



SECRETARY

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

August 20, 2019

Memorandum to Counsel for Applicant and Staff:

On August 14, 2019, the U.S. Nuclear Regulatory Commission (NRC) held an evidentiary session to receive testimony and exhibits in the uncontested proceeding regarding the application from the Tennessee Valley Authority for an early site permit for the Clinch River Nuclear Site in Roane County, Tennessee. On August 19, 2019, I issued an Order (Setting Deadline for Proposed Transcript Corrections). The hearing transcript appended to that Order omitted line numbers. Attached is a copy of the official hearing transcript containing line numbers. Please use the attached copy to develop your proposed transcript corrections, if any.

If you have any questions, please contact Ms. Denise McGovern ([denise.mcGovern@nrc.gov](mailto:denise.mcGovern@nrc.gov), 301-415-0681) of my staff.

Sincerely,

A handwritten signature in blue ink that reads "Annette Vietti-Cook".

Annette Vietti-Cook  
Secretary of the Commission

Enclosure:  
As stated.

**Official Transcript of Proceedings**  
**NUCLEAR REGULATORY COMMISSION**

Title: Hearing RE Early Site Permit for  
the Clinch River Nuclear Site

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Wednesday, August 14, 2019

Work Order No.: NRC-0494

Pages 1-183

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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COMMISSION HEARING ON EARLY SITE PERMIT FOR THE  
CLINCH RIVER NUCLEAR SITE: SECTION 189A. OF THE  
ATOMIC ENERGY ACT PROCEEDING

+ + + + +

WEDNESDAY,

AUGUST 14, 2019

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ROCKVILLE, MARYLAND

+ + + + +

The Commission met in the Commissioners'  
Hearing Room at the Nuclear Regulatory Commission,  
One White Flint North, 11555 Rockville Pike, at 9:00  
a.m., Kristine L. Svinicki, Chairman, presiding.

COMMISSION MEMBERS:

KRISTINE L. SVINICKI, Chairman

JEFF BARAN, Commissioner

ANNIE CAPUTO, Commissioner

DAVID A. WRIGHT, Commissioner

ALSO PRESENT:

ANNETTE VIETTI-COOK, Secretary of the Commission

MARIAN ZOBLER, General Counsel

1 NRC STAFF:  
2 FRED BROWN, Director, Office of New Reactors (NRO)  
3 ANNA BRADFORD, Deputy Director, DLSE, NRO  
4 TAMSEN DOZIER, Project Manager, NRO  
5 KENNETH ERWIN, Branch Chief, NRO  
6 ALLEN FETTER, Senior Project Manager, NRO  
7 MICHELLE HART, Senior Reactor Engineer, NRO  
8 BRUCE MUSICO, Senior Emergency Preparedness  
9 Specialist, NSIR  
10 MICHAEL SCOTT, Director, Division of Preparedness  
11 and Response, NSIR  
12 MICHAEL SPENCER, Office of General Counsel  
13 MALLECIA SUTTON, Senior Project Manager, NRO  
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1 ALSO PRESENT:  
2 RYAN DREKE, Counsel for TVA  
3 JOHN HOLCOMB, Manager, Small Modular Reactor  
4 Engineering, TVA  
5 RUTH HORTON, Program Manager, Environmental Support,  
6 TVA  
7 WALLY JUSTICE, Nuclear Consultant, Small Modular  
8 Reactor Engineering, TVA  
9 ARCHIE MANOHARAN, Senior Program Manager, Site  
10 Nuclear Licensing, TVA  
11 JEFF PERRY, Senior Project Manager, TVA  
12 JOE SHEA, Vice President, Regulatory Affairs and  
13 Support Services, TVA  
14 DAN STOUT, Director, Nuclear Technology Innovation,  
15 TVA  
16 ALEX YOUNG, Mechanical Engineer, Design, TVA  
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C-O-N-T-E-N-T-S

Opening Remarks, Swearing in of Witnesses and  
Admission of Exhibits

Kristine Svinicki . . . . . 6

Overview (TVA)

Joe Shea . . . . . 16

Dan Stout . . . . . 21

Commission Q&A . . . . . 29

Overview (NRC Staff)

Frederick Brown . . . . . 39

Anna Bradford . . . . . 45

Commission Q&A . . . . . 56

Safety Panel:

Applicant

Archie Manoharan . . . . . 64

Alex Young . . . . . 70

Staff

Allen Fetter . . . . . 74

Mallecia Sutton . . . . . 77

Bruce Musico . . . . . 79

Michelle Hart . . . . . 82

Michael Scott . . . . . 92

Commissioner Q&A . . . . . 100

1 Environmental Panel (TVA)

2 Jeff Perry . . . . . 146

3 Ruth Horton . . . . . 147

4 Tamsen Dozier . . . . . 153

5 Kenneth Erwin . . . . . 159

6 Environmental Panel (NRC Staff)

7 Tamsen Dozier . . . . . 168

8 Commission Q&A . . . . . 169

9 Closing Statement by Applicant . . . . . 170

10 Closing Statement by Staff . . . . . 180

11 Commission Q&A and Closing Statements . . . . . 184

12 Adjourn . . . . . 193

13

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P-R-O-C-E-E-D-I-N-G-S

8:58 a.m.

CHAIRMAN SVINICKI: Again, good morning and welcome everyone to this morning's mandatory hearing which we will now call to order.

I want to welcome the applicant, the Tennessee Valley Authority, or TVA as I'm sure they'll be referred to throughout the day. I want to welcome also the NRC staff, members of the public in the room with us and those who are observing the web cast of today's proceedings remotely.

The Commission convenes today to conduct an evidentiary hearing on TVA's application for an early site permit to determine the suitability of the Clinch River Nuclear Site in Oak Ridge, Tennessee for one or more small modular reactors.

The early site permit, if approved, would resolve a number of environmental, emergency planning and siting issues, but would not authorize the construction or operation of any reactors. That would require one or more separate and subsequent licensing actions which would also be subject to a hearing.

As we begin this morning I would like to acknowledge the presence of our federal partners from the Federal Emergency Management Agency including Dr.

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1 Michael Casey who is director of the Technological  
2 Hazards Division.

3 We thank you, Dr. Casey, and FEMA for your  
4 written comments which we received on July 8th  
5 regarding the NRC's consideration of emergency  
6 planning zones in this proceeding. Although today's  
7 hearing does not include an opportunity for  
8 presentations beyond those from the parties, which are  
9 TVA and the NRC staff, we will be considering the FEMA  
10 comments carefully. They have been entered as a part  
11 of the docket of this hearing and we encourage FEMA to  
12 continue working with the NRC staff. If after  
13 listening today FEMA would like to supplement or  
14 clarify its earlier written statement in this case, it  
15 may certainly provide a supplemental letter to which  
16 the parties would have an opportunity to respond and  
17 the Commission would have an opportunity to take under  
18 consideration again.

19 I will now look up and look up at our FEMA  
20 visitors. Thank you very much for being here today.  
21 I had an opportunity to say hello and good morning to  
22 you separately.

23 This hearing is required under Section  
24 189A of the Atomic Energy Act of 1954, as amended.  
25 The Commission also will be reviewing the adequacy of

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1 the NRC staff's environmental impact analysis under  
2 the National Environmental Policy Act of 1969, or  
3 NEPA.

4 The general order of the hearing is as  
5 follows: First, I will address procedural matters  
6 associated with the swearing in of witnesses and the  
7 admission into the record of the parties' exhibits.  
8 TVA and the NRC staff will then provide testimony in  
9 witness panels that provide an overview of the  
10 application as well as address safety and  
11 environmental issues associated with the NRC staff's  
12 review with Commission questions following each panel.

13 The Commission expects to issue a decision  
14 after the hearing promptly with due regard to the  
15 complexity of the issues after it makes the following  
16 necessary findings:

17 On the safety side the Commission will  
18 determine, one, whether the applicable standards and  
19 requirements of the Atomic Energy Act and the  
20 Commission's regulations, specifically those in 10 CFR  
21 Section 52.24, have been met.

22 Second, whether any required notifications  
23 to other agencies or bodies have been duly made.

24 Third, whether there is reasonable  
25 assurance that the site is in conformity with the

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1 provisions of the Atomic Energy Act and the NRC's  
2 regulations.

3 Fourth, whether the applicant is  
4 technically qualified to engage in the activities  
5 authorized.

6 And fifth, whether issuance of the permit  
7 would be inimical to the common defense and security  
8 or to the health and safety of the public.

9 On the environmental side under 10 CFR  
10 51.105A, the Commission will first determine whether  
11 the requirements of the National Environmental Policy  
12 Act, Section 1022A, C and E, and the applicable  
13 regulations in 10 CFR Part 51 have been met.

14 Second, independently consider the final  
15 balance among the conflicting factors contained in the  
16 record of the proceeding with a view to determining  
17 the appropriate action to be taken.

18 Third, determine after weighing the  
19 environmental, economic, technical and other benefits  
20 against environmental and other costs and considering  
21 reasonable alternatives whether the early site permit  
22 should on the basis of the environmental review be  
23 issued, denied or appropriately conditioned.

24 And finally, fourth, determine whether the  
25 NEPA review conducted by the NRC staff has been

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1       adequate.

2                   Today's meeting is open to observation by  
3       the public. We do not anticipate the need to close  
4       the meeting to discuss non-public information. If a  
5       party believes that the response to a question may  
6       require reference to non-public information, then that  
7       party should answer the question to the extent  
8       practicable with information in the publicly-available  
9       record and file any non-public response promptly after  
10      the hearing on the non-public docket.

11                   Let me now ask my fellow Commissioners  
12      whether they have any opening remarks.

13                   (No audible response.)

14                   CHAIRMAN SVINICKI: Hearing none, I will  
15      now proceed with the swearing in of witnesses and I  
16      will begin with the Tennessee Valley Authority.

17                   Would the counsel for TVA please introduce  
18      yourself?

19                   MR. DREKE: I'm Ryan Dreke with TVA's  
20      Office of General Counsel.

21                   CHAIRMAN SVINICKI: Thank you. Would you  
22      please read the names of TVA's witnesses?

23                   Each witness should stand as her or his  
24      name is read and please remain standing.

25                   Please proceed.

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1 MR. DREKE: Joseph Shea, Daniel Stout,  
2 John Holcomb, Walter Lee, Archie Manoharan, Michael  
3 Alex Young, Walter Justice, Jeffrey Perry, and Ruth  
4 Horton.

5 CHAIRMAN SVINICKI: Thank you very much.

6 So for all the witnesses, would you please  
7 raise your right hand while I read the oath?

8 Do you swear or affirm that the testimony  
9 you will provide in this proceeding is the truth, the  
10 whole truth and nothing but the truth?

11 ALL: I do.

12 CHAIRMAN SVINICKI: Thank you. Is there  
13 anyone who did not answer in the affirmative?

14 (No audible response.)

15 CHAIRMAN SVINICKI: Okay. Hearing not,  
16 you may put your hands down and you may retake your  
17 seats. Thank you.

18 Staff counsel, are there any objections to  
19 including the witness list as part of the record?

20 MR. SPENCER: No objections.

21 CHAIRMAN SVINICKI: Thank you. In the  
22 absence of objections the witness list is admitted  
23 into the record.

24 Next we will turn to TVA's exhibits.  
25 Counsel for TVA, are there any changes to your

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1 previously submitted exhibit list?

2 MR. DREKE: No, there are not.

3 CHAIRMAN SVINICKI: Please read the range  
4 of numbers of the exhibits to be admitted.

5 MR. DREKE: TVA-001 to TVA-015.

6 CHAIRMAN SVINICKI: Is there a motion to  
7 admit the exhibits into the record?

8 MR. DREKE: Yes, there is.

9 CHAIRMAN SVINICKI: Staff counsel, are  
10 there any objections to the admission of the exhibits  
11 and the exhibit list as part of the record?

12 MR. SPENCER: No objections.

13 CHAIRMAN SVINICKI: In the absence of  
14 objections the exhibits and exhibit list are admitted  
15 into the record.

16 We will now turn to the same process with  
17 the NRC staff starting with the presentation of  
18 witnesses.

19 Counsel for the NRC staff, would you  
20 please introduce yourself?

21 MR. SPENCER: I'm Michael Spencer, counsel  
22 for the NRC staff.

23 CHAIRMAN SVINICKI: Would you please read  
24 the names of the staff's witnesses? And as you do,  
25 would each NRC witness please stand as her or his name

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1 is read and remain standing?

2 MR. SPENCER : Joseph Anderson, Daniel  
3 Barss, Anna Bradford, Frederick Brown, LUISSETTE  
4 Candelario, Allen Fetter, Joseph Giacinto, Michelle  
5 Hart, David Heeszal, Patricia Milligan, Bruce Musico,  
6 Judy Petrucelli, Michael Scott, Mallecia Sutton,  
7 Jenise Thompson, Jennifer Davis, Peyton Doub, Tamsen  
8 Dozier, Kenneth Erwin, Jessica Kratchman, Phillip  
9 Meyer, and Donald Palmrose.

10 CHAIRMAN SVINICKI: Thank you. And it's  
11 very convenient that the NRC staff witnesses are all  
12 off here in the seats to my left.

13 So I would ask each of you to raise your  
14 right hands.

15 Do you swear or affirm that the testimony  
16 you will provide in this proceeding is the truth, the  
17 whole truth and nothing but the truth?

18 ALL: I do.

19 CHAIRMAN SVINICKI: You may lower your  
20 hands. Are there any NRC witnesses who did not take  
21 the oath or answer in the affirmative?

22 (No audible response.)

23 CHAIRMAN SVINICKI: Hearing none, thank  
24 you. You may retake your seats.

25 Counsel for TVA, are there any objections

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1 to including the witness list as part of the record?

2 MR. DREKE: TVA has no objection.

3 CHAIRMAN SVINICKI: In the absence of  
4 objections the witness list is admitted into the  
5 record.

6 We will now turn to the staff exhibits.  
7 Counsel for the NRC staff, are there any changes to  
8 your previously submitted exhibit list?

9 MR. SPENCER: No changes.

10 CHAIRMAN SVINICKI: Please read the range  
11 of numbers of the exhibits to be admitted.

12 MR. SPENCER: NRC-001 to NRC-018.

13 CHAIRMAN SVINICKI: Is there a motion to  
14 admit the exhibits into the record?

15 MR. SPENCER: Yes.

16 CHAIRMAN SVINICKI: Counsel for TVA, are  
17 there any objections to the admission of the exhibits  
18 and the exhibit list into the record?

19 MR. SPENCER: TVA has no objections.

20 CHAIRMAN SVINICKI: In the absence of  
21 objections the exhibits and exhibit list are admitted  
22 into the record.

23 We will now turn to our first panel  
24 presentation. Counsel, thank you very much and you  
25 may re-take your previous seats.

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1           And I would ask the staff witnesses -- or  
2 no, that's not how we're doing it. Sorry. Our first  
3 presentation is TVA providing an overview of its  
4 application, but the Office of the Secretary will  
5 clear some of the name plates here at the table. Yes?

6           MS. VIETTI-COOK: Well, they will come up  
7 after this.

8           CHAIRMAN SVINICKI: Okay. All right.  
9 Thank you very much.

10           The NRC staff witnesses will join us after  
11 the TVA presentation.

12           So for our first presentation, again TVA  
13 will provide an overview of its application. And  
14 after each overview panel we will have a round of  
15 questions from the Commissioners. For the two  
16 subsequent presentations, the Safety Panel and the  
17 Environmental Panel, first TVA and then the staff will  
18 testify followed by an opportunity for the Commission  
19 to pose questions to both parties.

20           The Commissioner will have an opportunity  
21 to bank their time as they see fit throughout the day  
22 to focus on particular questions or areas of focus.  
23 And we will rotate the order of questioning by members  
24 of the Commission throughout the day.

25           I remind the witnesses of this panel and

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1 other panels who will appear before us that they  
2 remain under oath and that the Commission is generally  
3 familiar with the prehearing filings and it is not  
4 necessary to repeat that testimony.

5 So now I will ask the TVA presenters in  
6 the order that they've established to please proceed.  
7 And prior to presenting for the first time would you  
8 please introduce yourselves briefly? Thank you.

9 MR. SHEA: Good morning, Chairman  
10 Svinicki, Commissioner Baran, Commissioner Caputo and  
11 Commissioner Wright. My name is Joe Shea and I am  
12 Vice President for Regulatory Affairs and Support  
13 Services for the Tennessee Valley Authority.

14 I'm pleased to appear before you today  
15 regarding TVA's application for an early site permit  
16 for the Clinch River site in Roane County, Tennessee.  
17 With me at the table today are Dan Stout, Director of  
18 Nuclear Technology Innovation, and John Holcomb, Small  
19 Modular Reactor Engineering Manager.

20 To open I would like to talk briefly about  
21 TVA and set the stage for discussion of the early site  
22 permit application for the Clinch River site.

23 Slide 2. TVA is a corporate agency and  
24 instrumentality of the United States Government  
25 established by the Tennessee Valley Authority Act of

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1 1933. This federal statute stated that TVA's primary  
2 missions are to improve the navigability and to  
3 provide for the flood control of the Tennessee River,  
4 to provide for reforestation and the proper use of  
5 marginal lands in the Tennessee Valley, to provide for  
6 the agricultural and industrial development of the  
7 valley, and to provide for the national defense by the  
8 creation of a corporation for the operation of certain  
9 government properties. In short, TVA's mission is to  
10 improve the quality of life in the valley through the  
11 integrated management of the region's resources.

12 In proposing the TVA in 1933, Franklin D.  
13 Roosevelt asked Congress to create a corporation  
14 clothed with the power of government, but possessed of  
15 the flexibility and initiative of a private  
16 enterprise.

17 TVA is fully self-financed and funds  
18 virtually all operations through electricity sales and  
19 power system bond financing. TVA sets rates as low as  
20 feasible and reinvests net income in power sales and  
21 to power system improvements, economic development and  
22 environmental stewardship.

23 Next slide, please. TVA's mission to  
24 provide low-cost reliable power to the people of the  
25 valley is an enduring one. TVA serves that mission in

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1 the context of today's strategic imperatives, namely  
2 balancing power rates and debt such that TVA can  
3 maintain low rates while living within its means and  
4 managing the trade-off between optimizing the value of  
5 our asset portfolio and being responsible stewards of  
6 the valley's environmental and natural resources. To  
7 achieve the mission within those strategic imperatives  
8 TVA focuses on the key areas of energy, environmental  
9 stewardship, and economic development.

10 Slide 4. With regard to energy, TVA  
11 serves approximately 10 million citizens living in  
12 parts of seven states in an area covering  
13 approximately 80,000 square miles. As an energy  
14 provider TVA uses a network of over 16,000 miles of  
15 transmission lines to provide power to a series of 154  
16 local power companies who distribute power directly to  
17 individual customers. TVA also transmits power to 58  
18 directly-served large customers.

19 In addition, TVA also purchases a portion  
20 of power supply from third-party operators under long-  
21 term power purchase agreements. Today TVA's  
22 generation portfolio is approximately 39 percent  
23 nuclear, 21 percent coal, 26 percent natural gas, 10  
24 percent hydro, 3 percent wind and solar, and 1 percent  
25 energy efficiency.

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1                   Next slide, please.       Environmental  
2                   stewardship is an important part of TVA's mission of  
3                   service. TVA is committed to protecting the valley's  
4                   natural resources as well as its historical and  
5                   cultural heritage. TVA manages the Tennessee River to  
6                   provide multiple benefits to the people that it serves  
7                   and to ensure that the region will always be a safe,  
8                   healthy and beautiful place to live, work and play.  
9                   That includes monitoring the health of the region's  
10                  reservoirs, rivers and streams, promoting clean  
11                  marinas and clean boating, and taking good care of  
12                  approximately 293 acres of reservoir land, 11,000  
13                  miles of shoreline, and more than 80 public recreation  
14                  areas. TVA's management of the river also helps  
15                  maintains navigation, provides water supply for about  
16                  5 million people in the region, and provides a  
17                  reliable 652-mile river navigation channel from  
18                  Knoxville, Tennessee to Paducah, Kentucky.

