State and local government within the plume-exposure pathway EPZ and each state with the ingestion-exposure pathway EPZ. each state within the ingestion exposure pathway EPZ. If the full participation exercise is conducted more than 1 year prior to issuance of an operating license for full power, an exercise which tests the licensee's onsite emergency plans must be conducted within one year before issuance of an operating license for full power. This exercise need not have State or local government participation.	TVA would be exempt from those portions of 10 CFR Part 50, Appendix E, Section IV.F.2.a.(i)-(iii) related to offsite participation in exercises because TVA would be exempt from the umbrella provisions of 10 CFR Part 50, Appendix E, Section IV.F.2.a.

ENCLOSURE 2

Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3

Note: **Bold text with strikethroughs indicates text to be deleted.** Text not in bold with strikethroughs represent exemptions being sought and are part of a previous submittal. Underlines indicate text to be added.

Table 1-2 (Sheet 8 of 10)**Exemptions Requested from 10 CFR 50, Appendix E for the Site Boundary EPZ Emergency Plan**

Item	Regulation in Appendix E to 10 CFR Part 50	Basis for Exemption
17	<p>F 2.c. Offsite plans for each site shall be exercised biennially with full participation by each offsite authority having a role under the radiological response plan. Where the offsite authority has a role under a radiological response plan for more than one site, it shall fully participate in one exercise every two years and shall, at least, partially participate in other offsite plan exercises in this period. If two different licensees each have licensed facilities located either on the same site or on adjacent, contiguous sites, and share most of the elements defining co-located licensees, then each licensee shall:</p> <p>(1) Conduct an exercise biennially of its onsite emergency plan;</p> <p>(2) Participate quadrennially in an offsite biennial full or partial participation exercise;</p> <p>(3) Conduct emergency preparedness activities and interactions in the years between its participation in the offsite full or partial participation exercise with offsite authorities, to test and maintain interface among the affected State and local authorities and the licensee. Co-located licensees shall also participate in emergency preparedness activities and interaction with offsite authorities for the period between exercises;</p> <p>(4) Conduct a hostile action exercise of its onsite emergency plan in each exercise cycle; and</p> <p>(5) Participate in an offsite biennial full or partial participation hostile action exercise in alternating exercise cycles.</p>	<p>Because there are no offsite consequences from any credible event in excess of the criteria provided in SSAR Section 13.3, formal offsite radiological emergency response plans are not necessary. Therefore, there is no need for OROs to participate in biennial exercises.</p> <p>Although the likelihood of an accident or event resulting in offsite doses exceeding the EPA PAG beyond the Site Boundary is extremely remote, TVA's Emergency Plan will describe the capabilities to determine if a radiological release is occurring and promptly communicate that information to OROs for their consideration. OROs are responsible for deciding what, if any, protective actions should be taken utilizing its CEMP. Formal offsite radiological emergency response plans would not be required. Therefore, a full participation exercise is not required. Also refer to basis for 10 CFR 50.47(b) and 10 CFR 50.47(b)(4) in Table 1-1 and 10 CFR Part 50, Appendix E, Section IV.F.2.a.</p> <p>TVA would continue to invite State and local support organizations to participate in the periodic drills and exercises conducted to assess its ability to perform responsibilities related to an emergency at the facility.</p> <p>Those portions of F.2.c relating to co-located facilities are not applicable to the CRN Site ESPA. However, if in the future, the CRN Site became a co-located facility, those portions of F.2.c applicable to the CRN Site are addressed elsewhere in F.2.</p>

ENCLOSURE 2

Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3

Note: Bold text with strikethroughs indicates text to be deleted. Text not in bold with strikethroughs represent exemptions being sought and are part of a previous submittal. Underlines indicate text to be added.

Table 1-2 (Sheet 9 of 10)
Exemptions Requested from 10 CFR 50, Appendix E for the Site Boundary EPZ Emergency Plan
Regulation in Appendix E to 10 CFR Part 50