19                  Next slide, please. TVA is also committed  
20                  to limiting the environmental impact of its operation.  
21                  To protect air quality TVA has invested more than \$7  
22                  billion to reduce nitrogen and sulfur dioxide  
23                  emissions from its coal-fired plants. TVA has in  
24                  recent years decommissioned some of its oldest, least  
25                  efficient coal-fired units and increased power

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1 generation from cleaner resources. These include the  
2 21st Century's first new nuclear unit at Watts Bar and  
3 more natural gas units. TVA is moving toward  
4 generating and purchasing more renewable energy. In  
5 fact, in 2017 renewables, including conventional hydro  
6 production, constituted approximately 13 percent of  
7 our energy portfolio and contributed in part to a 47  
8 percent reduction in carbon dioxide emissions compared  
9 to 2005 levels.

10 Slide 7, please. Economic development is  
11 a cornerstone of TVA's mission to make life better for  
12 valley residents. Last year in partnership with state  
13 and local groups TVA helped attract or retain more  
14 than 65,000 jobs and more than \$11.3 billion in  
15 capital investment across the Tennessee Valley Region.  
16 TVA helped our economic development partners by  
17 hosting workshops, sharing in-depth technical and  
18 economic data, providing grants, and supporting  
19 business incubators. In recognition of these efforts,  
20 in 2018 *Site Selection* magazine ranked TVA among North  
21 America's 10 best utilities for economic development  
22 for the 13th year in a row.

23 And now I'd like to introduce Dan Stout  
24 who will discuss in more details TVA's efforts to date  
25 regarding the pursuit of an early site permit for a

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1 small modular reactor at the Clinch River site.

2 Dan?

3 MR. STOUT: Good morning, Chairman  
4 Svinicki and Commissioners Baran and Caputo and  
5 Wright. I'm very pleased to be here today regarding  
6 the Tennessee Valley Authority's application for an  
7 early site permit at the Clinch River site in Oak  
8 Ridge, Tennessee.

9 I'd like to start by recognizing the  
10 significant work put forth by the Nuclear Regulatory  
11 Commission staff in reviewing our application and the  
12 diligent work of all the TVA employees and contractors  
13 supporting the review. The NRC has completed a  
14 thorough review and analyzing site safety,  
15 environmental protection and plans for coping with  
16 emergencies consistent with the NRC mandate to protect  
17 the public health and safety.

18 The purpose of our application is to  
19 determine the suitability of the site for deployment  
20 and operation of two or more small modular reactors,  
21 which I'll refer to as SMRs. SMRs are nuclear  
22 reactors that are 300 megawatts electric or less,  
23 enabling more factory fabrication and less  
24 construction at the site. As a next generation  
25 nuclear technology the designs considered incorporate

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1 improved safety and increased operational flexibility.  
2 SMRs support TVA's technology innovation mission and  
3 are consistent with our vision to be one of the  
4 nation's leaders in cleaner low-cost energy.

5 SMRs would use a small fraction of land as  
6 compared to other clean energy sources and could re-  
7 power retired fossil fuel sites. Although expected to  
8 usually operate as baseload generation, SMRs are  
9 designed to be capable of varying output to match  
10 electricity demand, enabling integration with  
11 intermittent renewables. Underground construction  
12 provides enhanced safety and security. Most SMR  
13 designs rely heavily on passive safety, meaning that  
14 they can safely shut down, self-cool with no operator  
15 action or electrical power and no additional water for  
16 extended durations.

17 SMR designs have accident source terms  
18 that are expected to be several orders of magnitude  
19 lower than large light water reactors which results in  
20 reduced accident consequences and lower doses.  
21 Accordingly, SMRs have the potential for reduced  
22 emergency planning zones and correspondingly lower  
23 costs.

24 Next slide, please. TVA has been  
25 evaluating small modular reactors for about 10 years.

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1 Work initially was focused on a construction permit  
2 for B&W, later BWXT's mPower reactor design, with site  
3 characterization work starting in 2010, but B&W  
4 reduced its pace and eventually ceased development in  
5 2014. TVA shifted to pursuing a technology-neutral,  
6 early site permit application using a plant parameter  
7 envelope with an appropriately sized emergency  
8 planning zone.

9 The plant parameter envelope was informed  
10 by the four U.S. light water reactor designs under  
11 development at that time: mPower, Holtec, NuScale and  
12 Westinghouse. Based on very preliminary evaluation  
13 TVA had confidence that a two-mile emergency planning  
14 zone would accommodate all of the SMR designs being  
15 considered and that at least one would be able to  
16 demonstrate the ability to meet site mandatory  
17 requirements. Archie and Alex will get into detail on  
18 this in the Safety Panel.

19 TVA established four key objectives for  
20 the SMR program: (1) to demonstrate that power  
21 generated by SMRs could be used for addressing  
22 critical energy security issues; and (2) to  
23 demonstrate that SMR technology can assist federal  
24 facilities with meeting carbon reduction objectives;  
25 (3) to demonstrate SMR design features that lead to

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1 improved safety; and (4) to demonstrate that SMR power  
2 generating facilities can be deployed in an  
3 incremental fashion to better meet the power  
4 generation needs of a service area.

5 These objectives informed the site  
6 selection process leading to identification of four  
7 candidate sites, one on Redstone Arsenal and three on  
8 or near the Oak Ridge Reservation. The Clinch River  
9 site was determined to be the preferred site.

10 Next slide, please. Because it was  
11 disturbed in the 1970s and 1980s by the Department of  
12 Energy's Clinch River Breeder Reactor Program, there  
13 would be less environmental impact from SMR deployment  
14 on this preferred site as compared to the other  
15 candidate sites.

16 The Clinch River site is located on the  
17 Clinch River arm of the Watts Bar Reservoir and is  
18 within the City of Oak Ridge in Roane County,  
19 Tennessee. The site is a 935-acre portion of the  
20 1,200-acre parcel of TVA-managed reservoir land. The  
21 land is owned by the United States of America and is  
22 managed by TVA as an agency of the Federal Government.  
23 It is a neighbor to the Department of Energy's Oak  
24 Ridge Reservation, a current TVA customer. Existing  
25 500 and 161-kilovolt transmission lines cut through

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1 the site making transmission connection relatively  
2 easy.

3 Although the Clinch River Breeder Reactor  
4 Project ended in the 1980s without being completed  
5 some basic infrastructure such as roads and stormwater  
6 retention structures were built and remain. The Oak  
7 Ridge area provides strong community support and an  
8 abundant and skilled workforce.

9 Next slide, please. The TVA early site  
10 permit application itself consists of a site safety  
11 analysis report, environmental report, two distinct  
12 major features emergency plans, and the associated  
13 exemptions. TVA drafted the early site permit  
14 application and its constituent plant parameter  
15 envelope based upon NRC-endorsed NEI 10-01 guidance  
16 with margin added to specific parameters.

17 TVA's early site permit application  
18 assumes a maximum of 800 megawatts thermal for each  
19 individual reactor unit and a maximum of 2,420  
20 megawatts thermal for the site. The early site permit  
21 application also assumes two or more reactor units are  
22 deployed. A plant parameter envelope approach is  
23 conservative and flexible, allowing for a variety of  
24 reactor designs, design updates and providing  
25 flexibility for future business options and decisions.

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1           Next slide, please.       This slide  
2 illustrates the regulator bases for the development of  
3 the early site permit application. The regulatory  
4 bases consist of various Commission regulations,  
5 standard review plans, regulatory guides, review  
6 standards, and requirements of the Atomic Energy Act  
7 of 1954, as amended.

8           Next slide, please. The NRC commenced the  
9 review of the early site permit application in the  
10 beginning of 2017. The application was originally  
11 submitted -- was originally submitted had about 8,000  
12 pages supported by 80,000 pages of technical  
13 information.

14           One of the highlights I'd like to point  
15 out is the efficient use of audits. The staff did a  
16 good job preparing for the audits listing out all of  
17 their question, all their information needs well in  
18 advance of the audits. As a result, TVA was able to  
19 prepare responses to all of the information needs in  
20 advance so that when face-to-face discussions took  
21 place between the staff and the TVA subject matter  
22 experts, there was meaningful discussion on the  
23 challenges leading to clarity regarding the resolution  
24 of open issues. Further, with clarity of open issues  
25 TVA voluntarily supplemented the application avoiding

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1 the need to use the RAI process in many cases.

2 Both NRC staff and TVA identified issues  
3 early and promptly addressed them by applying each  
4 agency's resources efficiently. By the end of the  
5 audits and application supplements issues had been  
6 resolved. Accordingly, instead of dealing with  
7 hundreds of RAIs, the total was about a dozen. Many  
8 of these review process successes resulted from very  
9 frequent clear and candid communication at both the  
10 staff and the management levels.

11 Next slide, please. Prior to TVA's  
12 submission of the early site permit application to NRC  
13 in May of 2016 the NRC and TVA were involved in a  
14 number of preapplication interactions including site  
15 visits, alternative site visits, preapplication  
16 readiness review. Following acceptance the NRC  
17 performed four major audits during the spring and  
18 summer of 2017 supporting hydrology, groundwater,  
19 seismic, geotech, environmental and a comprehensive  
20 four-month emergency preparedness audit that began in  
21 the fall of 2017.

22 In the summer of 2018 audits supporting  
23 meteorology and health physics were conducted along  
24 with a supplemental emergency preparedness audit.  
25 Additionally, the NRC conducted a detailed QA

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1 inspection covering Chapter 17.5 of the SSAR.

2 Next slide, please. The NRC review  
3 officially began the first week of January in 2017.  
4 The top line of this chart shows the application  
5 updates and revisions.

6 The second area shows the safety review  
7 with audits and RAIs in 2017, ACRS meetings in 2018,  
8 and the final Safety Evaluation Report in June of this  
9 year.

10 The next area is the environmental review  
11 with the Notice of Intent Scoping meeting and audits  
12 in early 2017. The draft Environmental Impact  
13 Statement was issued in April 2018 and the final  
14 Environmental Impact Statement in April of this year,  
15 with the last area being the hearing. In July 2018  
16 all contentions were dismissed or denied and the  
17 Atomic Safety and Licensing Board terminated, hence we  
18 are here today for the mandatory hearing.

19 Next slide, please. In summary, SMRs have  
20 the potential to provide a resilient and reliable  
21 energy source with advanced safety features that can  
22 benefit the nuclear industry and help achieve multiple  
23 Federal Government objectives. TVA and NRC staff  
24 support the Clinch River site as suitable for future  
25 construction and operation of SMRs based on rigorous

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1 evaluations and resulting conclusion that the  
2 applicable standards and requirements of the Atomic  
3 Energy Act and Commission regulations are satisfied.

4 TVA has the operational experience and  
5 technical qualifications to engage in any NRC-  
6 authorized activities at the Clinch River site and a  
7 staff of nuclear professionals will ensure safe,  
8 reliable and environmentally-sound construction and  
9 operation of SMRs should TVA make a decision to do so.

10 The early site permit application, NRC  
11 staff's final Safety Evaluation Report and final  
12 Environmental Impact Statement fully support the NRC  
13 findings required for issuance of the early site  
14 permit application. NRC staff have concluded that  
15 issuance of the early site permit for the Clinch River  
16 will not be inimical to the common defense and  
17 security or health and safety of the public. Thank  
18 you.

19 CHAIRMAN SVINICKI: Thank you very much  
20 for that presentation. I will be recognized first for  
21 the TVA Overview Panel for questions, so let me begin.

22 The first question is one of  
23 clarification. And if the audio-visual folks can be  
24 putting back up TVA's slide 10, which is an aerial  
25 view of the Clinch River site. You mentioned -- and

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1 of course for those of us who have been around nuclear  
2 issues for a while, the Clinch River Breeder Reactor  
3 Project is rather legendary, but you mentioned that as  
4 a result of that project the site has some level of  
5 disturbance. And it's more my eyesight than any fault  
6 of the photo. You mentioned that roads are there and  
7 some drainage.

8           Could you just describe specifically, is  
9 that the extent of what we see here, because I know  
10 the site had some development. Looks like there's  
11 some areas where the vegetation is disturbed there as  
12 well. I just -- I can't see very clearly. Are there  
13 are structures on the site?

14           MR. STOUT: So the structures you can see  
15 near the center: a small parking lot and two trailers  
16 for work and a trailer for core borings, there is a  
17 road, kind of an inner loop --

18           CHAIRMAN SVINICKI: Yes.

19           MR. STOUT: -- that was there that we have  
20 improved slightly for the purpose of conducting  
21 additional site characterization. There's a circle on  
22 the -- more on like the toe of the boot. That's where  
23 the meteorology tower was located.

24           CHAIRMAN SVINICKI: Okay. Thank you.

25           MR. STOUT: And you can see a right-of-way

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1 for power line cutting from the west to the east at  
2 the top. That's the 500-kilovolt transmission line.  
3 And going from the southeast to the north, that's a  
4 161-kilovolt transmission line.

5 Stormwater retention is very difficult to  
6 see on this, but there are several stormwater  
7 retention areas on the site.

8 CHAIRMAN SVINICKI: Okay. Thank you. And  
9 I assume this is a relatively recent photo. This is  
10 not a historic photo.

11 MR. STOUT: Yes.

12 CHAIRMAN SVINICKI: Okay. Thank you very  
13 much.

14 Shifting a little bit now, you mentioned  
15 that in 2014 TVA shifted to -- its approach to a  
16 technology-neutral application. Were there some  
17 central factors that contributed with your decision to  
18 do that? You mentioned that there were generally kind  
19 of four SMRs under development at the time. Could you  
20 describe at a high level what the pivot in thinking  
21 was there?

22 MR. STOUT: TVA was very interested in the  
23 attributes of the small modular reactors, and advanced  
24 reactors, in terms of smaller cost increments, more  
25 flexibility in terms of operation, but at that time in

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1 2014 there were no applications in -- submitted to the  
2 Nuclear Regulatory Commission. So the level of  
3 information was very preliminary. It was even more  
4 preliminary for the advanced reactor developers at  
5 that time. And TVA was considering the schedule and  
6 the timeline for advanced reactor community's  
7 development plans and focused on light water reactor  
8 SMRs to form the basis behind the plant parameter  
9 envelope that was established.

10 Now the plant parameter envelope is the  
11 basis and TVA can consider reactors that fit within  
12 that, whether they be light water or non-light water.

13 CHAIRMAN SVINICKI: Thank you for that.  
14 And my final question is you noted the minimal number  
15 of requests for additional information. If I  
16 understood you correctly on slide 14, you attributed  
17 some of that limited number of RAIs to the extensive  
18 pre-submittal engagement that went on between TVA and  
19 the NRC staff.

20 Were there any topical areas that were  
21 particularly emphasized in your pre-submittal  
22 engagement with the NRC staff or would you  
23 characterize that the nature of the benefit of that  
24 was just familiarizing the staff with your overall  
25 approach?

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1 MR. STOUT: So preapplication engagement  
2 did focus a lot on emergency planning as well as  
3 environmental aspects. Was effective at achieving  
4 alignment and clarity on the content of the  
5 application, but the primary benefit came associated  
6 with the audits. And it was the information needs in  
7 advance of the audits, identifying all of the comments  
8 and information needs that the staff had as they  
9 entered into the audit. And TVA had enough time to  
10 prepare in advance the -- not only a response to the  
11 staff, but to draft language within an application  
12 supplement and see if any of the issues were addressed  
13 by a solution, and that led to the constructive  
14 dialogue during the audit. And then rather than wait  
15 for a request for additional information, we could  
16 supplement the application soon after the audit and  
17 obviate the need for an RAI.

18 CHAIRMAN SVINICKI: Thank you very much  
19 for that.

20 Now I will recognize Commissioner Baran  
21 for his questions. Thank you.

22 COMMISSIONER BARAN: Thanks.

23 Well, thank you for your presentations.  
24 I don't have any questions for this panel, so I'll  
25 reserve my time.

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1 CHAIRMAN SVINICKI: Thank you very much.

2 Next we will turn very quickly then to  
3 Commissioner Caputo.

4 Please proceed.

5 COMMISSIONER CAPUTO: Good morning. I  
6 would like to start with sort of a high-level question  
7 about your pursuit of small reactors and the multiple  
8 designs that you have considered.

9 So you anticipate a level of safety  
10 inherent in these designs that surpasses existing  
11 reactors. Could you just describe that in a little  
12 more detail, please?

13 MR. STOUT: Sure. There are design  
14 features that improve safety, things such as  
15 underground construction, substantially more cooling  
16 water present in the reactor. These are designs that  
17 are post-9/11. They can take into account features,  
18 security by design and they lead to slower accident  
19 progression. They lead to fewer accidents, fewer  
20 components that are being relied on for safety so that  
21 there are less safety systems. And so there are fewer  
22 accidents. The accidents happen slower allowing for  
23 more time for response.

24 MR. SHEA: And I think that reflects the  
25 current generation of designers taking into account

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1 the Commission's expectation that advanced designs  
2 will be inherently safer at the plant level and then  
3 thus allowing for the margins to public health and  
4 safety to be really enhanced in the design itself.

5 COMMISSIONER CAPUTO: Okay. Thank you.

6 In conducting a review like this the NRC  
7 interacts with a wide range of federal, state, tribal  
8 and local governments and agencies, some in a formal  
9 role and some in a consulting role. Would you please  
10 describe some of TVA's outreach to state, tribal, and  
11 local government and agencies?

12 MR. STOUT: Yes, TVA had multiple  
13 interactions at the state, tribal and local levels,  
14 not only with elected officials, but also with local  
15 residents. There were opportunities for local elected  
16 officials, government agencies to review sections that  
17 were relevant to the application.

18 We also conducted some public outreach.  
19 One example, we sent letters to neighbors of the site  
20 and invited them to a barbecue. And we gave them  
21 tours of the site. We had a room set up with visual  
22 images. And we got to hear concerns of the locals  
23 that can be factored into design of a future facility.

24 COMMISSIONER CAPUTO: Thank you. One last  
25 quick question. So you discuss the use of audits and

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1 how that led to some improvement in efficiency of the  
2 review. I assume all of the material that was  
3 provided to the staff was made publicly available on  
4 the record?

5 MR. STOUT: Yes.

6 COMMISSIONER CAPUTO: Okay. Thank you.

7 CHAIRMAN SVINICKI: Thank you very much,  
8 Commissioner Caputo.

9 Next we will recognize Commission Wright.

10 Please proceed.

11 COMMISSIONER WRIGHT: Thank you very much.

12 Good morning. Thank you for your  
13 presentations. So the NRC has issued five early site  
14 permits. So when you were preparing the application  
15 did you look to the other early site permits to kind  
16 of look to gain some efficiencies? And if so, could  
17 you share maybe a couple with me?

18 MR. STOUT: Yes, PSEG was the most recent  
19 early site permit application before ours, and so we  
20 had benchmarking trips with PSEG staff. We involved  
21 them in a readiness review in advance of our  
22 application and we reviewed other ESPs. And so we did  
23 our best to address all issues that were addressed in  
24 all the prior applications prior to submittal.

25 COMMISSIONER WRIGHT: Thank you. So if

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1 the early site permit is issued, are there some  
2 factors that may affect your decision I guess to apply  
3 for a construction permit or a combined license  
4 referencing this ESP in the future?

5 MR. SHEA: Well, certainly as we prepared  
6 the application we put together the approach with the  
7 emergency planning, and in large part to -- as an  
8 initiative to recognize that future advanced designs  
9 with inherently safer by-design elements to them might  
10 provide a basis for changes in the structures around  
11 emergency planning.

12 And in -- with a focus on the bottom line  
13 of protecting public health and safety assured through  
14 those defense-in-depth mechanisms we certainly looked  
15 for the opportunity to address issues like future O&M  
16 costs associated with the entire operation, and  
17 certainly emergency planning is an element of that,  
18 again looking to ensure that through all of those  
19 barriers public health and safety is assured.

20 COMMISSIONER WRIGHT: So do you have any  
21 idea or any sense of when you might make those  
22 decisions and --

23 MR. STOUT: So TVA recently issued an  
24 Integrated Resource Plan and it contained an element  
25 that TVA will continue to evaluate emerging nuclear

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1 technologies including SMRs as part of our technology  
2 innovation efforts. The demand for power over the  
3 next couple of decades is relatively flat. There will  
4 be some retirements anticipated and the need for some  
5 additional generation.

6 Alternatives such as combined- cycle gas  
7 and solar appear to be more cost-competitive than  
8 small modular reactors at this point, however, our  
9 Integrated Resource Plan did recognize that we have an  
10 interested customer in the Department of Energy and  
11 that there's the potential that the Department could  
12 partner with TVA in a manner that would share in the  
13 costs and risks of initial deployment.

14 COMMISSIONER WRIGHT: Thank you. My last  
15 question for you is going to be -- so are there any  
16 NRC actions or decisions out there that may affect  
17 your decision?

18 MR. SHEA: Well, certainly as we're  
19 looking at the design certification application that's  
20 pending we're watching carefully the issues that are  
21 novel that are being reviewed by the staff and in some  
22 cases brought to the Commission's attention to  
23 understand will that proposed design achieve all that  
24 it's intended to in terms of both safety improvement,  
25 but also construction, operation, cost improvements as

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1 well and looking at the totality of that. And that  
2 will absolutely inform our decision about that  
3 technology and other similar new technologies.

4 COMMISSIONER WRIGHT: Thank you so much.

5 CHAIRMAN SVINICKI: Thank you,  
6 Commissioner Wright. And, again, my thanks to the TVA  
7 witnesses on this particular panel. I will now ask  
8 the NRC overview panel witnesses to take their seats  
9 with us here at the table.

10 In this panel, the staff will provide an  
11 overview of the NRC staff review of the application  
12 and a summary of their regulatory findings.

13 And as they take their seats, I will ask  
14 each of them before speaking to please introduce  
15 themselves. And I will begin with Mr. Fred Brown.  
16 Fred, please proceed.

17 MR. BROWN: Frederick Brown. Thank you,  
18 Chairman. Good morning, Chairman and Commissioners.

19 If we could have Slide 2, please. As I  
20 have indicated, I am Fred Brown, the director of the  
21 Office of New Reactors. And with me on this panel is  
22 Anna Bradford, who is the permanent deputy director  
23 and currently the acting director of our Division of  
24 Licensing, Siting and Environmental Analysis.

25 On behalf of the NRC staff that reviewed

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1 the early site permit application for the Clinch River  
2 Nuclear Site, we are pleased to address the Commission  
3 at this mandatory hearing.

4 The team here today will present the  
5 results of the staff's review of the application for  
6 the early site permit, or ESP, at the Clinch River  
7 Nuclear Site in Oak Ridge, Tennessee. And as you know  
8 and just heard the application was submitted to the  
9 NRC by the Tennessee Valley Authority, or TVA.

10 The staff's final Safety Evaluation  
11 Report, or SER, was completed in June of 2019, and the  
12 final Environmental Impact Statement, or final EIS,  
13 was completed in April of 2019.

14 These documents are the culmination of a  
15 two and a half year review effort by the staff and  
16 represent the results of coordinated activities and  
17 efforts by scientists, engineers, attorneys and  
18 administrative professionals from multiple offices  
19 within the Agency as well as the efforts or other  
20 agencies and our contractors.

21 Within the NRC, the main offices that  
22 contributed to the review include the Office of  
23 Nuclear Security and Incident Response, which reviewed  
24 the emergency preparedness and security areas.

25 The Office of the General Counsel reviewed

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1 the SER and the EIS. The Advisory Committee on  
2 Reactor Safeguards, or ACRS, reviewed and reported on  
3 the safety aspects of the application in accordance  
4 with 10 CFR 52.23. In addition, the NRC Region II  
5 office supported public meetings in the community near  
6 the Clinch River Nuclear Site.

7 The U.S. Army Corps of Engineers and the  
8 Department of Homeland Security also contributed to  
9 the review. Specifically, the Corps of Engineers was  
10 a cooperating agency in the environmental review.  
11 And, as the Chairman pointed out at the beginning of  
12 this morning's hearing, the Federal Emergency  
13 Management Agency was consulted regarding emergency  
14 planning.

15 Slide 3, please. For this panel, I will  
16 give an overview of the ESP application, and Ms.  
17 Bradford will summarize the staff's safety review and  
18 findings as well as giving an overview of the  
19 environmental review and findings.

20 After that, I will close out the  
21 presentation with an overview of the panel  
22 presentations that follow us.

23 Slide 4, please. In May of 2016, TVA  
24 submitted an application for an ESP at the Clinch  
25 River Nuclear Site. Following interactions with the

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1 NRC staff, TVA provided supplemental information in  
2 support of that application.

3 Consistent with NRC guidance, the NRC  
4 staff completed its acceptance review to determine  
5 whether the ESP application as supplemented contained  
6 sufficient technical information in scope and depth to  
7 allow the NRC staff to conduct its detailed safety and  
8 environmental reviews within a predictable time frame.

9 The staff determined in December of 2016  
10 that the application with the supplemental information  
11 was sufficient for docketing and issued a Federal  
12 Register notice to that effect on January 12, 2017.

13 During the review, the staff has expended  
14 approximately 40,000 hours on the safety and  
15 environmental reviews associated with this ESP and our  
16 contractors, working in collaboration with us, devoted  
17 approximately 6,000 additional hours to support the  
18 environmental and safety reviews.

19 This effort has involved over 72  
20 engineers, scientists, technical specialists and  
21 attorneys. During this time, the staff conducted 12  
22 public meetings and public conference calls in support  
23 of the ESP application as was mentioned by the  
24 previous panel.

25 The applicant responded to 13 requests for

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1 additional information comprising 51 staff questions  
2 and 12 of those RAIs were associated with the safety  
3 review, one with the environmental review.

4 In addition, the staff considered over  
5 2,500 letters and emails containing comments on the  
6 draft Environmental Impact Statement. The review of  
7 this application was a very thorough effort and was  
8 focused on protecting public health, safety and the  
9 environment.

10 Slide 5, please. The ESP application  
11 specifically proposes that the duration of the permit  
12 before a 20 year term, as allowed by 10 CFR 52.26(a).  
13 The ESP application is unique in that rather than  
14 using the standard 10 mile plume exposure pathway  
15 emergency planning zone, or EPZ, TVA proposed first a  
16 plume exposure pathway EPZ sizing methodology,  
17 second, two major features emergency plans, one plan  
18 for a site boundary plume exposure pathway EPZ and a  
19 second plan for an approximately two mile radius plume  
20 exposure pathway EPZ, and third, the associated  
21 exemption request associated with those EPZ plans.

22 The specific analysis that was performed  
23 in reviewing these unique details will be discussed in  
24 detail in the safety review panel that follows.

25 The ESP application request does not

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1 request approval of a specific plume exposure pathway  
2 EPZ size at this time. Instead a future combined  
3 license or construction permit applicant referencing  
4 the ESP would use the sizing methodology to determine  
5 the plume exposure pathway EPZ size that is  
6 appropriate for the selected reactor technology.

7 Slide 6, please. If the ESP is issued,  
8 the NRC would be approving the Clinch River Nuclear  
9 Site as a suitable site for the potential construction  
10 and operation of two or more small modular reactors  
11 that are bounded by the specified plant parameter  
12 envelope.

13 As the Chairman indicated, an ESP does not  
14 authorize actual construction or operation of a  
15 nuclear power plant. I will now turn the presentation  
16 over to Anna Bradford.

17 MS. BRADFORD: Next slide, please. Thank  
18 you, Fred, and good morning, Chairman Svinicki and  
19 Commissioners. As Fred mentioned, I am the acting  
20 director of the Division of Licensing, Siting and  
21 Environmental Analysis in the Office of New Reactors.

22 And the safety review evaluated the  
23 characteristics of the proposed site, the plant  
24 perimeter envelope, or PPE, the major features  
25 emergency plans and the plume exposure pathway EPZ

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1 size methodology for use by a future combined license  
2 or construction permit applicant.

3 Next slide, please. TVA has not selected  
4 a specific reactor designed for this site. To approve  
5 an ESP site without a selected reactor technology, an  
6 ESP applicant can propose a PPE with values that bound  
7 a variety of reactor technologies rather than one  
8 specific technology.

9 The PPE represents a surrogate nuclear  
10 plant for the purposes of evaluating an ESP  
11 application. TVA's plant perimeter envelope was  
12 developed based on four potential small modular  
13 reactor, or SMR, designs.

14 The safety panel will discuss in more  
15 detail the development of the PPE.

16 TVA's PPE assumes the construction and  
17 operation of two or more SMRs at the Clinch River  
18 Nuclear Site with a combined maximum nuclear  
19 generating capacity of 2,420 megawatts thermal or 800  
20 megawatts electric.

21 Next slide, please. A combined license or  
22 construction permit application referencing an ESP  
23 would identify a specific technology. During the  
24 combined license or construction permit review, the  
25 PPE values and the ESP would be compared to those of

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1 the selected technology.

2 If the design characteristics of the  
3 selected technology exceed the bounding ESP PPE  
4 values, additional reviews would be conducted to  
5 ensure that the site remains suitable from a safety  
6 and environmental standpoint for construction and  
7 operation of the selected technology.

8 Next slide, please. The ACRS examined the  
9 staff safety review of the ESP application. Between  
10 May and November of 2018, the staff presented its  
11 results in four subcommittee meetings. The staff  
12 presented the results of the safety review to the ACRS  
13 full committee in December 2018.

14 Following the full committee meeting, the  
15 ACRS issued a report in January 2019 concluding that  
16 there is reasonable assurance that SMRs with design  
17 characteristics that fall within the PPE, used by TVA  
18 in its ESP application, can be built and operated at  
19 the Clinch River Nuclear Site without undue risk to  
20 public health and safety.

21 This ACRS report recommended issuance of  
22 the Clinch River Nuclear Site ESP. And the staff  
23 issued the final Safety Evaluation Report on June 14,  
24 2019.

25 Next slide, please. The staff prepared

1       SECY-19-0064 dated June 21, 2019, to support this  
2       mandatory hearing.       In that paper, the staff  
3       summarized the basis to support a Commission  
4       determination that the staff's reviews were adequate  
5       to support the findings necessary to support the  
6       findings necessary to support the ESP.

7               The required safety and environmental  
8       findings are in 10 CFR 52.24(a), and I will now  
9       summarize the staff's basis supporting each finding.

10              First, the applicable standards and  
11       requirements of the Atomic Energy Act of 1954, as  
12       amended, and the Commission's regulations have been  
13       met.

14              The staff reviewed and evaluated the  
15       application against the applicable criteria in the  
16       Commission's regulations.

17              Second, any required notifications to  
18       other agencies or bodies, including Federal Register  
19       notices, have been duly made as documented in SECY-19-  
20       0064.

21              Third, there is reasonable assurance that  
22       the site is in conformity with the provisions of the  
23       AEA and the Commission's regulations.       The staff  
24       concluded that all applicable site-related regulatory  
25       requirements were satisfied and that the site

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1 characteristics in the ESP application are acceptable.

2 Next slide, please. Fourth, the applicant  
3 is technically qualified to engage in the activities  
4 authorized. The technical qualifications of the  
5 applicant are summarized in the SECY paper and in  
6 Chapter 1 of the FSER.

7 Fifth, issuance of the permit will not be  
8 inimical to the common defense and security or to the  
9 health and safety of the public. The staff largely  
10 bases this conclusion on the applicant's compliance  
11 with the pertinent regulations. Also, as stated in  
12 the SECY paper, the staff is not aware of any  
13 information presenting any locality concerns.

14 And sixth, the findings required by  
15 Subpart A of 10 CFR Part 51 have been made.

16 Finally, the staff did not address the  
17 findings in 10 CFR 52.24(a)(5) and (a)(7). These  
18 findings are not applicable to the Clinch River review  
19 because first, TVA did not propose inspections, test  
20 analyses and acceptance criteria as permitted by 10  
21 CFR 52.17(b)(3). And, second, TVA did not request a  
22 limited work authorization under 10 CFR 52.17(c).

23 Now I will be discussing the environmental  
24 review and provide an overview of the process we used  
25 in conducting the review, the draft summary record of

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1 decision and the staff's recommendation as a result of  
2 that review.

3 I will also discuss the findings that need  
4 to be made under 10 CFR 51.105 before the permit can  
5 be granted.

6 Next slide, please. The NRC's proposed  
7 action related to the TVA application is the issuance  
8 of an ESP for the Clinch River Nuclear site approving  
9 the site as suitable for the future construction and  
10 operation of two or more SMRs with characteristics  
11 that fall within the PPE.

12 As Fred stated earlier, an ESP does not  
13 authorize construction and operation of a nuclear  
14 power plant. However, the ESP site suitability  
15 determination requires the consideration of the  
16 environmental impacts from construction operation at  
17 the proposed and alternative sites.

18 Therefore, the staff prepared an  
19 Environmental Impact Statement, or EIS, for the Clinch  
20 River Nuclear Site ESP application. The EIS was  
21 prepared in accordance with the National Environmental  
22 Policy Act of 1969, or NEPA, and 10 CFR Part 51.

23 The U.S. Army Corps of Engineers Nashville  
24 District, or the Corps, participated with the staff as  
25 a cooperating agency in preparing the EIS under the

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1 terms of a Memorandum of Understanding between the NRC  
2 and the Corps for the review of nuclear power plant  
3 applications.

4 As a member of the environmental review  
5 team, the Corps participated in site visits and in the  
6 development of the draft EIS and final EIS.

7 Next slide, please. This diagram outlines  
8 the environmental review process for preparing an EIS  
9 for an early site permit. TVA submitted an  
10 environmental report as part of its ESP application  
11 and subsequently submitted supplemental information  
12 leading up to the docketing of the application.

13 The staff conducted a scoping process,  
14 including a scoping meeting near the site. During the  
15 scoping period, the staff contacted federal, state and  
16 local agencies, along with federal recognized Indian  
17 tribes, to solicit comments.

18 During its preparation of the draft EIS,  
19 the staff received additional information from TVA as  
20 a result of audits and public meetings. The staff  
21 also used independent sources in its analyses.

22 A draft EIS was issued in April 2017 for  
23 a 75 day public comment period. Two public meetings  
24 were also held near the site during the comment  
25 period.

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1           The staff also met with tribes and other  
2 federal and local agencies regarding their comments  
3 and questions on the draft EIS. Over 2,500 letters  
4 and emails containing comments were received on the  
5 draft EIS, the vast majority of which were form  
6 letters through the website of two environmental  
7 advocacy groups.

8           Comments on the draft EIS were considered  
9 in preparing the final EIS, which was issued in April  
10 2019. The comments and the responses are included in  
11 Appendix E of the final EIS.

12           As stated in the final EIS, the staff's  
13 recommendation related to the environmental aspects of  
14 the proposed action is that the ESP should be issued.  
15 The staff based its recommendation on the ESP  
16 application and environmental report, consultation  
17 with federal, state, tribal and local agencies, the  
18 review team's independent review, the consideration of  
19 public comments received on the environmental review  
20 and the assessment summarized in the EIS, including  
21 the potential mitigation measures identified in the ER  
22 and the EIS.

23           This recommendation also rests on the  
24 staff determination that none of the alternative sites  
25 assessed as obviously superior to the Clinch River

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1 Nuclear Site.

2 Next slide, please. Per 10 CFR  
3 51.50(b)(2), an environmental report for an early site  
4 permit does not need to include an assessment of the  
5 benefit or cost of the proposed action, including need  
6 for power, or a consideration of alternative energy  
7 sources.

8 As TVA did not address these topics in its  
9 application per 10 CFR 51.75(b), the EIS also did not  
10 address these topics.

11 If a future combined license or  
12 construction permit application references the ESP,  
13 the ER and EIS for that application would address  
14 these topics.

15 Next slide, please. The staff included a  
16 draft summary record of decision as a reference in  
17 SECY-19-0064. This document states the decision being  
18 made, identifies all alternatives considered in  
19 reaching the decision and discusses the preferences  
20 among those alternatives.

21 The draft summary record of decision also  
22 states whether the Commission has taken all  
23 practicable measures within its jurisdiction to avoid  
24 or minimize environmental harm from the alternative  
25 selected.

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1                   Next slide, please. This slide and the  
2 next lists the environmental findings pursuant to 10  
3 CFR 51.105(a) that the Commission must make to support  
4 the issuance of the ESP for the Clinch River Nuclear  
5 Site.

6                   The staff believes that the scope of the  
7 environmental review, the methods used to conduct the  
8 review and the conclusions reached in the EIS are  
9 sufficient to support a positive Commission  
10 determination regarding these findings.

11                   For the first finding, in accordance with  
12 NEPA Section 1022A, the staff's environmental review  
13 uses systematic interdisciplinary approach to  
14 integrate information from many fields, including the  
15 natural and social sciences as well as the  
16 environmental sciences.

17                   In accordance with NEPA Section 1022C, the  
18 EIS for the Clinch River Nuclear Site ESP addresses  
19 the environmental impact of the proposed action, any  
20 unavoidable adverse environmental affects,  
21 alternatives to the proposed action, the relationship  
22 between local, short-term uses of the environment and  
23 the maintenance and enhancement of long-term  
24 productivity and any irreversible and irretrievable  
25 commitments of resources that would be involved in the

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1 proposed action should it be implemented.

2 Also, as documented in correspondence  
3 presented in Appendix F of the EIS, the staff met the  
4 requirement in NEPA 1022C that it consult with and  
5 obtain comments from other federal agencies with  
6 jurisdiction by law or special expertise.

7 In accordance with NEPA Section 1022E, the  
8 staff concludes that Chapter 9 of the final EIS  
9 demonstrates that the staff adequately considered  
10 alternatives to the proposed action. The alternatives  
11 considered in the EIS include the no action  
12 alternative, site alternatives and system design  
13 alternatives.

14 For all these reasons, the staff's review  
15 also comports with NRC's requirements in Subpart A of  
16 10 CFR Part 51. The staff concludes that the  
17 environmental findings in the EIS constitute the hard  
18 look required by NEPA and have reasonable support in  
19 logic and fact.

20 For the second required finding by 10 CFR  
21 51.105(a), the staff considered the final balance  
22 among conflicting factors for site suitability in the  
23 staff's comparison of alternative sites.

24 The staff found that none of the  
25 alternative sites considered were environmentally

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1 preferable to the Clinch River Nuclear Site.

2 Next slide, please. As previously stated,  
3 TVA was not required to, and did not, address the  
4 balance of benefits and costs in the ESP application.  
5 Accordingly, the EIS also did not address the balance  
6 of benefits and costs as provided by 10 CFR 51.75(b).

7 Should the NRC issue this ESP for the  
8 Clinch River Nuclear Site and a construction permit or  
9 combined license application that references the ESP  
10 is submitted, these matters will be considered in the  
11 EIS prepared in connection with that application.

12 In the final EIS, the staff considered  
13 reasonable alternatives to the proposed action and  
14 determined that none were obviously superior. Based  
15 on that analysis, the staff recommends that the ESP be  
16 issued.

17 For the fourth finding under 10 CFR  
18 51.105(a), the staff believes that the Commission will  
19 be able to find after this hearing that the NEPA  
20 review performed by the staff has been adequate.

21 As will be discussed in more detail during  
22 the environmental panel later today, the staff  
23 performed a thorough and complete environmental  
24 review, sufficient to meet the requirements of NEPA  
25 and adequate to inform the Commission's action on the

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1 request for the ESP.

2 Thank you. And I will now return the  
3 presentation back to Fred.

4 MR. BROWN: Thank you, Anna. Slide 19,  
5 please. During this hearing, the staff will be  
6 presenting information on the issues listed in this  
7 table.

8 During the safety panel, the staff will  
9 present an overview of its safety review and discuss  
10 the TVA EPZ sizing methodology and associated  
11 exemptions.

12 The environmental panel will provide a  
13 summary of the process for developing the EIS, the  
14 identification and analysis of alternatives, a summary  
15 of the environmental impacts at the preferred site and  
16 the conclusions and recommendations in the final EIS.

17 This concludes the staff's opening  
18 remarks, and we are prepared to respond to any  
19 questions. Thank you.

20 CHAIRMAN SVINICKI: Mr. Brown, Ms.  
21 Bradford, thank you very much for your presentations.  
22 We will begin the questions for this panel with  
23 Commissioner Baran.