Item	Basis for Exemption
18	<p>F 2.d. Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in the ingestion pathway portion of exercises at least once every exercise cycle. In States with more than one nuclear power reactor plume exposure pathway EPZ, the State should rotate this participation from site to site. Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in a hostile action exercise at least once every cycle and should fully participate in one hostile action exercise by December 31, 2015. States with more than one nuclear power reactor plume exposure pathway EPZ should rotate this participation from site to site.</p> <p>Because there are no offsite consequences from <u>any</u> credible event in excess of the criteria provided in SSAR Section 13.3, formal offsite radiological emergency response plans are not necessary. Therefore, there is no need for OROs to participate in hostile action exercises.</p> <p>Although the likelihood of an accident or event resulting in offsite doses exceeding the EPA PAG beyond the Site Boundary is extremely remote, TVA's Emergency Plan will describe the capabilities to determine if a radiological release is occurring and promptly communicate that information to OROs for their consideration. OROs are responsible for deciding what, if <u>any</u>, protective actions should be taken utilizing its CEMP. Formal offsite radiological emergency response plans would not be required. Therefore, offsite participation in a hostile action exercise is not required.</p> <p>TVA would continue to invite State and local support organizations to participate in the periodic drills and exercises conducted to assess its ability to perform responsibilities related to an emergency at the facility.</p> <p>Refer to basis for 40 CFR 50, Appendix E, Section IV.2.</p>

ENCLOSURE 2

Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3

Note: **Bold** text with **strike-throughs** indicates text to be deleted. Text not in bold with **strike-throughs** represent exemptions being sought and are part of a previous submittal. Underlines indicate text to be added.

Table 1-3 (Sheet 1 of 2)
Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) for the 2-Mile EPZ Emergency Plan

Item	Regulation in 10 CFR 50.33(g), 50.47(b) or 50.47 (c)(2)	Basis for Exemption
1	<p>10 CFR 50.33(g): If the application is for an operating license or combined license for a nuclear power reactor, or if the application is for an early site permit and contains plans for coping with emergencies under § 52.17(b)(2)(ii) of this chapter, the applicant shall submit radiological emergency response plans of State and local governmental entities in the United States that are wholly or partially within the plume exposure pathway emergency planning zone (EPZ), as well as the plans of State governments wholly or partially within the ingestion pathway EPZ. If the application is for an early site permit that, under 10 CFR 52.17(b)(2)(i), proposes major features of the emergency plans describing the EPZs, then the descriptions of the EPZs must meet the requirements of this paragraph.</p> <p>Generally, the plume-exposure-pathway EPZ for nuclear power reactors shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas-cooled reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.</p>	The criteria established in SSAR Section 13.3, provide for adequate protection of public health and safety in accordance with the EPA PAG.

ENCLOSURE 2

Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3

Note: Bold text with strikethroughs indicates text to be deleted. Text not in bold with strikethroughs represent exemptions being sought and are part of a previous submittal. Underlines indicate text to be added.

Table 1-3 (Sheet 2 of 2)
Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) for the 2-Mile EPZ Emergency Plan

Item	Regulation in Appendix E to 10 CFR Part 50	Basis for Exemption
2	<p>10 CFR 50.47(c)(2): Generally, Generally, the plume-exposure-pathway-EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas cooled nuclear reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.</p>	Refer to basis for 10 CFR 50.33(g).

ENCLOSURE 3 to Letter CNL-18-009

Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1-3

ENCLOSURE 3

Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3

Clean version of markups to ESPA, Part 6, Section 1.1, Table 1-1, 1-2 and 1-3 are presented in the following pages. (Note: Only a portion of the section and tables are shown.)

1.1 SUMMARY DESCRIPTION

A review of regulatory requirements was undertaken as part of the Clinch River Nuclear (CRN) Site Early Site Permit Application (ESPA) to identify potential exemptions from portions of 10 CFR 50.33(g), 50.47(b) and (c)(2), and 10 CFR Part 50, Appendix E, to the extent that these regulations apply to specific provisions of onsite and offsite emergency planning. The regulations, as written, do not take into account (1) the enhanced safety expected to be inherent in the design of Small Modular Reactors (SMRs) or (2) the application of the significant body of risk information available to inform the technical basis for the Plume Exposure Pathway (PEP) Emergency Planning Zone (EPZ) size. Pursuant to 10 CFR 52.7, "Specific Exemptions," which is governed by 10 CFR 50.12, "Specific Exemptions," Tennessee Valley Authority (TVA) requests exemptions from the following for the CRN Site SPA:

- Certain standards in 10 CFR 50.47(b) regarding onsite and offsite emergency response plans for nuclear power reactors;
- Certain requirements of 10 CFR 50.33(g) and 10 CFR 50.47(c)(2) to establish PEP EPZ for nuclear power plants; and
- Certain requirements of 10 CFR Part 50, Appendix E, which establish the elements that make up the content of emergency plans.