24 COMMISSIONER BARAN: Thank you both. I'll  
25 continue to reserve my time for the subsequent panels

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1 you mentioned. Thanks.

2 CHAIRMAN SVINICKI: Thank you. And with  
3 that, we recognize Commissioner Caputo.

4 COMMISSIONER CAPUTO: And I just have one  
5 quick question. TVA opted to defer consideration for  
6 the need for power in evaluation of energy  
7 alternatives. Since they haven't stated an intent to  
8 pursue a license immediately or construction in the  
9 near-term, this is unusual to defer the consideration  
10 of need for power and energy alternatives given that  
11 those may change with the passage of time. Correct?

12 MS. BRADFORD: I'm sorry. Did you ask if  
13 it is unusual?

14 COMMISSIONER CAPUTO: Unusual.

15 MS. BRADFORD: It's not unusual for an ESP  
16 applicant that doesn't plan to build right away. It's  
17 not unusual --

18 COMMISSIONER CAPUTO: Great.

19 MS. BRADFORD: -- to defer a  
20 consideration of those issues to COL states.

21 COMMISSIONER CAPUTO: Okay. Thank you.  
22 That was my only question.

23 CHAIRMAN SVINICKI: Thank you.  
24 Commissioner Wright.

25 COMMISSIONER WRIGHT: Good morning. Thank

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1 you for your presentations. In the first panel you  
2 heard me ask about, you know, the efficiencies that  
3 possibly could have been gained by looking at the  
4 previous ESPs that have been issued.

5 Did you do the same thing? Did you go  
6 through that process? And if you did, did you find  
7 some efficiencies that were gained and could you share  
8 them with me?

9 MS. BRADFORD: Sure. I think one thing  
10 was that we had several staff that had previously  
11 worked on ESPs that also worked on this ESP. So  
12 obviously they brought that experience and they were  
13 familiar with what we had done in previous ESPs.

14 And we were able to say, hey, here's one  
15 way we can do something different or one way that  
16 worked really well last time or didn't work so well  
17 and apply that now. So I think definitely just in a  
18 practical way we learned from that.

19 We're also going to do a lessons learned  
20 review of this ESP. Once it's completed, actually we  
21 were waiting until after this mandatory hearing to see  
22 how everything goes so we can go back and look at the  
23 entire process and see -- make sure we understand what  
24 went well, what didn't, why were we able to be a  
25 little bit ahead of schedule and make sure that that's

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1 documented for future reviews.

2 COMMISSIONER WRIGHT: Thank you. Fred, by  
3 the time -- if this ESP is issued and then they apply  
4 for a construction permit or whatever, the merger will  
5 have happened. And if that does happen, do you  
6 anticipate any knowledge management issues or internal  
7 challenges due to the merger for staffing or anything  
8 like that?

9 MR. BROWN: So in relation to the general  
10 turnover and staff, generational turnover, we do have  
11 a challenge in front of us. And we've worked to  
12 mitigate that.

13 The leadership team that would be  
14 responsible for this functional area will have a great  
15 deal of continuity, Robert Taylor, Anna Bradford and  
16 at the branch chief level and the new Center of  
17 Expertise for Environmental Reviews for the  
18 environmental part. And it's part of what the  
19 transition team, the reunification team, is working on  
20 for continuity of individual staff reviewer and  
21 supervisor work in the future.

22 So it is a challenge, and we believe we're  
23 mitigating that challenge effectively.

24 COMMISSIONER WRIGHT: Okay. Thank you.

25 CHAIRMAN SVINICKI: Well, I have a couple

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1 of questions, but Fred, I wanted to reflect on your  
2 long involvement in many of the new reactor activities  
3 under Part 52, which is new in an NRC sense, kind of  
4 a new regulation. And there are certain provisions  
5 that have not even yet gone through our proof of  
6 concept.

7 Of course, the Vogtle construction, the  
8 construction of Vogtle Units 3 and 4 continues. But  
9 there are some regulatory provisions that we will be  
10 doing for the first time even though this regulation  
11 has been on our books for quite some time. And I know  
12 you've had a very direct and substantive involvement  
13 over the last years in working through a lot of this.

14 As a result, I think you and I may have a  
15 special place in our heart for what we call the Part  
16 52 lessons learned activity and the rulemaking there.  
17 I know that Anna responded that there will be a  
18 lessons learned specifically for this Clint River ESP  
19 review.

20 But there is a broader set of lessons  
21 learned as we move through Part 52 that the Agency, I  
22 make no presumption about activity levels in the  
23 future, but our culture is that when we learn lessons  
24 and we want to manage that knowledge for our  
25 successors and make certain that if we learned

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1 fundamental things about that regulation that could  
2 improve upon it, that we want to put those in place.

3 This wasn't an SMR related technology.  
4 Were there any uniquenesses, Fred, that you think came  
5 out of this Clint River ESP review that would have a  
6 unique place in the Part 52 lessons learned rulemaking  
7 that we may ultimately do or was it basically  
8 validation of the same fortification of the same  
9 issues and lessons we've been learning?

10 MR. BROWN: So I do think in terms of the  
11 Part 52 rulemaking, we did solicit from TVA their  
12 prospectus on lessons learned.

13 And the Commission will soon receive a  
14 paper that lays out all of the proposed changes to  
15 Part 50 and 52, which should, in my view, reflect  
16 improved opportunity to provide reasonable assurance  
17 of adequate protection in an open, transparent,  
18 predictable, reliable way with clarity of expectation.  
19 The Commission should get that in the very near-term.

20 I do also think that in terms of the self-  
21 assessment that Anna mentioned that you referred to,  
22 we, as an office, fundamentally need to look at in  
23 2007 when we set up systems for the number of draft  
24 safety evaluations that we prepare, how we prepare  
25 them, how we review them, how we engage with ACRS, it

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1 was done in an environment where there would be 22  
2 concurrent projects.

3 And the fidelity of not missing anything  
4 was critically important. I don't believe we focused  
5 on efficiency. And I believe we have an opportunity  
6 with this lesson learned to re-evaluate our internal  
7 processes as well as the rules that govern these  
8 reviews going forward. And that should benefit any  
9 future COL applicant under Part 52 or CPL applicant.

10 CHAIRMAN SVINICKI: Well, thank you for  
11 that. I look forward to any of the staff's  
12 recommendations in that regard. And I thank you for  
13 the care and attention.

14 You know, I think there are things we do  
15 in the course of our career that we do for posterity  
16 in our successors. So I appreciate, Fred, your and  
17 your whole team's focus on this issue of making sure  
18 that we take the opportunity to enshrine the knowledge  
19 we have not just in the rulemaking as I proposed but  
20 in office processes and procedures. So thank you for  
21 that.

22 And with that, I thank this panel. And we  
23 are scheduled now for a break. We're a little bit  
24 ahead of schedule so I am going to use my discretion  
25 to give us 10 whole minutes.

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1           We will reconvene at 10:20. There's going  
2 to be excitement on my side of the table. So please  
3 be back in the room prepared at about 20 minutes  
4 after. Thank you.

5           (Whereupon, the above-entitled matter went  
6 off the record at 10:11 a.m. and resumed at 10:23  
7 a.m.)

8           CHAIRMAN SVINICKI: Well, thank you  
9 everyone for reconvening so promptly. I call the  
10 hearing back to order.

11           Now we will conduct what we are terming  
12 the safety panel. The parties will address relevant  
13 sections of the application and the final safety  
14 evaluation report.

15           With particular focus on the proposed  
16 exemptions from certain emergency planning  
17 requirements and the risk informed dose-based and  
18 consequence-oriented methodology for determining the  
19 appropriate plume exposure pathway emergency planning  
20 zone at the Clinch River site.

21           In terms of the witnesses for this panel,  
22 we will begin with the TVA witnesses. I would ask you  
23 to proceed.

24           And prior to presenting, please introduce  
25 yourself. And particularly, if you have not presented

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1 on an earlier panel. So, would the TVA panel please  
2 proceed?

3 MS. MANOHARAN: Good morning, Chairman,  
4 and Commissioners. I'm Archie Manoharan, I'm TVA  
5 licensing engineer.

6 Today Alex Young and I'll be presenting  
7 the emergency preparedness information in the ESP for  
8 the Clinch River site.

9 Next slide please. Three parts of the  
10 ESPA describe the emergency preparedness approach for  
11 SMR at the Clinch River site.

12 Slide 18 shows these three parts in the  
13 structure of my presentation today. Starting with the  
14 big picture, Part 5 of the application describes two  
15 distinct major features emergency plans.

16 Part 5A describes the major features  
17 emergency plan for a site boundary plume exposure  
18 pathway emergency planning zone. And Part 5B  
19 describes the major features emergency plan for a two-  
20 mile plume exposure pathway emergency planning zone.

21 As a reactor technology has not yet been  
22 selected, only major features emergency plan, with the  
23 information available during the ESP development have  
24 been described.

25 TVA will include SMR design specific

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1 information in a future application to create a  
2 complete and integrated emergency plan.

3 TVA developed two emergency plans for two  
4 reasons. First, TVA expects that the four SMR designs  
5 that inform the plant parameter envelope, PPE, would  
6 meet the applicable dose criteria requirements at the  
7 two-mile distance.

8 And at least one design is expected to  
9 meet the applicable dose criteria requirements at the  
10 site boundary distance.

11 Second, to optimize licensing review and  
12 provide potential options for a future application.  
13 Both plans are based on the generic part of the TVA  
14 nuclear power radiological emergency plan, which is  
15 approved by the NRC and currently used for the TVA  
16 nuclear fleet.

17 Once TVA selects a reactor technology, it  
18 will evaluate the appropriate EPZ size based on the  
19 distance at which the regulatory dose criteria are  
20 met. If the dose criteria are met at the site  
21 boundary, the information in Part 5A will be used to  
22 develop a complete and integrated emergency plan.

23 If the dose criteria are met at two-mile  
24 EPZ distance, then the information in Part 5B will be  
25 used to develop a complete and integrated emergency

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1 plan.

2 It is important to note that the ESPA does  
3 not determine a final EPZ size for the Clinch River  
4 site. This information will be provided in a future  
5 application.

6 TVA submitted a set of exemption requests  
7 in the ESPA as the emergency plans in Part 5 deviate  
8 from the NRCs current ten-mile emergency planning zone  
9 requirements. These exemption requests are described  
10 in Part 6 of the application.

11 One set of exemption requests support the  
12 site boundary information in Part 5A. And the others  
13 support two-mile information in Part 5B.

14 Part 2 of the ESPA describes and  
15 establishes the technical basis for the emergency  
16 preparedness approach. In section 13.3, a dose base  
17 consequence-oriented methodology for determining the  
18 appropriate size of a plume exposure pathway EPZ size  
19 for SMR is described.

20 Next slide please. TVA is committed to  
21 protecting public safety and health. For the Clinch  
22 River site, TVA will maintain agreements with  
23 surrounding emergency response agencies and support  
24 organizations and continue to work with state and  
25 local governments and support organizations to ensure

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1 the emergency preparedness capabilities are  
2 commensurate with the potential risk to the public.

3 During the ESPA development, TVA reached  
4 out to the local counties and cities to discuss the  
5 unique emergency preparedness approach. As a result  
6 of these numerous discussions, letters of support from  
7 the state of Tennessee, Roane County, Anderson County  
8 and city of Oak Ridge were received. These letters  
9 were subsequently submitted to the NRC to support the  
10 review of the ESPA.

11 Next slide please. The figure on Slide 20  
12 shows, in red, the site boundary EPZ for the Clinch  
13 River site.

14 If TVA selects SMR technology that meets  
15 the regulatory dose criteria at the site boundary  
16 distance, a future application would use information  
17 in Part 5A to develop a complete and integrated  
18 emergency plan for NRC's review.

19 Next slide please. The figure on Slide 21  
20 shows the exact size and configuration of the two-mile  
21 EPZ for Clinch River site.

22 The blue circle shows a two-mile radius  
23 from the center of the site and the red is the actual  
24 two-mile EPZ boundary. TVA developed this boundary  
25 based on local emergency needs and capabilities.

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1           It accounts for conditions such as  
2 demography, topography, planned characteristics and  
3 access routes. It TVA selects an SMR technology that  
4 meets the regulatory dose criteria at the two-mile  
5 distance, a future application would use part 5B  
6 information to develop a complete and integrated plan  
7 for the NRC's review.

8           Next slide please. As noted earlier, Part  
9 6 of the ESPA describes TVA's EPZ related exemption  
10 requests. For the two-mile EPZ emergency plan, the  
11 approach is similar to a ten-mile EPZ in that we  
12 recognize a formal offsite plants and support from  
13 offsite response organizations will be required.

14           Therefore, only a request to deviate from  
15 the ten-mile EPZ size is being requested. For the  
16 site boundary EPZ, in addition to the request to  
17 deviate from the ten-mile EPZ size requirement,  
18 exemptions from various elements of a formal offsite  
19 emergency plan, requirements for evacuation time  
20 estimates and certain elements of offsite exercises  
21 are being requested.

22           If these exemption requests are granted,  
23 they could be used in a future application referencing  
24 a specific SMR technology, as long as the selected  
25 technology demonstrates the regulatory dose criteria

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1 are met at site boundary or two-mile distance.

2 In either case, TVA would confirm that  
3 there would be no radiological consequences outside  
4 the EPZ from any credible events in excess of the dose  
5 criteria consistent with the risk informed dose-based  
6 methodology.

7 Next slide please. Part 2 of the ESPA  
8 describes a risk informed dose-based consequence-  
9 oriented methodology for determining an appropriate  
10 plume exposure pathway EPZ size.

11 The approach takes into consideration  
12 various SMR safety and design advancements. For  
13 example, SMR, as compared to large light water  
14 reactors, have smaller cores, their source terms are  
15 expected to be several magnitudes lower, which results  
16 in reduced accident consequences.

17 SMRs are also expected to have several  
18 magnitudes reduced, likelihood of accidents and much  
19 slower accident progressions. Which gives more time  
20 to take mitigative actions if needed.

21 The dose-based methodology is consistent  
22 with a NUREG-0396 approach. And if approved, will be  
23 implemented in a future application to determine the  
24 plume exposure pathway EPZ size for the Clinch River  
25 site.

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1           Similar to the analysis in NUREG-0396, the  
2 methodology determines the EPZ size based on dose  
3 consequences analysis for a spectrum of potential  
4 accidents, including design basis and severe  
5 accidents. And has the same dose criteria as NUREG-  
6 0396.

7           I will now turn over the presentation to  
8 Alex, who will discuss the technical criteria of the  
9 EPZ sizing methodology, and the example analysis  
10 conducted to demonstrate the methodology.

11           MR. YOUNG: Thank you, Archie. Next slide  
12 please. My name is Alex Young, design engineer for  
13 Tennessee Valley Authority.

14           The EPZ sizing methodology is broken down  
15 into three technical criteria. The first refer to as  
16 Criteria Alpha. Is that the EPZ should encompass  
17 those areas in which projected dose from design basis  
18 accidents could exceed the EPA early phase protective  
19 action guide of one rem TEDE.

20           The second criteria, referred to as  
21 Criteria B, is that the EPZ should encompass those  
22 areas in which consequences of less severe core melt  
23 accidents could exceed the EPA early-phase PAG. Less  
24 severe core melt accidents include intact containment,  
25 beyond design basis accident scenarios with a main

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1 core damage frequency greater than one times ten to  
2 the negative six or one in one million per reactor  
3 year.

4 The third criteria, referred to as  
5 Criteria Charlie, is that the EPZ should be of  
6 sufficient size to provide for substantial reduction  
7 and early severe health effects in the event of more  
8 severe core melt accidents. More severe core melt  
9 accident scenarios include postulated containment  
10 failure or bypass accidents, with a main core damage  
11 frequency greater than one times ten to the negative  
12 seventh or one in ten million per reactor year.

13 To provide insurance of substantial  
14 reduction early health defects, the conditional  
15 probability of those exceeding 200 rem whole body for  
16 more severe core melt accidents, is less than one  
17 times ten to the negative third or one in 1,000.

18 Next slide please. To respond to staff  
19 RAIs, an example analysis demonstrating the technical  
20 criteria was developed. The example analysis is a  
21 design specific analysis based on the potential  
22 deployment of a NuScale power plant at the Clinch  
23 River site.

24 This example analysis demonstrates that  
25 TVA can implement the risk informed dose-based

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1 consequence-oriented methodology used in the ESPA and  
2 that TVA anticipates at least one design considered  
3 within the PPE meets the criteria for both EPA early  
4 phase PAGs and the substantial reduction early health  
5 effects with margin.

6 Next slide please. Here on this slide  
7 I'll briefly discuss the EPZ plant parameter. As a  
8 result of staff RAIs and audits, a need for a plant  
9 parameter was communicated to ensure the exemption  
10 requests are applied appropriately in the future.

11 This plant parameter is similar to those  
12 documented in the Chapter 2 of the site safety  
13 analysis report. In that, in a future application, it  
14 will have to be evaluated to ensure that the selected  
15 design is bounded by the plant parameters established  
16 in the ESPA.

17 In a future application, to apply the EPZ  
18 exemptions, TVA would compare source terms from  
19 selected SMR designs to those established in the EPZ  
20 plant parameter.

21 To establish an EPZ plant parameter, TVA  
22 developed a composite four-day atmospheric release  
23 source term with margin. This allowed TVA to account  
24 for various SMR designs and accident types and the  
25 total four-day release that the EPA early phase PAG

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1 doses are based on. Back to Archie.

2 MS. MANOHARAN: Thank you, Alex. Next  
3 slide please.

4 This last slide is an overview of the  
5 emergency preparedness information described in TVA's  
6 ESPA for the Clinch River site. In Part 5, TVA  
7 requests that NRC approve the major features emergency  
8 plan for site boundary and two-mile EPZ.

9 A future application would include the  
10 remaining elements of either the site boundary or two-  
11 mile EPZ to develop a complete and integrated  
12 emergency plan. If the selected technology does not  
13 meet the dose criteria at site boundary or two-mile,  
14 then TVA would need to develop a new emergency plan.

15 Part 6 requests the NRC grant the  
16 exemptions to support the site boundary and two-mile  
17 EPZ major features emergency plan.

18 Part 2 describes TVA's risk informed dose-  
19 based methodology for determining the appropriate  
20 plume exposure pathway EPZ size, which takes into  
21 account the safety and design advancements of the SMR  
22 designs considered within the PPE.

23 TVA seeks NRC's approval to use this  
24 methodology for a design specific implementation in a  
25 future application. That concludes TVA's safety panel

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1 presentation. Thank you for your time today.

2 CHAIRMAN SVINICKI: Thank you very much to  
3 the TVA witnesses. I will now call the NRC Staff  
4 safety panel witnesses to please occupy the seats  
5 behind their name cards.

6 And proceed, when they are ready, in the  
7 order that they've agreed to. And again, this is just  
8 the uniqueness of the room setup that they have to be  
9 called mid-panel like this, but thank you.

10 MR. FETTER: Slide 2 please. Good  
11 morning, Chairman and Commissioners. My name is Allen  
12 Fetter, senior project manager. And with me is Ms.  
13 Mallecia Sutton, also senior project manager from the  
14 Office of New Reactors.

15 With us is Bruce Musico, senior emergency  
16 preparedness specialist from the Office of Nuclear  
17 Security and Incident Response, or NSIR.

18 Michelle Hart, senior reactor engineer  
19 from the Office of New Reactors.

20 And Mike Scott, the director of the  
21 division of preparedness and response in NSIR.

22 We will briefly describe the ESP review  
23 process, including the concept of plant parameter  
24 envelope, or PPE, and summarize the results of the  
25 Staff safety review.

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1           We also discuss the staff's review of  
2 emergency planning, plume exposure pathway, EPZ sizing  
3 methodology and the associated exemption request.

4           Slide 3 please. As discussed in the  
5 overview panel, the Applicant used a PPE to bound the  
6 characteristics of the plant that might be located at  
7 the site. The Staff used this information to support  
8 the safety review.