The requested exemptions allow for the development and implementation of emergency plans that are commensurate with the significantly reduced risk associated with SMR technology. The current 10 CFR Part 50 regulatory requirements for emergency planning provide an appropriate planning basis for the current operating plants. However, some of these requirements are not necessary to protect the health and safety of the public in the vicinity of an SMR facility due to the decreased potential consequences associated with such a facility. The requested exemptions would require the SMR design selected for the Combined License Application (COLA) to meet the established criteria at the selected EPZ boundary. The criteria are consistent with and based upon the U.S. Environmental Protection Agency (EPA) Protective Action Guides (PAG) 1 rem dose criteria for early phase protective actions in the unlikely event of a severe accident. The intermediate and late phase EPA PAGs are not relevant to sizing of the PEP EPZ, and further references to the EPA PAGs in this document and Site Safety Analysis Report (SSAR) Section 13.3 are to the early phase EPA PAG.

ENCLOSURE 3**Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3**

Note: Strikethroughs represent exemptions being sought and are part of a previous submittal.

Table 1-1 (Sheet 1 of 4)
Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) for the Site Boundary EPZ Emergency Plan

Item	Regulation in 10 CFR 50.33(g), 50.47(b) or 50.47 (c)(2)	Basis for Exemption
1	10 CFR 50.33(g): If the application is for an operating license or combined license for a nuclear power reactor, or if the application is for an early site permit and contains plans for coping with emergencies under § 52.17(b)(2)(ii) of this chapter, the applicant shall submit radiological emergency response plans of State and local governmental entities in the United States that are wholly or partially within the plume exposure pathway emergency planning zone (EPZ), as well as the plans of State governments wholly or partially within the ingestion pathway EPZ. If the application is for an early site permit that, under 10 CFR 52.17(b)(2)(i), proposes major features of the emergency plans describing the EPZs, then the descriptions of the EPZs must meet the requirements of this paragraph. Generally, the plume-exposure pathway EPZ for nuclear power reactors shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas-cooled reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.	The criteria established in SSAR Section 13.3, provide for adequate protection of public health and safety by providing an EPZ that encompass the areas in which the plume exposure doses could exceed the EPA PAG, and for where there is a substantial reduction in risk of significant early health effects. Because there are no offsite consequences from any credible event in excess of the criteria provided in SSAR Section 13.3, defined EPZs and formal offsite radiological emergency response plans are not necessary

ENCLOSURE 3**Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3****Note: Strikethroughs represent exemptions being sought and are part of a previous submittal.**

Table 1-1 (Sheet 4 of 4)
Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) for the Site Boundary EPZ Emergency Plan
Regulation in 10 CFR 50.33(g), 50.47(b) or 50.47 (c)(2)

Item	Regulation	Basis for Exemption
7	10 CFR 50.47(b)(10): A range of protective actions has been developed for the plume exposure pathway EPZ for emergency workers and the public. If developing this range-of-actions, consideration has been given to evacuation, sheltering, and, as appropriate, pre-hydrant-use-of-potassium iodide (K1), as appropriate. Evacuation time estimates have been developed by applicants and licensees. Licensees shall update the evacuation time estimates on a periodic basis. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed.	Because there are no offsite consequences from any credible event in excess of the criteria provided in SSAR Section 13.3, formal offsite radiological emergency response plans are not necessary. Therefore, the language regarding the range of actions to be considered with respect to the public beyond the Site Boundary is not applicable. Refer to basis for 10 CFR 50.47(b).
8	10 CFR 50.47(c)(2): Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas cooled nuclear reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.	The criteria established in SSAR Section 13.3, provide for adequate protection of public health and safety by providing an EPZ that encompass the areas in which the plume exposure doses could exceed the EPA PAG, and for where there is a substantial reduction in risk of significant early health effects. Because there are no offsite consequences from any credible event in excess of the criteria provided in SSAR Section 13.3, formal offsite radiological emergency response plans are not necessary.

ENCLOSURE 3

Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3

Note: Strikethroughs represent exemptions being sought and are part of a previous submittal.