9           TVA's PPE is based on construction and  
10 operation of two or more small module reactors, or  
11 SMRs, at the Clinch River Nuclear site. Where a  
12 single unit may not exceed 800 megawatts thermal for  
13 the reactor core. And the total capacity for the site  
14 is not to exceed 2,420 megawatts thermal or 800  
15 megawatts electric.

16           Slide 4 please. In the development of the  
17 PPE, an applicant typically draws data from a number  
18 of plant technologies under consideration to construct  
19 the bounding envelope. It is important to note that  
20 when issuing the permit, the NRC approves the PPE  
21 rather than a specific technology that the PPE was  
22 drawn from.

23           As such, any plant technology that can be  
24 demonstrated to be bounded by the PPE is suitable for  
25 use in a combined license or construction permit

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1 application. In TVA's case, they used preliminary  
2 information. The four SMR designs are indicated on  
3 this slide. Or the slide that was up there.

4 Slide 5 please. A combined license or  
5 construction permit application then incorporates the  
6 ESP by reference, must identify the chosen SMR  
7 technology for the Clinch River Nuclear site, address  
8 COL action items and permit conditions, and provide  
9 other information necessary to support combined  
10 license or construction permit issuance.

11 Slide 6 please. The Staff's safety review  
12 included five audits and one inspection, 12 requests  
13 for additional information comprising 50 questions.

14 The final safety evaluation report  
15 included 41 COL action items and seven permit  
16 conditions.

17 Slide 7 please. The Staff reviewed the  
18 following technical areas, seismology, geology,  
19 hydrology, meteorology, geography, demography, which  
20 includes population distribution, site hazards  
21 evaluation, radiological effluent releases,  
22 radiological dose consequences, emergency  
23 preparedness, security plan feasibility and quality  
24 assurance.

25 I will now turn the presentation over to

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1 Ms. Mallecia Sutton.

2 MS. SUTTON: Thank you, Allen. Good  
3 morning. My name is Mallecia Sutton. As Allen said,  
4 I'm a senior project manager in the Office of New  
5 Reactors.

6 The Staff proposes to include seven permit  
7 conditions that would require actions from the  
8 combined license construction permit applicant  
9 referencing the EPS.

10 Permit conditions one and two relate to  
11 potential facility hazards. Permit conditions three  
12 and four relates to site investigation and improvement  
13 activities associated with the excavation and safety  
14 related structures.

15 Permit condition five and six relate to  
16 emergency planning. Permit condition seven provides  
17 that references in the ESP SSAR, to the terms combined  
18 license, combined license applicant or combined  
19 license application, will include and apply to a  
20 construction permit, construction permit applicant and  
21 construction permit application respectively, unless  
22 the content indicates otherwise.

23 Next slide please. Slide 9. Based upon  
24 the Staff review, the Staff made the following  
25 conclusions.

1 First, the ESP application satisfies  
2 applicable regulations. Second, issuance of the ESP  
3 will not be inimical to the common defense and  
4 security to the public health and safety.

5 Next slide please. Slide 10. Third, two  
6 or more SMRs can be safely cited on the Clinch River  
7 Nuclear site if they, one, have design characteristics  
8 following within the design parameters for the site.

9 Two, have site parameters following within  
10 the site characteristics for the site. And three,  
11 meet the ESP terms and conditions.

12 Next, Bruce Musico, Michelle Hart and I  
13 will discuss the staff's review of the emergency  
14 planning, the plume exposure path rate, EPZ size and  
15 methodology and associate exemptions request.

16 Michael Scott will discuss our  
17 interactions with the Federal Emergency Management  
18 Agency, FEMA.

19 Next slide please. The TVA ESP  
20 application is unique in its approach to emergency  
21 planning. In that it proposes a methodology to  
22 determine the appropriate plume explosion path for EPZ  
23 for a particular site.

24 TVA is risk informed, dose-based and  
25 consequence-oriented approach is consistent with the

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1 current emergency planning framework. The NRC is not  
2 being asked to approve a specific EPZ size at this  
3 time.

4 A combined license or construction permit  
5 applicant referencing the ESP were used in methodology  
6 to determine the appropriate plume explosion pathway  
7 EPZ size.

8 There are also exemption requests  
9 associated with the TVA's proposal to deviate from the  
10 current ten-mile plume explosion pathway EPZ  
11 requirement.

12 In the safety evaluation report, the Staff  
13 found that TVA's methodology and associated exemption  
14 requests are acceptable. Now, we'll turn the  
15 presentation to Bruce.

16 MR. MUSICO: Thank you. Good morning. My  
17 name is Bruce Musico and I'm a senior emergency  
18 preparedness specialist in NSIR. I and Michelle Hart  
19 reviewed the emergency planning information in the ESP  
20 application.

21 Can I have Slide 12 please. This slide  
22 shows the three key areas of review associated with  
23 emergency planning. They include, first, the two  
24 major features, emergency plans that TVA requested us  
25 to review and approve.

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1           Second, the 25 exemptions, which are  
2 associated with the two major features, emergency  
3 plans, and third, a plume exposure pathway EPZ sizing  
4 methodology, which would be used in the combined  
5 license or construction permit application to  
6 determine the size of the EPZ for the Clinch River  
7 Nuclear site.

8           Slide 13 please. Part 5 of the ESP  
9 application included two major features and emergency  
10 plans. Both of which consists of limit aspects of the  
11 proposed onsite emergency plan for the Clinch River  
12 Nuclear site.

13           The first plan, ESP application Part 5A,  
14 reflects the site boundary plume exposure pathway EPZ.  
15 While the second plan, EPZ application 5B reflects a  
16 two-mile plume exposure pathway EPZ.

17           The two-miles is measured from the center  
18 point of the site. The two-mile EPZ emergency plan  
19 also includes an evacuation time estimate, or ETE.  
20 Which characterizes evacuation from the two-mile EPZ  
21 area surrounding the site.

22           A combined license or a construction  
23 permit applicant referencing the ESP would use one of  
24 these major features emergency plans. The selection  
25 of which depends on the outcome of the combined

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1 license or construction permit applicants EPZ sizing  
2 analysis.

3 Slide 14 please. In Part 6 of the ESP  
4 application, TVA provided two sets of requested  
5 exemptions from NRC's emergency planning requirements.

6 These exemptions applied to both major  
7 features and emergency plans and reflected the  
8 associated plume exposure pathway EPZs.

9 For the major feature emergency plan that  
10 could be used in connection with the two-mile plume  
11 exposure pathway EPZ, TVA requested only two  
12 exemptions from the requirements in 10 CFR 50.33(g)  
13 and 10 CFR 50.47(c)(2), that the plume exposure  
14 pathway EPZ, for nuclear power plants, consist of an  
15 area about ten-miles in radius. All of the remaining  
16 EPA requirements for a nuclear reactor site would  
17 still apply to it.

18 For the major feature emergency plan that  
19 could be used in connection with the site boundary  
20 plume exposure pathway EPZ, TVA requested 25  
21 exemptions from NRC EPA requirements. These include  
22 two exemptions from the ten-mile plume exposure  
23 pathway EPZ requirement in, again, 10 CFR 50.33(g) and  
24 50.47(c)(2), along with 23 additional exemptions from  
25 various parts of 10 CFR 50.47 and Appendix E, to 10

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1 CFR part 50.

2 These additional exemptions deal with such  
3 offsite emergency planning areas as state and local  
4 emergency plans, public alert and notification and  
5 evacuation time estimate and offsite emergency  
6 preparedness exercises.

7 Acceptability of the requested exemptions  
8 depends on the acceptability of TVA's proposed plume  
9 exposure pathway EPZ size methodology. Michelle Hart  
10 will now address the Staff's review of this  
11 methodology.

12 MS. HART: Next slide please. Thank you,  
13 Bruce. Good morning, my name is Michelle Hart and I'm  
14 a senior reactor engineer in the Office of New  
15 Reactors.

16 I evaluated TVA's proposed methodology for  
17 EPZ sizing for the plume exposure pathway. Which I  
18 will call the EPZ sizing methodology for short.

19 In the following presentation I will  
20 discuss two related topics. First, TVA's EPZ sizing  
21 methodology and second, a related permit condition.

22 For the EPZ sizing methodology I will  
23 describe general features of the analysis method and  
24 the supporting technical criteria. Then I will  
25 describe the dose criteria used to determine the plume

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1 exposure pathway EPZ size. And finally, I will  
2 describe the basis for the Staff's review and finding.

3 Next slide please. Slide 16. The Staff  
4 has not previously evaluated a plume exposure pathway  
5 EPZ sizing methodology for a specific power reactor  
6 site as a part of a licensing application.

7 While there is no applicable guidance for  
8 EPZ sizing on a site-by-site basis, there is guidance  
9 on performing accident consequence analysis that is  
10 generally applicable. Such as Reg Guide 1.183 for  
11 design basis accident dose analyses.

12 To help in its determination of the  
13 proposed methodologies acceptability, the Staff looked  
14 at the technical basis for the current regulations in  
15 10 CFR Part 50 that require a plume exposure pathway  
16 EPZ of about ten-miles in radius for power reactors.

17 This technical basis is provided in staff  
18 technical report NUREG-0396, which describes the  
19 considerations used, including analysis of the  
20 potential offsite consequences of a range of accidents  
21 for large light water reactors.

22 The general concept that SMRs may propose  
23 a site-specific EPZ size has been previously approved  
24 by the Commission. The Staff's intent to develop a  
25 technology neutral dose-based consequence-oriented

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1 emergency planning and preparedness framework for  
2 SMRs, including EPZ size, was described in SECY  
3 110152.

4 The Staff requirements memorandum for SECY  
5 150077, which provided Commission approval for the  
6 Staff to initiate a rulemaking on emergency planning  
7 for SMRs and other new technologies, directed that the  
8 Staff be prepared to the adapt of an approach, to  
9 EPZs, for SMRs under existing exemption processes in  
10 parallel with its rulemaking efforts.

11 Next slide please. There are three  
12 technical criteria that TVA use to develop the EPZ  
13 sizing methodology.

14 TVA based these three technical criteria  
15 on the discussion in NUREG-0396. The first criterion  
16 is that the plume exposure pathway, EPZ, should  
17 encompass those areas in which the projected dose from  
18 design basis accidents could exceed the environment  
19 protection agency, or EPA, early phase protective  
20 action guide, or PAG, that would indicate that early  
21 protective actions be taken to protect the public  
22 health and safety.

23 The second criterion is that the plume  
24 exposure pathway, EPZ, should encompass those areas in  
25 which the consequences of less severe core melt

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1 accidents could exceed the EPA early phase PAG.

2 Next slide please. The third criterion is  
3 that the plume exposure pathway, EPZ, should be of  
4 sufficient size to provide for substantial reduction  
5 and early health effects in the event of more severe  
6 core melt accidents.

7 Next slide please. Slide 19. Now I will  
8 describe the steps in TVA'S methodology for  
9 determining the plume exposure pathway EPZ size.

10 TVA'S application describes the  
11 methodology that a combined license or a construction  
12 permit applicant would use, along with the chosen  
13 design specific accident release information, to  
14 provide the technical basis for the final plume  
15 exposure pathway EPZ size, for the Clinch River  
16 Nuclear site.

17 In the first step, the applicant would  
18 select the appropriate site and design specific  
19 accident scenarios to determine the consequences of  
20 accidents. For the evaluation of design basis  
21 accident consequences, the methodology uses the  
22 bounding design basis accident, which is the design  
23 basis accident in either the combined license or  
24 construction permit application, that has a release to  
25 the environment that results in the highest doses at

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1 the exclusionary boundary and low population zone.

2 The site and design specific probabilistic  
3 risk assessment, or PRA, will be used to categorize  
4 the severe accident scenarios by frequency, for use in  
5 the EPZ size determination.

6 The severe accident scenarios are  
7 separated into two categories. The more probable,  
8 less severe core melt accidents within intake  
9 containment are in one category.

10 The less probable, more severe core melt  
11 accidents with postulated containment failure or  
12 bypass, are in the other category.

13 Next slide please. In the second step,  
14 the applicant would determine the source term  
15 radionuclide releases to the atmosphere as a function  
16 of time for the selected accident scenarios.

17 Step 3 is the calculation of dose  
18 consequences at a distance from the plant. And the  
19 final step is to determine the appropriate plume  
20 exposure pathway EPZ size that meets the dose  
21 criteria.

22 I will describe the dose criteria next.

23 Next slide please. Slide 21. The dose  
24 criteria relate to dose to an individual from exposure  
25 to the airborne plume during its passage into

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1 groundshine.

2 As a predictive model, the analysis uses  
3 the average atmospheric dispersion characteristics for  
4 the site. For the design basis accidents and the more  
5 probable less severe core melt accident categories,  
6 the dose criterion is one rem total effective dose  
7 equivalent from an exposure duration of 96 hours.

8 This dose quantity is at the lower end of  
9 the dose range given in the EPA PAG manual as a  
10 protective action guide for such early protective  
11 actions as evacuation and sheltering of the public.

12 For the less probable, more severe core  
13 melt accidents category, those with containment  
14 failure or bypass, the dose criterion used to verified  
15 substantial reduction in early health effects, is that  
16 the conditional probability is less than ten to the  
17 negative three per reactor year of it exceeding an  
18 acute dose of 200 rem whole body from a 24 hour  
19 exposure, beyond the outer boundary of the plume  
20 exposure pathway EPZ.

21 Next slide please. The staff found that  
22 the features of TVA's EPZ sizing methodology are  
23 consistent with the features of the analysis described  
24 in NUREG-0396. Which is the technical basis for the  
25 current ten-mile EPZ size requirement for power

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1 reactors.

2           Similar to what was done in NUREG-0396,  
3 TVA's methodology considers a range of accidents,  
4 performs accident consequence analyses to determine  
5 dose to an individual at distance and then determines  
6 an area outside of which early protective actions are  
7 not likely to be necessary to protect the public from  
8 radiological releases.

9           Finally, TVA's technical criteria are  
10 essentially the same as the criteria used in NUREG-  
11 0396.

12           Next slide please. A plume exposure  
13 pathway, EPZ, determined by the proposed methodology  
14 will maintain the same level of radiation protection  
15 in the environs of the Clinch River Nuclear site. In  
16 other words, dose savings to members of the public.

17           That is provided by the regulatory  
18 requirement of a plume exposure pathway EPZ of about  
19 ten-miles in radius for large light water reactors.  
20 Based on this review, the Staff concludes that TVA's  
21 proposed methodology for determination of a site-  
22 specific plume exposure pathway EPZ size is reasonable  
23 and consistent with the analyses that form the  
24 technical basis for the current regulatory  
25 requirements.

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1           Next slide please. Slide 24. Now I move  
2 to a different but related topic. The permit  
3 condition related to the combined license or  
4 construction permit, applicants use of the requested  
5 emergency planning and exemptions.

6           Permit condition five requires that the  
7 combined license or construction permit applicant to  
8 demonstrate that the design specific accident release  
9 source term used in the EPZ sizing analysis is bounded  
10 by the non-design specific source term developed by  
11 TVA and included in permit condition five.

12           Next slide please. The accident release  
13 source term is a bounding four-day integrated release  
14 that meets TVA's EPZ sizing methodology dose criteria  
15 at the site boundary.

16           The source term for the permit condition  
17 envelops potential SMR designs that may be selected  
18 for the combined license or construction permit  
19 application. This is the same general idea as the ESP  
20 plant parameter envelope for design basis accidents.

21           The combined license or construction  
22 permit applicant must satisfy permit condition five to  
23 use the emergency planning exemptions if granted in  
24 the ESP. Unless a variance is requested and approved.

25           Now I turn the presentation back to Bruce,

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1 to discuss the Staff's review of the exemption  
2 request.

3 MR. MUSICO: Thank you, Michelle. Slide  
4 26 please. The review of the exemption request is  
5 governed by 10 CFR 50.12, which states in part that  
6 the Commission may grant exemptions from the  
7 requirements of the regulations, which are authorized  
8 by law, will not present an undue risk to the public  
9 health and safety and are consistent with the common  
10 defense and security.

11 In addition, the Commission will not  
12 consider granting an exemption unless special  
13 circumstances are present.

14 Slide 27 please. The staff determined  
15 that the request exemptions are not contrary to the  
16 Atomic Energy Act or other legal requirements. The  
17 staff also determined that the requested exemptions  
18 will not present an undue risk to the public health  
19 and safety and are consistent with the common defense  
20 and security.

21 TVA's methodology maintains the same level  
22 of protection that is dose savings, surrounding the  
23 Clinch River Nuclear site as that which currently  
24 exists at the ten-mile plume exposure EPZ, excuse me,  
25 ten-mile plume exposure pathway EPZ for large light

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1 water reactors. Also, the requested exemptions  
2 present no security issues.

3 Slide 28 please. For TVA's requested  
4 exemptions, the applicable special circumstance is in  
5 10 CFR 50.12(a)(2)(ii), which states in part that  
6 application of the regulation in the particular  
7 circumstances is not necessary to achieve the  
8 underlying purpose of the rule.

9 The staff reviewed all of the requested  
10 exemptions against this standard and agrees with TVA  
11 that the special circumstance in 10 CFR  
12 50.12(a)(2)(ii) applies to the requested exemptions.

13 Slide 29 please. As a result of the  
14 detailed review of the requested exemptions, the staff  
15 finds that the establishment of a plume exposure  
16 pathway EPZ, in a combined license or construction  
17 permit application, will maintain the same level of  
18 protection that is dose savings surrounding the Clinch  
19 River Nuclear site, as that which currently exists at  
20 the ten-mile plume exposure pathway EPZ for large  
21 light water reactors.

22 As such, TVA's approach will serve the  
23 same underlying purpose as the current regulations,  
24 with regard to public health and safety. Therefore,  
25 special circumstances are present in all criteria for

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1 the proposed exemptions are satisfied.

2 I will now turn the presentation over to  
3 Michael Scott.

4 MR. SCOTT: Good morning. I'm Mike Scott,  
5 the director of the division of preparedness and  
6 response in NSIR.

7 In that position I am the primary senior  
8 management interface with FEMA's technical hazards  
9 division which is the part of FEMA most closely  
10 involved in consultation in NRC's licensing actions  
11 with potential emergency planning implications.

12 Over the next few slides I will address  
13 the NRC Staffs interactions with FEMA on the Clinch  
14 River ESP application and review. The NRC coordinated  
15 its review of the ESP application with FEMA, pursuant  
16 to the requirements of 10 CFR 52.17 and 52.18. And  
17 the most recent memorandum of understanding between  
18 FEMA and the NRC.

19 Slide 31 please. FEMA's review of the ESP  
20 application was limited because, first, the ESP  
21 application did not include any offsite emergency  
22 plans. Although it did include an evacuation time  
23 estimate for the two-mile plume exposure pathway EPZ  
24 that could be used to support development of those  
25 plans if the two-mile plume exposure pathway EPZ is

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1 justified at the combined license stage.

2 Second, both major features of emergency  
3 plans only address limited aspects of the proposed  
4 onsite emergency plans for the Clinch River Nuclear  
5 site. The limited extent of the areas reviewed in the  
6 ESP application for the emergency plans is permitted  
7 by the major features approached in our regulations.

8 Slide 32 please. In its January 24th,  
9 2018 letter, FEMA provided the NRC its findings  
10 associated with its review of the TVA ESP application.  
11 The findings addressed the two application areas that  
12 required FEMA's review, consisting of first, whether  
13 there are significant impediments to the development  
14 of emergency plan and, second, the major features of  
15 the emergency plan.

16 For the first finding, FEMA stated that it  
17 did not identify any physical characteristics of the  
18 proposed Clinch River Nuclear site that could pose a  
19 significant impediment to the development of emergency  
20 plans. Including evacuation from the proposed two-  
21 mile plume exposure pathway EPZ.

22 Slide 33 please. For the second finding,  
23 FEMA stated that the boundary established for the  
24 proposed two-mile plume exposure pathway EPZ, was  
25 established relative to local emergency response needs

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1 and capabilities, as they are effected by such  
2 conditions as demography, topography, land  
3 characteristics, access routes and jurisdictional  
4 boundaries.

5 FEMA added that it had worked with the  
6 Tennessee emergency management agency to come to this  
7 determination.

8 Slide 34 please. In its January 24th,  
9 2018 letter, FEMA also stated in part that its  
10 findings do not endorse or determine the adequacy of  
11 a proposed two-mile plume exposure pathway EPZ for the  
12 Clinch River site.

13 FEMA stated in its January 28th, and more  
14 recent July 2019 letter, that as the licensing process  
15 moves forward, FEMA looks forward to providing  
16 continued consultative support to the NRC, including  
17 during a future combined license application review.

18 Slide 35 please. Valuing FEMA's  
19 perspective on emergency planning for SMRs and being  
20 aware of some differing views, the NRC Staff suggested  
21 that FEMA provide written comments. They did so in a  
22 letter dated July 8th, 2019.

23 The letter expressed concerns about the  
24 approach to EPZ sizing contained in TVA's ESP  
25 application and accepted by the NRC Staff.

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1 Slide 36 please. The NRC Staff's views on  
2 the concerns expressed by FEMA are provided in the  
3 Staff's responses to questions posed by the  
4 Commission. The Staff also plans to respond to FEMA.

5 The issues raised by FEMA represent  
6 differing perspectives on emergency planning that have  
7 arisen in the last several years and not just on this  
8 licensing action. The Staff has held numerous  
9 interactions with FEMA to attempt to reach accord.

10 Some progress has been made, but some  
11 differences remain. The Staff's differences with FEMA  
12 on this action focus in large part on the degree of  
13 reliance the Staff proposes to place on risk  
14 assessment in support of decision making for emergency  
15 preparedness. And on the extent to which planning  
16 includes worst-case scenarios.

17 The NRC regulations are risk informed, not  
18 focused on the worst conceivable case. Said another  
19 way, the NRC's regulatory framework is founded on  
20 safety objectives that require the risk of nuclear  
21 energy to be very small, not zero.

22 The risk assessment that supports  
23 emergency planning includes a wide spectrum of  
24 initiating scenarios. The dose outcome, and input to  
25 EPZ sizing for human induced events that we evaluate,

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1 is similar to the outcomes of other events.

2 The Staff's approach to the EPZ sizing  
3 review suits the protection to the risk, which factors  
4 in probability as well as consequence. For the TVA  
5 application, the Staff's approach to the EPA sizing  
6 review is consistent with the approach taken when the  
7 EPZ regulations were developed.

8 Slide 37 please. FEMA's letter states  
9 that local authorities must determine offsite  
10 radiological emergency planning requirements.

11 The NRC Staff values and sought the views  
12 of our government partners on this licensing action  
13 and has involved, and will involve, local authorities  
14 on emergency planning in the context of the rules that  
15 govern emergency planning.

16 But EPZ sizing is ultimately based on an  
17 assessment of the nuclear risk. The NRC is tasked  
18 with making such assessments and determining what the  
19 appropriate requirement should be.

20 That said, the NRC Staff does not object  
21 to licensees working with state and local authorities  
22 to develop capabilities beyond those that we require.  
23 FEMA and the NRC Staff disagree on the use of the EPA  
24 PAGs in support of EPZ sizing.

25 The 2017 update to the PAG manual states

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1 "the size of the EPZ is based on the maximum distance  
2 at which a PAG might be exceeded." This is exactly  
3 how the NRC proposes to use the PAGs to determine EPZ  
4 sizing in a risk informed manner.

5 FEMA's letter indicates that FEMA believes  
6 that the NRC Staff assumes a massive immediate and  
7 coordinated federal response absent formal offsite  
8 radiological emergency planning. However, the NRC  
9 Staff doesn't assume a rapid and coordinated response.

10 Rather, it would be highly unlikely that  
11 such a response would be needed for the slowly  
12 developing and relatively low-level hazard posed by  
13 the type of facility that could demonstrate the PAGs  
14 would not be exceeded offsite.

15 A site boundary EPZ, in such  
16 circumstances, is analogous to the approach to  
17 emergency planning for other facilities posing very  
18 small offsite risk, including non-power reactors.

19 To summarize this discussion, the NRC  
20 Staff respects FEMA in their role as our partner in  
21 emergency response. We actively sought their views on  
22 subjects under discussion today.

23 As is clear, we don't agree on the  
24 approach to EPZ sizing. The NRC Staff has considered  
25 FEMA's views carefully, but we believe that the

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1 Staff's conclusions on EPZ sizing, as presented today,  
2 appropriately align the protection to the risk and are  
3 consistent with Commission direction on risk informing  
4 NRC's activities.

5 Slide 38 please. In addition to  
6 discussing these matters extensively with FEMA, and in  
7 addition to public meetings held on the EPS licensing  
8 action, the NRC Staff has reached out to, and sought  
9 views of, numerous stakeholders on EPZ sizing for  
10 SMRs.

11 For example, we held two meetings with the  
12 Tennessee emergency management agency. And we  
13 encourage that agency to share their views by letter,  
14 which they have done.

15 The Staff has also met with a conference  
16 on radiation control program directors, the national  
17 emergency management association and the federal  
18 radiological preparedness coordinating committee, to  
19 inform those organizations of the Staff's work on the  
20 emergency planning subjects presented today and to  
21 hear their views.

22 I will now turn the presentation back to  
23 Mallecia.

24 MS. SUTTON: Thank you, Mike. Next slide  
25 please. If the EPS is issued, the Applicant will have

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1 approval, with conditions, on TVA's plume exposure  
2 pathway for EPZ size methodology, the two major  
3 features emergency plans and 25 request exemptions to  
4 emergency planning requirements.

5 Next slide please. Slide 40. A combined  
6 license of construction permit applicant that  
7 incorporates, by reference, the ESP, must demonstrate  
8 the implementation of TVA's plume exposure pathway for  
9 EPZ size methodology, using the design specific input  
10 for the chosen SMR technology supports either the site  
11 boundary EPZ or the two-mile EPZ. And satisfies the  
12 permit condition for use of the emergency planning  
13 exemptions.

14 In addition, with respect to emergency  
15 planning, the combined license of construction permit  
16 application must address the 16 COL action items, must  
17 satisfy the two permit conditions and must provide any  
18 other emergency planning information necessary for  
19 issuance of the combined license of construction  
20 permit.

21 Next slide please. Slide 41. The Staff  
22 concludes that TVA has presented an acceptable  
23 methodology for determining the size of the plume  
24 exposure path for EPZ, for the Clinch River Nuclear  
25 site because the methodology is consistent with the

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1 technical bases for the current ten-mile plume  
2 exposure pathway for EPZ size requirement for power  
3 reactors.

4 Slide 42 please. The Staff also concludes  
5 that the two major features emergency plans provided  
6 in the ESP application meet the applicable  
7 requirements of 10 CFR 50.47 and Appendix E, to 10 CFR  
8 Part 50.

9 And finally, the Staff concludes that the  
10 exemption request are acceptable because they are  
11 authorized by law, would not present an undue risk to  
12 the public health and safety, are consistent with the  
13 common defense and security and special circumstances  
14 are present.

15 With that, the Staff's presentation for  
16 the safety panel is complete. We're happy to take any  
17 questions you may have. Thank you.

18 CHAIRMAN SVINICKI: Well thank you to the  
19 NRC witnesses on the safety panel. Again, we will  
20 have Commissioner questions now.

21 And I appreciate the NRC witness's  
22 cooperation, if a question is being answered by the  
23 TVA witness directly behind you, if you can help by  
24 shifting to one side or another. And I appreciate  
25 your indulgence in that.

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1                   And we will begin the questions for this  
2 panel with Commissioner Caputo.

3                   COMMISSIONER CAPUTO: Good morning. Thank  
4 you all for being here.

5                   I think the majority of my questions are  
6 probably going to be directed at Michael, and perhaps  
7 Bruce, but I'll start with Michael.

8                   So, you've already stated the emergency  
9 planning zone sizing methodology described in the FSER  
10 uses the same technical criteria and provides the same  
11 level of protection as the ten-mile EPZ does for  
12 existing large light water reactors.

13                  Our Advisory Committee on Reactor  
14 Safeguards, with their significant severe accident  
15 expertise, concurred with these conclusions, correct?

16                  MR. SCOTT: That is correct.

17                  COMMISSIONER CAPUTO: Thank you. And  
18 TVA's methodology uses the same EPZ rational as in  
19 NUREG-0396 based on "a full spectrum of accidents and  
20 corresponding consequences tempered by probability  
21 considerations," correct?

22                  MR. SCOTT: That's also correct.

23                  COMMISSIONER CAPUTO: I'm going to quote  
24 from the Staff's response to one of the pre-hearing  
25 questions. "After September 11th, 2001, the NRC

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1 conducted vulnerability studies that revealed that the  
2 timing and magnitude of releases related to hostile  
3 action would be no more severe than in other accident  
4 sequences considered in the emergency preparedness  
5 basis.

6 For credible attack sequences, the  
7 initiating event may change how the accident starts,  
8 including terrorists, insider threats, cyber, et  
9 cetera, but it does not change the source term, how  
10 fast the fuel melts or potential offsite  
11 consequences."

12 So, the full spectrum of threats is  
13 encompassed in the EP basis by accounting for a range  
14 of accident scenarios, including those with the  
15 shortest timing and the largest magnitude, correct?

16 MR. SCOTT: That's correct.

17 COMMISSIONER CAPUTO: Also, in response to  
18 the pre-hearing questions, the Staff noted, "if a COL  
19 or CP applicant demonstrates that a site boundary  
20 plume exposure pathway EPZ is justified, however, then  
21 the need for offsite actions would be highly  
22 unlikely."

23 And by highly unlikely, we mean an  
24 accident scenario that has a likelihood of less than  
25 a million years, correct?

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1 MR. SCOTT: That's correct.

2 COMMISSIONER CAPUTO: So if a highly  
3 unlikely release of radioactive material, and once  
4 again quoting the Staff, "of a highly unlikely release  
5 of radioactive material occurs, an offsite response is  
6 necessary, the NRC Staff acknowledges that such a  
7 response would occur in the context of an all hazards  
8 framework, consistent with how such a release would  
9 currently be handled for NRC licensees other than  
10 power reactors," correct?

11 MR. SCOTT: That's correct.

12 COMMISSIONER CAPUTO: And, Michael, you  
13 already stated earlier that the NRC did not rely on  
14 offsite response actions from local or federal  
15 response teams in its analysis?

16 MR. SCOTT: That's correct, Commissioner.

17 COMMISSIONER CAPUTO: FEMA's comprehensive  
18 preparedness guide entitled, "developing and  
19 maintaining emergency operations plans states,  
20 planning considers all hazards and threats while  
21 causes of emergencies can vary greatly, many of the  
22 effects do not."

23 The guide also recognizes that while each  
24 hazards characteristics are different, the general  
25 task for conducting an evacuation and shelter

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1 operations are the same.

2 So, to be clear, to the extent that the  
3 NRC would rely on an all hazards approach to planning  
4 would be in the context of accident scenarios with a  
5 likelihood of less than one in a million years and  
6 that the public would be adequately protected existing  
7 emergency response plans, correct?

8 MR. SCOTT: Essentially that's correct.  
9 I'd just like to add that the Staff based its  
10 conclusions on evaluation of the method that the  
11 licensee, or the applicant, proposes with regard to  
12 comparison of the offsite doses with the EPA PAGs.

13 And that, therefore our reasonable  
14 assurance finding, from based on that, and not about  
15 any assumptions about the effectiveness of all hazards  
16 planning.

17 COMMISSIONER CAPUTO: Okay.

18 MR. SCOTT: I just want to make sure  
19 that's clear.

20 COMMISSIONER CAPUTO: Okay, thank you. In  
21 response, once again, to pre-hearing questions, the  
22 Staff provided some insights on the history of the EPZ  
23 concept.

24 "The EPZ concept was developed in response  
25 to a request by the conference of radiation control

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1 program directors in 1976 to establish bounds on  
2 planning so that offsite response organizations could  
3 understand the extent of necessary planning for cases  
4 where doses exceed the protection action guides, and  
5 protective actions are thus required.

6 If the offsite doses do not exceed the  
7 PAGs, then no specific protective actions would be  
8 necessary and offsite planning would therefore not be  
9 necessary. The NRC and EPA both support this use of  
10 the PAG method as a threshold, as documented by the  
11 joint NRC EPA taskforce in the NRCs NUREG-0396 and  
12 EPA's companion document 520. As well as in the 1992  
13 EPA manual of protective action guides and protective  
14 actions for nuclear incidents."

15 So, just to continue, the EPA's 2017  
16 update to the PAG manual states, "the size of the EPZ  
17 is based on the maximum distance at which a PAG might  
18 be exceeded." The manual also states, "when dose  
19 projections are at levels less than one rem over the  
20 first four-days, evacuation is not recommended due to  
21 the associated risks of moving large numbers of  
22 people."

23 So, just to summarize, the NRC and EPA  
24 work together to develop the EPZ concept using the EPA  
25 PAGs to set an EPZ distance recognizing the

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1 appropriate balance between the risk of exposure and  
2 the risks associated with evacuations. Is that  
3 accurate?

4 MR. SCOTT: I believe that is accurate,  
5 yes.

6 COMMISSIONER CAPUTO: Another point of  
7 clarification. We don't use EPA PAGs to establish an  
8 acceptable level of risk for normal, non-emergency  
9 conditions. We have separated more conservative  
10 standards for normal operation, correct?

11 MR. SCOTT: Correct.

12 COMMISSIONER CAPUTO: All right. And I'm  
13 going to shift gears to a separate question on  
14 flooding.

15 According to TVA's flooding analyses, the  
16 probable maximum flood level at the Clinch River site  
17 would be [REDACTED] feet mean sea level. That the planned  
18 finished grade elevation of the Clinch River site is  
19 [REDACTED] feet higher than the maximum water elevation.

20 Given this significant margin, would  
21 safety related structure systems and components be  
22 susceptible to flooding or is this considered a dry  
23 site?

24 MS. SUTTON: Hi, my name is Mallecia  
25 Sutton. So the height, so for the evaluation and the

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1 hydrology, the system would be safe. If you need more  
2 technical information, I can have Joe Giacinto, the  
3 hydrologist, come to the stand.

4 COMMISSIONER CAPUTO: Okay --

5 MS. SUTTON: Okay.

6 COMMISSIONER CAPUTO: -- thank you.

7 MS. SUTTON: You're welcome.

8 CHAIRMAN SVINICKI: I guess would the NRC  
9 witness please come to the podium?

10 And while you're making your way there, if  
11 when you reach the podium, could you please introduce  
12 yourself?

13 And would you please verify that you have  
14 been sworn and are reflected on the witness list?

15 MR. GIACINTO: Hi, my name is Joe  
16 Giacinto, Office of New Reactors and I have been sworn  
17 in.

18 CHAIRMAN SVINICKI: Thank you. Do you  
19 need the question to be repeated for you?

20 MR. GIACINTO: Please. Yes.

21 COMMISSIONER CAPUTO: According to TVA's  
22 flooding analyses, the probable maximum flood level at  
23 the Clinch River site would be [REDACTED] feet mean sea  
24 level. And that the planned finished grade elevation  
25 of the Clinch River site is [REDACTED] feet higher than the

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1 maximum water elevation.

2 So given this significant margin, would  
3 safety related structure systems and components still  
4 be susceptible to flooding or is this considered a dry  
5 site?

6 MR. GIACINTO: It would be considered a  
7 dry site at this point. Yes.

8 COMMISSIONER CAPUTO: And so, what does  
9 that entail?

10 MR. GIACINTO: Well, a dry site indicates  
11 that there is no danger from flooding. And so, given  
12 the large margin of the site above the Clinch River,  
13 which is about 80 feet about the Clinch River normal  
14 water level, and the height that the site above the  
15 maximum flood level, which is over ■ feet. That  
16 would be considered a dry site.

17 COMMISSIONER CAPUTO: Okay, thank you.  
18 And sorry, one more, one last question.

19 For Michael. During the NRC's  
20 interactions with FEMA on this application, or on the  
21 reactor EPZ rulemaking that's ongoing, did FEMA  
22 representatives offer any technical basis that would  
23 call into question the NRC Staff's conclusions  
24 regarding the safety of SMRs and the methodology for  
25 corresponding EPZ size?

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1 MR. SCOTT: None that I'm aware of.

2 COMMISSIONER CAPUTO: Okay, thank you. I  
3 have no further questions.

4 COMMISSIONER CAPUTO: Thank you,  
5 Commissioner Caputo. Next we will recognize  
6 Commissioner Wright. Please proceed.

7 COMMISSIONER WRIGHT: Good morning. Yes,  
8 it's still morning.

9 So I'm going to ask a question that's  
10 going to be for both panels, so we'll, I guess, first  
11 jump in, whoever wants to do it.

12 So, I'm interested in hearing about the  
13 interactions and discussions that the Staff and TVA  
14 had regarding the proposed permanent conditions. How  
15 did those discussions go, do you feel you engaged on  
16 the subject earlier enough in the process here?

17 And I guess, did the draft conditions  
18 evolve based on these discussions?

19 MR. FETTER: So hi, this is Allen Fetter.  
20 The Staff were writing their individual SEC sections  
21 and they used what they considered their own  
22 engineering and technical judgment to develop  
23 permanent conditions, what they thought would be  
24 important to address for the COL.

25 And those were not done in a vacuum, those

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1 were presented to management, and also discussed with  
2 TVA before the SE's were issued.

3 COMMISSIONER WRIGHT: Any comment?

4 MR. STOUT: And TVA was made aware of the  
5 permit conditions and we understood them. We see that  
6 a future application can meet those requirements.

7 On occasion it appears that the permit  
8 conditions are already existing regulatory  
9 requirements, however, there is no impediment to us  
10 meeting them.

11 COMMISSIONER WRIGHT: Were there any  
12 proposed conditions that were removed during the  
13 discussions that had been there previous? Or earlier?

14 MS. SUTTON: Yes. So, after we presented  
15 some of the permit conditions to TVA and discussion  
16 with the Staff, some of the permit conditions were  
17 removed or revised, appropriately.

18 COMMISSIONER WRIGHT: Okay. Anything  
19 specific we'd be interested in knowing about?

20 MS. SUTTON: Not at this time. Well,  
21 we've had fruitful discussions with the Staff and  
22 management and management, there is a lot of proposed  
23 conditions and permit conditions that we proposed.

24 Some of the management, before even the  
25 applicant saw them, asked us to go back to look

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1 through the regulatory basis and then we revised them,  
2 removed them or made appropriate changes. So there  
3 was nothing that was glaring that we thought was  
4 necessary moving forward. That wasn't presented now.

5 COMMISSIONER WRIGHT: Okay. I'm going to  
6 stay with the NRC Staff here with the next couple of  
7 questions.

8 So, were there any unexpected challenges  
9 that you encountered during your safety review of the  
10 ESP application, and if there were, can you maybe  
11 briefly tell me how you overcame those challenges?

12 MS. SUTTON: As stated in our  
13 presentation, de novo issue of evaluating the EPZ size  
14 methodology was a challenge for the staff. We worked  
15 together with our counterpart, NSIR, came up with a  
16 process to evaluate the deviation from the current  
17 ten-mile EPZ and how the Staff will provide the  
18 technical basis to justify if the exemptions could be  
19 approved and granted per the Commissions regulations.

20 And so, as we went through the process and  
21 got management input and guidance, we felt like we  
22 were able to provide the necessary, meet their  
23 necessary regulations to say that the exemptions could  
24 be granted.

25 COMMISSIONER WRIGHT: So, considering, I

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1 guess, exemptions that maybe have been previously  
2 granted from the general requirement of that ten-mile  
3 EPZ, can you describe to me where maybe you've done  
4 that before?

5 And how were those circumstances maybe  
6 different or similar in this case?

7 MR. SCOTT: So, I'll address that if I  
8 could. So, the rules do allow for reactors that are  
9 smaller or, in the case of the high temperature gas  
10 coolant reactor, setting the EPZ size on a case-by-  
11 case basis.

12 So that's already written in there. And  
13 there were several very small reactors sometime back  
14 that had five mile EPZ. Those are since  
15 decommissioned. And there was of course a Fort St.  
16 Vrain HTGR that also had a five mile EPZ.