Table 1-2 (Sheet 6 of 10)
Exemptions Requested from 10 CFR 50, Appendix E for the Site Boundary EPZ Emergency Plan

Item	Regulation in Appendix E to 10 CFR Part 50	Basis for Exemption
13	F.2.a(i) For an operating license issued under this part, this exercise must be conducted within two years before the issuance of the first operating license for full power (one authorizing operation above 5 percent of rated power) of the first reactor and shall include participation by each State and local government within the plume exposure pathway EPZ, and each state within the ingestion exposure pathway EPZ. If the full participation exercise is conducted more than 1 year prior to issuance of an operating licensee for full power, an exercise which tests the licensee's onsite emergency plans must be conducted within one year before issuance of an operating license for full power. This exercise need not have State or local government participation.	TVA would be exempt from those portions of 10 CFR Part 50, Appendix E, Section IV.F.2.a.(i)-(iii) related to offsite participation in exercises because TVA would be exempt from the umbrella provisions of 10 CFR Part 50, Appendix E, Section IV.F.2.a.

ENCLOSURE 3**Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3****Note: Strikethroughs represent exemptions being sought.**

Table 1-2 (Sheet 8 of 10)
Exemptions Requested from 10 CFR 50, Appendix E for the Site Boundary EPZ Emergency Plan

Item	Regulation in Appendix E to 10 CFR Part 50	Basis for Exemption
17	<p>F 2.c. Offsite plans for each site shall be exercised biennially with full participation by each offsite authority having a role under the radiological response plan. Where the offsite authority has a role under a radiological response plan for more than one site, it shall fully participate in one exercise every two years and shall, at least, partially participate in other offsite plan exercises in this period. If two different licensees each have licensed facilities located either on the same site or on adjacent, contiguous sites, and share most of the elements defining co-located licensees, then each licensee shall:</p> <p>(1) Conduct an exercise biennially of its onsite emergency plan;</p> <p>(2) Participate quadrennially in an offsite biennial full or partial participation exercise;</p> <p>(3) Conduct emergency preparedness activities and interactions in the years between its participation in the offsite full or partial participation exercise with offsite authorities, to test and maintain interface among the affected State and local authorities and the licensee. Co-located licensees shall also participate in emergency preparedness activities and interaction with offsite authorities for the period between exercises;</p> <p>(4) Conduct a hostile action exercise of its onsite emergency plan in each exercise cycle; and</p> <p>(5) Participate in an offsite biennial full or partial participation hostile action exercise in alternating exercise cycles.</p>	<p>Because there are no offsite consequences from any credible event in excess of the criteria provided in SSAR Section 13.3, formal offsite radiological emergency response plans are not necessary. Therefore, there is no need for OROs to participate in biennial exercises.</p> <p>Although the likelihood of an accident or event resulting in offsite doses exceeding the EPA PAG beyond the Site Boundary is extremely remote, TVA's Emergency Plan will describe the capabilities to determine if a radiological release is occurring and promptly communicate that information to OROs for their consideration. OROs are responsible for deciding what, if any, protective actions should be taken utilizing its CEMP. Formal offsite radiological emergency response plans would not be required. Therefore, a full participation exercise is not required. Also refer to basis for 10 CFR 50.47(b) and 10 CFR 50.47(b)(4) in Table 1-1 and 10 CFR Part 50, Appendix E, Section IV.F.2.a.</p> <p>TVA would continue to invite State and local support organizations to participate in the periodic drills and exercises conducted to assess its ability to perform responsibilities related to an emergency at the facility.</p> <p>Those portions of F.2.c relating to co-located facilities are not applicable to the CRN Site ESPA. However, if in the future, the CRN Site became a co-located facility, those portions of F.2.c applicable to the CRN Site are addressed elsewhere in F.2.</p>

ENCLOSURE 3**Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3**

Table 1-2 (Sheet 9 of 10)
Exemptions Requested from 10 CFR 50, Appendix E for the Site Boundary EPZ Emergency Plan

Item	Regulation in Appendix E to 10 CFR Part 50	Basis for Exemption
18	F 2.d. Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in the ingestion pathway portion of exercises at least once every exercise cycle. In States with more than one nuclear power reactor plume exposure pathway EPZ, the State should rotate this participation from site to site.	<p>Because there are no offsite consequences from any credible event in excess of the criteria provided in SSAR Section 13.3, formal offsite radiological emergency response plans are not necessary. Therefore, there is no need for OROs to participate in hostile action exercises.</p> <p>Although the likelihood of an accident or event resulting in offsite doses exceeding the EPA PAG beyond the Site Boundary is extremely remote, TVA's Emergency Plan will describe the capabilities to determine if a radiological release is occurring and promptly communicate that information to OROs for their consideration. OROs are responsible for deciding what, if any, protective actions should be taken utilizing its CEMIP. Formal offsite radiological emergency response plans would not be required. Therefore, offsite participation in a hostile action exercise is not required.</p> <p>TVA would continue to invite State and local support organizations to participate in the periodic drills and exercises conducted to assess its ability to perform responsibilities related to an emergency at the facility.</p>