17 So, it has been done in the past for  
18 different type power reactors. They weren't by  
19 exemption though, to my understanding, because it was  
20 in the rules.

21 COMMISSIONER WRIGHT: Okay, very good.  
22 Thank you.

23 CHAIRMAN SVINICKI: Well, let me add my  
24 thanks again for all the presentations. A number of  
25 subject matter areas have been covered already.

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1           Maybe this is a kind of broad, and for any  
2           TVA witness whose appropriate, but if the exemptions  
3           that are sought were granted, and again, the Staff has  
4           recommended approval of the EPZ sizing methodology, so  
5           assuming that all of that were put in place and  
6           assuming, there's a lot of ifs with this question,  
7           assuming that TVA came back in with a request for a  
8           construction permit or a COL application, would it be  
9           the planning to continue to have some measure of  
10          coordination with offsite emergency response and  
11          municipal and local officials, and if so, could you  
12          give a general description of what that kind of  
13          coordination offsite might look like? I realize this  
14          is a bit speculative.

15                 MR. STOUT: Yes, it is our intent to  
16                 continue to communicate and coordinate with the state  
17                 and the local emergency preparedness officials. We're  
18                 also a neighbor to the Department of Energy.

19                 They have emergency planning. Our site is  
20                 in their emergency planning zone. So there would be  
21                 offsite coordination on the appropriate emergency  
22                 plant preparedness response for any type of  
23                 application going forward. Whether it meets site  
24                 boundary or it meets two-mile.

25                 CHAIRMAN SVINICKI: Thank you. And

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1       although Commissioner Wright's question was not  
2       directed to the TVA witnesses, are you aware, was  
3       there any study of the historic five mile EPZs for say  
4       Fort St. Vrain or maybe Big Rock Point, I think was  
5       another that had a smaller EPZ, did that history form  
6       any foundation for your proposal or was it at least  
7       studied?

8                   MR. STOUT: We did consider all the past  
9       precedence, but we chose a unique approach and a  
10      specific dose-based methodology thinking that that's  
11      in the best interest of TVA and the country as we go  
12      forward and take advantage of the improvements in our  
13      tools and analysis capabilities.

14                   CHAIRMAN SVINICKI: Thank you. And I  
15      appreciate you mentioning the advances and modeling in  
16      simulation some of which this very proudly developed  
17      right there at Oak Ridge, near you. So they have  
18      aloot of computational tools that are available to  
19      modern applicants, such as yourself, that were not  
20      historically available.

21                   I wanted to turn now, I think this is for  
22      TVA, but I'll have a variation of this question for  
23      the NRC Staff as well. And it is in the consideration  
24      of alternative citing.

25                   I know that there is a lot already in the

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1 record. The staff witnessed, Ms. Bradford testified  
2 that in the Staff's view, none of the alternative  
3 sites, to the Clinch River site, were obviously  
4 superior in the environmental context.

5 Just as an aside, she mentioned that none  
6 of the other sites were environmentally preferable.  
7 I know this is the safety panel but I just thought I'd  
8 mention, those are the Staff's kind of parallel  
9 conclusions there in validating the Clinch River site.

10 Those are obviously pretty high bars.  
11 Obviously superior means they're not kind of neck-and-  
12 neck, but could one of the TVA witnesses give me any  
13 sense of what were the dispositive, what were the  
14 highest most major contributors to finalizing around  
15 the Clinch River site, in comparison to the  
16 alternatives that you looked at?

17 MR. STOUT: There is the environmental  
18 considerations that you just mentioned. But also on  
19 a technical side, there was an excavation performed  
20 for the Clinch River Breeder Reactor.

21 And we were able to use that information.  
22 And --

23 CHAIRMAN SVINICKI: In in-site  
24 characterization, you had that available to you?

25 MR. STOUT: Absolutely. And so that

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1 informed us on the suitability at the site in  
2 particular. So, we had less uncertainty as it relates  
3 to the geotechnical.

4 CHAIRMAN SVINICKI: Okay. And I would  
5 note though, it's always kind of a give and take in  
6 life because now some of that site disturbance of  
7 course would be factors that you would have to  
8 characterize more fully if you went forward with a COL  
9 application.

10 Staff noted in response to some pre-  
11 hearing questions that there are some things not yet  
12 established about the extent of some of those things.  
13 And so, I know part of the answer for both the Staff  
14 and for the Applicant are that there would be a fuller  
15 characterization of those excavations and their  
16 effects on any particular proposal to locate a  
17 facility there.

18 Just a thought, I would note that as well.  
19 And I think, so, I guess for the Staff, the variation  
20 on that question is, in terms of no other sites being  
21 obviously superior, where there factors you weighed?

22 I don't know if you have any request for  
23 additional information regarding this. Is there  
24 anything that comes to mind?

25 MR. FETTER: This is more in the area of

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1 the environmental review.

2 CHAIRMAN SVINICKI: Okay, sure.

3 MS. SUTTON: But just to ask you a  
4 question. There is no additional --

5 CHAIRMAN SVINICKI: But from the safety  
6 and the --

7 MS. SUTTON: There is no additional  
8 environment RAIs associated with the --

9 CHAIRMAN SVINICKI: Okay.

10 MS. SUTTON: And there was none on the  
11 safety side.

12 CHAIRMAN SVINICKI: The safety side  
13 either, okay.

14 MS. SUTTON: Okay. Yes.

15 CHAIRMAN SVINICKI: I think, again, the  
16 cite, alternative citing always has two prongs.  
17 Safety, which tends not to be the largest set of  
18 considerations, and the environmental as well, which  
19 I will pursue this with the next panel.

20 And with that, that concludes my questions  
21 for this panel and I turn it over to Commissioner  
22 Baran.

23 COMMISSIONER BARAN: Thank you. Well,  
24 thank you all for your hard work on this review. I  
25 have some questions on emergency preparedness.

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1           These questions, I think, are all for the  
2 NRC Staff, but you all can decide who wants to chime  
3 in on any given question.

4           I guess just to briefly summarize, I think  
5 where we are. As part of the early site permit the  
6 NRC Staff recommends approving TVA's methodology for  
7 determining plume exposure pathway emergency planning  
8 zone, or EPZ size, for the Clinch River site.

9           The early site permit wouldn't establish  
10 a specific EPZ at this time. Instead, the staff  
11 recommends issuing exemptions now that could result in  
12 a two-mile or site boundary EPZ for the site if a  
13 combined license or construction permit is later  
14 issued.

15           To be clear, the regulations say that the  
16 EPZ should extend about ten-miles out from the site,  
17 but the exemptions would allow the EPZ to stop at two-  
18 miles or at the boundary of the site, as long as the  
19 dose criteria are met. Is that right?

20           MR. SCOTT: That's correct.

21           COMMISSIONER BARAN: The dose criteria  
22 come from EPA's protection action guides, or PAGs as  
23 we've heard. The methodology results in a EPZ large  
24 enough to encompass the areas where the projected dose  
25 from design basis accidents could exceed one rem.

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1 Does this essentially adopt the  
2 methodology of the NRC Staff's draft proposed rule for  
3 emergency preparedness for small module reactors,  
4 which is currently pending before the Commission?

5 MR. SCOTT: So, the approach taken in this  
6 licensing action is similar to that in the rule.

7 COMMISSIONER BARAN: Is there any  
8 difference between this approach and the approach in  
9 the rule?

10 MR. SCOTT: I am not aware of any  
11 substantive differences with regard to plume exposure  
12 pathway EPZs --

13 COMMISSIONER BARAN: Okay.

14 MR. SCOTT: -- because the rule addresses  
15 ingestion pathway and this action does not because the  
16 Applicant chose not to go there.

17 COMMISSIONER BARAN: Okay.

18 MR. SCOTT: Can I just interject one  
19 thing, I wanted to add to my answer --

20 COMMISSIONER BARAN: Sure.

21 MR. SCOTT: -- to your previous question?

22 COMMISSIONER BARAN: Yes.

23 MR. SCOTT: So as what, I think your  
24 remarks refer to it, but I want to make sure mine did  
25 as well. So we're not in the EPS stage approving any

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1 EPZ. Not two-miles from outside boundary, nothing.

2 What we're proposing to approve is the  
3 method that could lead to that at the combined license  
4 stage.

5 COMMISSIONER BARAN: Right. Under this  
6 methodology, the quantitative dose formula determines  
7 the size of the EPZ, right?

8 So using the small type step formula you  
9 plug in factors that someone discussed on earlier  
10 slides, which is the reactors design features and  
11 characteristics, the source term, the site conditions,  
12 exposure and dose estimates.

13 And the formula spits out EPZ size, is  
14 that how it works?

15 MS. HART: The methodology results in dose  
16 distance that you would use then to determine if the  
17 EPZ size is supported.

18 COMMISSIONER BARAN: That sounds like a  
19 purely quantitative risk-based determination rather  
20 than a risk informed decision that accounts for expert  
21 judgement, defense-in-depth or public confidence. Is  
22 this a purely risk-based methodology for determining  
23 the EPZ size?

24 MR. SCOTT: As you know, the NRC licenses  
25 a large variety of facilities, from very large

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1 reactors down to individual sources. And most of  
2 those facilities don't require offsite planning.

3 So, at some point in the hazard spectrum,  
4 a decision needs to be made that the formal offsite  
5 radiological emergency planning is not needed anymore.  
6 And so, the Applicant proposes, and the Staff  
7 proposes, to accept that an appropriate place to draw  
8 that line to where the offsite formal planning is not  
9 needed anymore is when the EPA PAGs will not be  
10 exceeded offsite.

11 And Staff believes that is consistent with  
12 the Commission's guidance on risk informing EPZ  
13 sizing. It's consistent with the earlier, the EPA PAG  
14 discussion that we had earlier. It's also consistent  
15 --

16 COMMISSIONER BARAN: My question is a  
17 little different than that.

18 MR. SCOTT: Okay.

19 COMMISSIONER BARAN: My question is, is  
20 the methodology itself risk informed or is it risk-  
21 based?

22 MR. SCOTT: We believe it is risk  
23 informed. Do you want to add to that?

24 MS. HART: There is consideration on  
25 certainty and on consideration of defense-in-depth in

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1 the methodology. Of course, it's not been practiced  
2 yet. It would be evaluated in the implementation.

3 COMMISSIONER BARAN: Well, is anyone  
4 exercising any judgment about how large the EPZ should  
5 be or is it a mathematical calculation? Under the --

6 MS. HART: As far as the methodology  
7 itself it just determines the distance at which the  
8 EPA PAG is maybe exceeded. And also evaluates the  
9 substantial reduction in early health effects for  
10 those very severe accidents.

11 COMMISSIONER BARAN: This seems to be a  
12 significant departure from how NRC has always approach  
13 emergency preparedness. When NRC established the ten-  
14 mile EPZ for the existing fleet of large light water  
15 reactors, it wasn't based on the likelihood of an  
16 accident occurring.

17 In 1978 NUREG-0396, which has been cited  
18 several times today as being consistent with a  
19 proposed methodology, stated that "emergency planning  
20 is not based on quantified probabilities of incidents  
21 or accidents, but on the public perception of the  
22 problem, what can be done to protect health and  
23 safety."

24 In the 1986 safety goal policy statement  
25 the Commission said that emergency response

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1 capabilities are mandated to provide additional  
2 defense-in-depth, protection to the surrounding  
3 populations.

4 When the agency was working through  
5 advance reactor issues in 1993, the NRC Staff wrote  
6 that it views the inclusion of emergency preparedness  
7 by advance reactor licensees as an essential element.  
8 The NRC's defense-in-depth philosophy.

9 Four years later, now in the late '90s,  
10 the Staff emphasized the importance of getting the buy  
11 in and acceptance of federal state and local emergency  
12 response agencies, for any emergency response changes  
13 relating to new potentially safer reactor designs.

14 Is the Staff throwing all that out the  
15 window with this proposed methodology and these  
16 proposed exemptions?

17 MR. SCOTT: So, I don't believe so. In  
18 the sense that if an Applicant cannot show that their  
19 facility is a particularly low hazard facility, akin  
20 to what we've licensed in the past without site  
21 boundary EPZ, without offsite emergency planning, then  
22 they will not get the offsite, the site boundary EPZ.  
23 So we believe it's consistent with past practice.

24 Again, this is a different type of  
25 facility then some of those that have been considered

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1 earlier. A very low risk facility.

2 COMMISSIONER BARAN: Well, with the site  
3 boundary EPZ, there would be no dedicated offsite  
4 radiological emergency planning, right?

5 So that element of defense-in-depth would  
6 be dropped completely?

7 MR. SCOTT: The Staff acknowledges that  
8 for site boundary EPZ case, if an offsite emergency  
9 response was needed, it would be in the context of all  
10 hazards planning.

11 COMMISSIONER BARAN: I want to ask about  
12 FEMA's views, as you all did a good job I think  
13 discussing those during your presentation. FEMA has  
14 a key role in determining whether the emergency  
15 planning for nuclear power plant site is adequate.

16 Under NRC's regulations, no early site  
17 permit can be issued unless the NRC makes a finding  
18 that the major features of the emergency plan meet the  
19 regulatory requirements. And NRC is supposed to base  
20 its finding on FEMA's determinations as to whether the  
21 onsite and offsite emergency plans are adequate and  
22 whether there is reasonable assurance that they can be  
23 implemented.

24 In fact, under our regulations, in any NRC  
25 licensing proceeding a FEMA finding will constitute a

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1       rebuttable presumption on questions of adequacy and  
2       implementation capability. FEMA has this prominent  
3       role in our licensing process because of its  
4       undisputed expertise in this area. They are the  
5       federal emergency management agency after all.

6               In its August 11th, 2017 letter to NRC,  
7       FEMA says that it "did not review or analyze the  
8       feasibility of a site boundary EPZ for Clinch River."

9               Did the Staff ask FEMA to review the  
10       proposed major features of the site boundary EPZ  
11       emergency plan?

12              MR. SCOTT: No, we did not because given  
13       what the Applicant submitted, there was no scope for  
14       FEMA to review that particular piece. Now they --

15              COMMISSIONER BARAN: It wasn't required  
16       that FEMA review it?

17              MR. SCOTT: That's correct.

18              COMMISSIONER BARAN: But you still could  
19       have asked for FEMA's views and recommendations,  
20       right?

21              MR. SCOTT: Well, in effect we did ask for  
22       FEMA's views and they provided them in their July 8th,  
23       2019 letter.

24              COMMISSIONER BARAN: But not onsite  
25       boundary EPZ only on a two-mile EPZ?

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1 MR. SCOTT: We sought FEMA's views on all  
2 aspects of this action. Now, there's a separate,  
3 there's a difference between a consultation required  
4 by the rules and good practice of reaching out to our  
5 partner and asking for their views on these matters.

6 And so, although FEMA's views on site  
7 boundary EPZ were not required because offsite  
8 planning would not be required, we sought their views.  
9 And those are reflected in that July 8th, 2019 letter.

10 COMMISSIONER BARAN: Okay. And FEMA more  
11 formally reviewed the two-mile EPZ plan. In the  
12 August 27 letter FEMA stated, "FEMA cannot support any  
13 determination that a two-mile EPZ is adequate for  
14 their Clinch River Nuclear site at this time."

15 Two years later, FEMA's position hadn't  
16 changed. In a July 8th, 2019 letter, FEMA explained  
17 that it "does not currently endorse the establishment  
18 of a site boundary plume exposure pathway EPZ or a  
19 two-mile plume exposure pathway EPZ for any small  
20 modular reactor or other new technology, absent the  
21 integration of the full spectrum of threats and their  
22 associated impacts into the accident analyses and the  
23 probabilistic risk analysis."

24 So to be clear, as we sit here today, FEMA  
25 does not support a site boundary EPZ or a two-mile EPZ

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1 for Clinch River, is that right?

2 MR. SCOTT: Based on their July 8th, 2019  
3 letter, I believe that's correct.

4 COMMISSIONER BARAN: Okay. And FEMA  
5 disagrees with the NRC staff position that the  
6 applications EPZ size methodology is acceptable?

7 MR. SCOTT: I don't believe that they put  
8 it in their letter that way, but you quoted text from  
9 their letter that expresses some level of  
10 disagreement, given where we are.

11 COMMISSIONER BARAN: Okay. I want to ask  
12 about some of FEMA's specific concerns, based on their  
13 letters, I think FEMA is clearly concerned that design  
14 basis accidents aren't the only thing that could go  
15 wrong in a nuclear power plant.

16 And they want a future licensee, as well  
17 as state and local emergency responders, to be ready  
18 for low probability, high consequence events.

19 The Staff's proposed risk methodology for  
20 determining EPZ size doesn't factor in security risks,  
21 does it?

22 MR. SCOTT: Yes, it does, in a sense. And  
23 we talked about that earlier that for security risks  
24 within the full spectrum that we consider, that has  
25 been evaluated.

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1           And the way that type of accident would  
2 play out in terms of offsite release would be very  
3 similar to other initiators.

4           COMMISSIONER BARAN:     Well, and this  
5 follows up, I guess on what Commissioner Caputo was  
6 asking about earlier.   After 9/11, the NRC Staff  
7 reviewed the emergency planning for nuclear power  
8 plants in light of potential hostile actions and  
9 concluded that the emergency planning basis remained  
10 valid.

11           But that conclusion was based on their  
12 being a ten-mile EPZ with dedicated radiological  
13 emergency planning, wasn't it?

14           MR. SCOTT:   So, the presence or absence of  
15 a ten-mile EPZ does not reflect the security outcome  
16 of an event.   For example, even if a site boundary EPZ  
17 is approved, the Applicant is required to establish  
18 and maintain communication capabilities with offsite  
19 response people.   Security type people who would  
20 respond to a security event.

21           And, again, from an EPA perspective, the  
22 Staff sees a little difference in how these events  
23 would play out.

24           COMMISSIONER BARAN:   But in terms of the  
25 post-9/11, when the Staff looked at, in light of 9/11,

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1 the events of that day, when the Staff looked at our  
2 emergency planning and said, is this adequate or does  
3 this need to be updated for potential hostile actions,  
4 the Staff's conclusion that it did not need to be  
5 updated was based on a ten-mile EPZ with dedicated  
6 emergency planning, right? Dedicated radiological  
7 emergency planning.

8 MR. SCOTT: Again, I'm not aware that the  
9 Staff's considerations on that subject considered ten-  
10 mile EPZ in particular. I'd be happy to look into  
11 that and get back to you to verify that answer.  
12 That's my understanding of the situation.

13 COMMISSIONER BARAN: Okay. If Clinch  
14 River ended up with a site boundary EPZ, as we've  
15 said, then no dedicated offsite radiological emergency  
16 planning would be required, emergency responders would  
17 be left with all hazards planned, as you mentioned.

18 FEMA's concern that all hazards planning  
19 is not adequate for these types of emergencies. In  
20 FEMA's July 8th, 2019 letter to NRC FEMA states,  
21 "radiological emergency planning is not sufficiently  
22 addressed within the all hazards framework.  
23 Radiological emergency planning is unique.

24 In a worst-case scenario, our offsite  
25 response organizations could be challenged to

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1 effectively protect the health and safety of the  
2 public, using an ad hoc emergency planning construct."

3 That's pretty strong stuff. FEMA goes on  
4 to say that advance planning, such as provided by an  
5 EPZ reduces the complexity of the decision making  
6 process during an incident. And FEMA states, we which  
7 to stress that the proven best way to ensure offsite  
8 readiness is to develop, exercise and assess offsite  
9 response, organization, radiological capabilities, as  
10 it now done throughout the offsite EPZ.

11 Does the Staff believe that all hazards  
12 planning would be just as effective as dedicated  
13 radiological emergency planning in an actual  
14 radiological emergency?

15 MR. SCOTT: As I said in the testimony,  
16 the Staff reached its conclusions based on the  
17 comparison of the Applicant's proposed methods with  
18 the EPA PAGs.

19 We did not make any particular assumption  
20 about the effectiveness of the all hazards plan. We  
21 just don't believe that any facility that can  
22 demonstrate a source term low enough to support a site  
23 boundary EPZ.

24 The situation, the question of the  
25 effectiveness of all hazards response would not come

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1 into play because the situation would not occur that  
2 would require that.