ENCLOSURE 3**Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3****Note: Strikethroughs represent exemptions being sought and are part of a previous submittal**

Table 1-3 (Sheet 1 of 2)
Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) for the 2-Mile EPZ Emergency Plan

Item	Regulation in 10 CFR 50.33(g), 50.47(b) or 50.47 (c)(2)	Basis for Exemption
1	10 CFR 50.33(g): If the application is for an operating license or combined license for a nuclear power reactor, or if the application is for an early site permit and contains plans for coping with emergencies under § 52.17(b)(2)(ii) of this chapter, the applicant shall submit radiological emergency response plans of State and local governmental entities in the United States that are wholly or partially within the plume exposure pathway emergency planning zone (EPZ), as well as the plans of State governments wholly or partially within the ingestion pathway EPZ. If the application is for an early site permit that, under 10 CFR 52.17(b)(2)(i), proposes major features of the emergency plans describing the EPZs, then the descriptions of the EPZs must meet the requirements of this paragraph. Generally, -the plume exposure pathway EPZ for nuclear power reactors shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas-cooled reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.	The criteria established in SSAR Section 13.3, provide for adequate protection of public health and safety in accordance with the EPA PAG.

ENCLOSURE 3

Clean Version of Markups to ESPA Part 6, Section 1.1, Tables 1-1, 1-2 and 1.3

Note: Strikethroughs represent exemptions being sought and are part of a previous submittal

Table 1-3 (Sheet 2 of 2)
Exemptions Requested from 10 CFR 50.33(g), 50.47(b), and (c)(2) for the 2-Mile EPZ Emergency Plan

Item	Regulation in Appendix E to 10 CFR Part 50	Basis for Exemption
2	10 CFR 50.47(c)(2): Generally, the plume-exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas cooled nuclear reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.	Refer to basis for 10 CFR 50.33(g).

ENCLOSURE 4 to Letter CNL-18-009

Markups of Conforming Changes to ESPA SSAR Part 2, Tables 1.9-1 and 1.9-2

ENCLOSURE 4

Markups of Conforming Changes to ESPA SSAR Part 2, Tables 1.9-1 and 1.9-2

ESPA, Part 2, SSAR, Tables 1.9-1 and 1.9-2 are being revised as indicated on the following pages. Strikethroughs indicates text to be deleted. Bold text with underlines indicates text to be added. Text not in bold with underlines represents current formatting. (Note: Only a portion of the section and tables are shown.)

Table 1.9-1 (Sheet 9 of 9)
Conformance with Regulatory Guides

Regulatory Guide	Rev.	Title	Applicable SSAR Section	Conformance^(a)	Comments
4.7	3	General Site Suitability Criteria for Nuclear Power Stations	2.1.2	Conforms	
			2.1.3	Conforms	
			2.2.1–2.2.2	Conforms	
			2.2.3	Conforms	
			2.3.4	Conforms	
			2.3.5	Conforms	
			2.5.1	Conforms	
			2.5.2	Conforms	
			2.5.3	Conforms	
			13.3	Exception	Part 5A: TVA is requesting an exemption from certain elements of 10 CFR 50.33(g) and 10 CFR 50.47(c)(2) as they relate to the size of the Plume Exposure Pathway EPZ and the Ingestion Pathway EPZ. The Plume Exposure Pathway EPZ for the CRN Site described in Part 5B is about 2 miles.
					Part 5B: TVA is requesting an exemption from certain elements of 10 CFR 50.33(g) and 10 CFR 50.47(c)(2) as they relate to the size of the Plume Exposure Pathway EPZ and the Ingestion Pathway EPZ. The Plume Exposure Pathway EPZ for the CRN Site described in Part 5B is at the site boundary.
			<u>13.3.3.2</u>	<u>NA</u>	<u>The ingestion exposure pathway EPZ for the CRN Site will be described in the COLA.</u>
5.62	1	Reporting of Safeguards Events	13.3	Conforms	

(a) NA = Not applicable
(b) Revision 3 of Regulatory Guide 1.138 was issued in December of 2014; however, the subsurface investigation for the CRN Site was conducted between June 2013 and March 2014, using the information in Regulatory Guide 1.138 in effect at that time (Revision 2).

ENCLOSURE 4**Markups of Conforming Changes to ESPA SSAR Part 2, Tables 1.9-1 and 1.9-2**

Note: Strikethroughs indicates text to be deleted. Bold text with underlines indicates text to be added. Text not in bold with underlines represents current formatting.

Table 1.9-2 (Sheet 3 of 6)
Conformance with Standard Review Plan

Section of NUREG-0800	Rev.	Title	Applicable SSAR Section(s)	Conformance^(a)	Comments
2.5.2	5	Vibratory Ground Motion	2.5.2	Conforms	A sensitivity analysis was performed to evaluate the impact of the consideration of overburden on GMRS.
2.5.3	5	Surface Faulting	2.5.3	Conforms	
2.5.4	5	Stability of Subsurface Materials and Foundations	2.5.4	Conforms	Profiles illustrating the detailed relationship between the foundation and subsurface materials is provided in the COLA. While the foundation depth is provided, remaining information (e.g., information related to backfill and borrow) are provided in the COLA.
2.5.5	5	Stability of Slopes	2.5.5	Conforms	Site grading are developed and stability of any safety-related slopes are addressed in the COLA.
3.5.1.6	4	Aircraft Hazards	3.5.1.6	Conforms	
11.2	4	Liquid Waste Management System	11.2.3	Conforms	Information related to design is addressed in the COLA.
11.3	3	Gaseous Waste Management System	11.3.3	Conforms	Information related to design is addressed in the COLA.
13.3	3	Emergency Planning	13.3	Exception	<u>SRP Criterion 1:</u> Part 5A: TVA is requesting exemptions from certain elements of 10 CFR 50.47(b)(4)-(6), (9) and (10) and 10 CFR 50, Appendix E F.2, F.2.a, F.2.b-(iii), F.2.b-d, and F.2.f as they relate to offsite emergency planning.
					<u>SRP Criterion 2:</u> Part 5A: TVA is requesting exemptions from certain elements of 10 CFR 50.47(b)(4)-(6), (9) and (10) and 10 CFR 50, Appendix E F.2, F.2.a, F.2.b-(iii), F.2.b-d, and F.2.f as they relate to offsite emergency planning.
					<u>SRP Criterion 3:</u> Certain aspects of the technology-specific Emergency Action Levels (EALs) required by 10 CFR 50.47(b)(4) and 10 CFR 50 Appendix E Section IV.B are addressed in the COLA. An EAL scheme consistent with industry standards developed to address SMR technology will be adopted.

ENCLOSURE 4**Markups of Conforming Changes to ESPA SSAR Part 2, Tables 1.9-1 and 1.9-2**

Note: Strikethroughs indicates text to be deleted. Bold text with underlines indicates text to be added. Text not in bold with underlines represents current formatting.

Table 1.9-2 (Sheet 4 of 6)
Conformance with Standard Review Plan

Section of NUREG-0800	Rev.	Title	Applicable SSAR Section(s)	Conformance ^(a)	Comments
				<p>SRP Criterion 7: Due to the Site Boundary EPZ, onsite and offsite protective measures are being implemented in an ad hoc manner. Protective Action Recommendation (PAR) logic and PAR logic diagrams for the CRN Site are addressed and added to the Emergency Plan in the COIA.</p> <p>SRP Criterion 9: FEMA evaluations are beyond the scope of the Emergency Plan.</p> <p>SRP Criterion 10: TVA is requesting exemptions from certain elements of 10 CFR 50.33(g) and 10 CFR 50.47(c)(2) as they relate to EPZ and sizing. The EPZ for the CRN Site described in Part 5A is at the site boundary. The EPZ for the CRN Site described in Part 5B is about 2 miles.</p> <p>SRP Criterion 11: Part A: TVA is requesting exemptions from certain elements of 10 CFR 50, Appendix E, IV 2-IV 7 as they relate to Evacuation Time Estimates (ETEs). Due to the Site Boundary EPZ, an ETE is not being performed. Part B: In Part 6 of the ESPA, TVA is requesting exemptions from certain elements of 10 CFR 50.33(g) and 10 CFR 50.47(c)(2) as they relate to EPZ sizing. The EPZ for the CRN Site described in Part 5B is 2 miles. An ETE has been performed for the 2-mile EPZ.</p>	