3 COMMISSIONER BARAN: Okay. Well, separate  
4 from your findings, what is the Staff's view on this,  
5 is all hazards planning just as effective as dedicated  
6 radiological emergency planning?

7 MR. SCOTT: There is documentation out  
8 there that the Staff is aware of that supports that  
9 offsite authorities will take needed actions when  
10 required in various context.

11 We can provide you those references if  
12 you're interested in those, Commissioner.

13 COMMISSIONER BARAN: Yes, but that's not  
14 really answering my question. There's dedicated  
15 radiological hazards planning, which is currently  
16 required for the existing fleet, there is something  
17 else, which is all hazards planning, plans for all  
18 kinds of different hazards not just radiological, it's  
19 not focused on radiological.

20 Does the Staff believe that all hazards  
21 planning is just as effective in an actual  
22 radiological emergency planning as dedicated  
23 radiological emergency planning?

24 MR. SCOTT: So, if I might, I'd like to  
25 call upon a member of the NRC Staff to provide

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1 additional response to that question.

2 CHAIRMAN SVINICKI: Is this one --

3 MR. SCOTT: Patricia Milligan.

4 CHAIRMAN SVINICKI: -- one of the NRC  
5 witnesses?

6 MR. SCOTT: Yes.

7 CHAIRMAN SVINICKI: Yes, would you please  
8 come --

9 MR. SCOTT: Trish Milligan.

10 CHAIRMAN SVINICKI: And just for  
11 completeness for the transcript, would you state your  
12 name and just confirm that you were sworn in earlier  
13 this morning?

14 MS. MILLIGAN: Yes. My name is Patricia  
15 Milligan and I work for Mike Scott in the Office of  
16 NSIR. And yes, I was sworn in.

17 So, to your question --

18 COMMISSIONER BARAN: Yes.

19 MS. MILLIGAN: -- just to recap really  
20 quickly, again for me, sir?

21 MR. SCOTT: Sure. Does the Staff believe  
22 that all hazards planning would be just as effective  
23 as dedicated radiological emergency planning in an  
24 actual radiological emergency?

25 MS. MILLIGAN: That's an interesting

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1 question. If you look at --

2 COMMISSIONER BARAN: I thought so, thanks.

3 MS. MILLIGAN: Yes, it is.

4 (Laughter.)

5 MS. MILLIGAN: If you look at FEMA's  
6 guidance, which is called CPG 101, developing and  
7 maintaining emergency operations plans, they don't  
8 call out radiological planning as separate. Indeed,  
9 part of this guidance addresses radiological hazards.

10 What FEMA does in this particular guidance  
11 is suggest that if you are ever in a community where  
12 there's a radiological plan, you include this in your  
13 all hazards planning.

14 So, to answer your question, I think this  
15 particular guidance would say, yes, they believe that  
16 it's all part of all hazards. And indeed, in FEMA's  
17 guidance, which is CPG 101 right here.

18 They say that while there is uniqueness  
19 hazards, and clearly a chlorine gas release is very  
20 different from a radiological release, it is very  
21 different than a natural gas release. We know that.  
22 But there are so many commonalities in response.

23 That was also addressed to NUREG-0396  
24 where the taskforce there recognized that the response  
25 is very similar in many types of events. A train

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1 derailment with chlorine gas, that sorts of things.  
2 Evacuation and sheltering is common to all hazards.

3 COMMISSIONER BARAN: Well, the reason I'm  
4 asking this specific question is, it seems to be  
5 central to the concern that FEMA is stating in their  
6 letter when they say radiological emergency planning  
7 is not sufficiently addressed within the all hazards  
8 framework.

9 And I'm trying to understand, does the NRC  
10 staff disagree with that?

11 I mean, FEMA is saying they don't think  
12 all hazards is good enough and the Staff's response is  
13 what?

14 MR. SCOTT: The Staff's response is that  
15 the effectiveness of that offsite capability is not  
16 central to the determinations we made here. Again,  
17 once the hazard is low enough, then you don't need  
18 that capability.

19 And that's been demonstrated in NRC  
20 licensing practice, for example, for research reactors  
21 for many years.

22 COMMISSIONER BARAN: But on a couple  
23 different slides, and in various documents that are  
24 part of this docket, the NRC Staff has made a finding  
25 that the proposed methodology maintains the same level

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1 of protection as a ten-mile EPZ.

2 MS. HART: And let me clarify.

3 COMMISSIONER BARAN: If dedicated  
4 radiological emergency planning is superior to all  
5 hazards planning, I don't understand how the NRC Staff  
6 could make that determination.

7 If a site boundary EPZ does not have  
8 dedicated radiological emergency planning and two-mile  
9 or ten-mile EPZ does, what's the basis of concluding  
10 that those offer equal protection --

11 MR. SCOTT: Different level of hazard.

12 COMMISSIONER BARAN: Say it again?

13 MR. SCOTT: Different level of hazard.  
14 Again, I mean, we wouldn't propose a ten-mile EPZ for  
15 research reactor, we don't have those because the  
16 hazard is lower.

17 In effect, you have to draw the line  
18 somewhere. The Staff believes that drawing it at the  
19 site boundary, if the facility will support that, is  
20 supportive of protection of public health and safety  
21 without the need for formal offsite radiological  
22 emergency preparedness.

23 COMMISSIONER BARAN: Is the NRC Staff  
24 finding that the proposed methodology maintains the  
25 same level of protection as a ten-mile EPZ necessary

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1 for the issuance of the EPZ exemptions?

2 MR. SCOTT: It's consistent with it. I'd  
3 have to think about whether it's absolutely necessary.  
4 I would, we'll think about that question.

5 COMMISSIONER BARAN: Okay. Let me ask a  
6 slightly different issue about a slightly different  
7 issue.

8 Is there anything about the logic of the  
9 proposed methodology that couldn't be applied to the  
10 existing fleet of large light water reactors?

11 MR. SCOTT: If they would need to be, it  
12 would need to be considered under potential exemptions  
13 to 10 CFR Part 50 because the existing rules wouldn't  
14 permit it.

15 COMMISSIONER BARAN: Existing rules don't  
16 permit it here either, we're talking about exemptions.  
17 So my question is, is there anything about the logic  
18 of the methodology that couldn't be applied to the  
19 existing large light water reactor fleet?

20 MR. SCOTT: No. So an applicant, or a  
21 licensee, could come in and ask for exemptions and the  
22 Staff would consider those.

23 COMMISSIONER BARAN: If an existing  
24 nuclear power plant ran the numbers through this  
25 methodology and found that an eight mile or a five

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1 mile EPZ would meet the dose criteria, what would be  
2 the basis for NRC concluding that the plant should  
3 keep a ten-mile EPZ?

4 MR. SCOTT: We have to consider that  
5 application when it came in, Commissioner. Obviously  
6 we didn't get that kind of application in this case.  
7 And we haven't gone there because an applicant has not  
8 come in and requested that.

9 COMMISSIONER BARAN: Well, I wanted to  
10 understand what the implications would be if this  
11 methodology were applied to the existing fleet of  
12 large light water reactors.

13 And to figure that out, the Commission  
14 asked pre-hearing Question 22. And the Staff  
15 responded that it didn't have sufficient information  
16 to apply the proposed methodology to operating units.

17 To be clear, the staff has no idea how  
18 this methodology would impact the EPZ size of  
19 currently operating plants if were applied to them?  
20 Is that right?

21 MS. HART: We have not done any scoping  
22 analyses or anything like that to determine. I think  
23 the severe accident information is the information  
24 that we don't have in-house to be able to do that  
25 effectively at this time.

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1 COMMISSIONER BARAN: Isn't that something  
2 we want to know before setting this precedent?

3 MS. HART: This is a specific exemption  
4 for this specific site and so, it --

5 COMMISSIONER BARAN: The methodology that  
6 is acknowledged doesn't really confine itself to this  
7 site or to small modular reactors.

8 MR. SCOTT: So the Staff proposes to make  
9 this decision based on the information put in front of  
10 us with regard to whether it's protective of public  
11 health and safety. And that's the basis of the  
12 conclusion that we reached.

13 COMMISSIONER BARAN: To issue the EPA  
14 exemptions, NRC would need to find that there were  
15 special circumstances. In its application, TVA stated  
16 that special circumstance exist at Clinch River  
17 because the enhanced safety features and the design of  
18 SMR significantly enhance nuclear safety and provide  
19 considerable additional confidence in the protection  
20 of public health and safety.

21 Did the NRC Staff rely on that rationale  
22 to find that special circumstances are present here?

23 MS. HART: The Staff acknowledges that  
24 statement, and we did ask TVA to provide additional  
25 information, like what kind of things that they were

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1 talking about. And they did respond, an RAI response  
2 with that information.

3           However, our determination is made on the  
4 methodology itself in that it would be evaluated at  
5 the time with specific information for the specific  
6 reactor at the time of the COL or CP application.

7           COMMISSIONER BARAN: Well, we don't know  
8 what reactor design would be used at the site, and the  
9 NRC hasn't yet approved or determined the safety of  
10 any of the reactor designs that were used to set up  
11 the plant parameter envelope.

12           How could the staff conclude that there  
13 are special circumstances based on the assumed safety  
14 features of an unknown, unapproved design?

15           MS. HART: The special circumstances  
16 determination was not only based on that information,  
17 the special circumstances were based on the fact that  
18 there is a methodology that would be used by the COL  
19 or the CP applicant to determine an area outside of  
20 which protective, early protective actions may not  
21 have to be taken.

22           COMMISSIONER BARAN: So, to make a special  
23 circumstance is fine and its based purely on the  
24 methodology here, it's not based on any presumed  
25 characteristics of, safety characteristics of small

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1 module reactors?

2 MS. HART: Because we cannot verify those  
3 presumed characteristics at this time.

4 COMMISSIONER BARAN: If the ESP is issued,  
5 as currently proposed, would SMR construction at  
6 Clinch River need to have the specific attributes  
7 assumed in the Staff safety evaluation report in order  
8 to get the EPZ exemption?

9 MS. HART: So, what they would have to do  
10 is use the TVA sizing methodology to show that their  
11 EPZ size is supported, that they choose. And also  
12 meet permit condition five, the source term that's in  
13 that.

14 So, the specific discussion about slower  
15 and smaller cores, they don't need to specifically  
16 provide findings for that. Those statements.

17 COMMISSIONER BARAN: So permit condition  
18 five just focuses on source terms size, not these  
19 other attributes of small --

20 MS. HART: Correct.

21 COMMISSIONER BARAN: -- reactors?

22 Okay. I'm just trying to figure out  
23 whether this is, kind of a circular reasoning  
24 situation where the reason you can go down potentially  
25 a two-mile or site boundary EPZ is that SMRs are so

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1 much safer and the hazards are so much lower.

2 We don't know what SMR would actually be  
3 placed there, we don't know what the design would look  
4 like. Nothing has been approved by NRC, yet we're  
5 depending on some presumption about what that SMR  
6 would be to decide now that special circumstances  
7 exist to issue an exemption. Am I missing something?

8 MS. SUTTON: Okay, so the bounding  
9 parameters of the PPEs, 2,420 megawatts thermal. So,  
10 for any design that fits within that parameter, so the  
11 Staff is just not making a blanket statement that  
12 justifies size methodology, they are the PPE limits  
13 that COL or the CP applicant has to meet to be able to  
14 use the exemption request.

15 And also, they have to meet the permit  
16 condition five. There's all these parameters that are  
17 put in place for the COL or the CP applicant to meet.

18 So, I think -- so, keep in mind that it's  
19 not just like carving this one piece out, it's the  
20 totality of other information the Staff use as we  
21 evaluated TVA's request to come up with a parameters.

22 But it's based on the 2,420 megawatt  
23 thermal and how to, it doesn't matter what reactor it  
24 is, what the source term is, it has to fit within  
25 those boundaries for the PPE construct.

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1                   COMMISSIONER BARAN: Okay. In response to  
2 pre-hearing Question 18, the Staff stated that  
3 depending on the plant design, multiple reactor  
4 accidents, multiple reactor accidents for multiple  
5 module designs may or may not be included in the  
6 spectrum of accidents used for the plume exposure  
7 pathway EPZ size determination.

8                   Why wouldn't we consider the cumulative  
9 risks of multiple modules when setting EPZ size? Is  
10 that a basic lesson of Fukushima?

11                   MS. HART: So, in general, the GDCs that  
12 would be used would prevent common cause failures and  
13 multiple unit accidents. And so, looking at their PRA  
14 that they would provide at the time, and the  
15 information on the plants at the time a determination  
16 would made, whether multiple module or multiple unit  
17 accidents, would be a credible event to include in the  
18 EPZ size methodology.

19                   COMMISSIONER BARAN: My understanding is  
20 that we need to make a determination on whether to  
21 approve the proposed EPZ methodology now rather than  
22 waiting until a combined license or construction  
23 permit application, because this early site permit  
24 could not be issued at all with the EPZ exemptions,  
25 and that's because the application didn't address a

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1 ten-mile EPZ. So the application depends on EPZ  
2 exemptions being issued.

3 Is there any legal barrier to the  
4 Commission approving only the exemptions for a two-  
5 mile EPZ at this stage? And not the exemptions for a  
6 site boundary EPZ.

7 MR. SCOTT: There's no legal barrier to  
8 it. The Staff looked at that. Should you approve  
9 two-miles and not the site boundary.

10 And, again, we're talking about  
11 methodology here.

12 COMMISSIONER BARAN: Yes.

13 MR. SCOTT: Then the application would  
14 need to be revised. It could be approved but with a  
15 revised application. Because the application requests  
16 all of this.

17 So if the Commission, our understanding is  
18 that if the Commission were to choose to give it only  
19 part of it, then the application would have to be  
20 revised to reflect that. The part that's actually  
21 going to be approved by the Commission.

22 COMMISSIONER BARAN: The record of  
23 decision and the permit couldn't just specify which  
24 parts were being granted and which parts weren't?

25 MR. SCOTT: OGC advises us that the

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1 application would have to be revised.

2 MS. SUTTON: So, based on the Staff's  
3 review, based on our regulations, the Staff has to  
4 review what has been presented to them. So what was  
5 presented to the Staff was a exemption request looking  
6 at the size and methodology for approval.

7 So the Staff evaluation and findings are  
8 based on what was presented to us in application. So  
9 if the Commission chooses to carve out a piece of the  
10 application, then the application would have to be  
11 amended so the Staff can provide their findings to the  
12 Commission so they can make a decision.

13 COMMISSIONER BARAN: Hmm.

14 MS. SUTTON: So, right now we are looking  
15 at an entire application as it was presented, for the  
16 Staff evaluation.

17 COMMISSIONER BARAN: Okay. Well, that  
18 might be more of a post-hearing question to delve more  
19 into that, I probably don't have time to do that  
20 today.

21 MS. SUTTON: Okay.

22 COMMISSIONER BARAN: It sounds like it's  
23 maybe a fairly complex legal question. But I'll stop  
24 there. Thank you.

25 MS. SUTTON: Okay. You're very welcome.

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1 CHAIRMAN SVINICKI: Thank you very much.  
2 And since we will pivot aware from safety after this,  
3 and a lot of ground was covered, I don't have anything  
4 additional for this panel to use any more of my time,  
5 but do either of my colleagues?

6 Or with that, we're up against lunch hour,  
7 so that works well. And we are just slightly ahead of  
8 schedule, but I would prefer, for purposes of the  
9 webcast, to reconvene at the previously established  
10 time, which means we would recess now for two hours  
11 for lunch and reconvene at 2:00 p.m.

12 Thank you. And I will see those who need  
13 to come back this afternoon, later this afternoon.  
14 Thank you.

15 (Whereupon, the above-entitled matter went  
16 off the record at 12:01 p.m. and resumed at 2:00 p.m.)

17 CHAIRMAN SVINICKI: Well, good afternoon  
18 everyone. I call the hearing to order once again.

19 We will now conduct what we term the  
20 Environmental Panel. The parties will address the  
21 environmental review performed in connection with the  
22 early site permit application, including relevant  
23 sections of the final environmental impact statement.

24 I just remind the witnesses that they  
25 remain under oath. And that the Commission is

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1 familiar in general with all the pre-hearing filings.

2 We're going to begin the Environmental  
3 Panel with the TVA witnesses. Please proceed, and  
4 prior to presenting, please introduce yourself. Thank  
5 you.

6 MR. PERRY: Good afternoon Chairman and  
7 Commissioners. I am Jeff Perry, TVA Senior Project  
8 Manager with the Clinch River Site, SMR Project.

9 Today Ruth Horton and I, TVA Program  
10 Manager for Environmental Support and I will be  
11 presenting the environmental information and the early  
12 site permit application for the Clinch River Site.

13 TVA is responsible for a wide variety of  
14 environmental management services in the TVA power  
15 service area, which it undertakes in accordance with  
16 the mandate of the TVA Act.

17 In order to implement a comprehensive  
18 environmental management approach, TVA works with  
19 numerous state and federal agencies in its seven state  
20 region. TVA's environmental responsibilities include  
21 management of the rivers and reservoirs, public land  
22 and shoreline, and provision of recreation  
23 opportunities in the Tennessee River Water Shed. Next  
24 slide, please.

25 As you heard earlier, TVA's ESPA had

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1 addressed the site suitability for potential  
2 construction and operation of an SMR. And is based on  
3 a plant parameter envelop approach.

4 When preparing the environmental report,  
5 Part Three of the ESPA, TVA developed a set of  
6 bounding values to use in determining potential  
7 environmental impacts. TVA used the approaches and  
8 methods contained in NRC regulatory guidance to  
9 analyze the environmental impacts of potential SMR  
10 deployment at the site as required by 10 CFR Part 51.

11 NRC's final environment impact statement  
12 for issuing an early site permit was published in  
13 April 2019, consistent with the National Environmental  
14 Policy Act. Should TVA decide to pursue further  
15 licensing and deployment of SMRs at the site, we have  
16 performed our own environmental review as a part of  
17 that decision making process.

18 Now I'd like to turn the remainder of the  
19 presentation over to Ruth Horton, who will discuss the  
20 content of the environmental report.

21 MS. HORTON: Good afternoon. My name is  
22 Ruth Horton, Environmental Program Manager for the  
23 early site permit application development.

24 To analyze environmental impacts required  
25 by 10 CFR 51 and the National Environmental Policy

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1 Act, TVA used the approaches and methods contained in  
2 the body of the NRC regulatory guidance listed on this  
3 slide.

4 NUREG 1555 was the primary guidance used  
5 to inform the content of our environmental report.  
6 Next slide, please.

7 The TVA site selection process conducted  
8 in accordance with the EPRI siting guide and NUREG  
9 1555 first bounded the project's region of interest as  
10 TVA's power service area due to limitations stated in  
11 the TVA Act.

12 TVA identified six large federal direct  
13 served customers in the power service area as the  
14 potential candidate areas shown here. The regional  
15 screening process then eliminated four of the six  
16 areas, leaving the Oak Ridge Reservation and Redstone  
17 Arsenal as the two candidate areas that best satisfied  
18 the siting criteria.

19 Fifteen potential sites were identified  
20 between the two candidate areas. The next level of  
21 screening further narrowed the list of 15 potential  
22 sites down to three sites on or near the Oak Ridge  
23 Reservation, and one site on the Red Stone Arsenal for  
24 consideration as alternative sites in the ESPA.

25 None of the alternative sites were

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1 determined to be environmentally preferable to the  
2 proposed Clinch River site. Therefore, TVA identified  
3 the Clinch River site as preferred. Next slide,  
4 please.

5 The Clinch River site is located on the  
6 Clinch River arm of the Watts Bar Reservoir. And is  
7 within the City of Oak Ridge in Roane County,  
8 Tennessee.

9 It is a 935-acre parcel of TVA land  
10 adjacent to the U.S. Department of Energy's Oak Ridge  
11 Reservation. In addition to the Clinch River site, a  
12 196-acre area adjacent to the site entrance could be  
13 disturbed for access improvements.

14 The site was previously characterized in  
15 past studies performed in the 1970s and 1980s when it  
16 was the location of the proposed and later cancelled  
17 Clinch River Breeder Reactor Project.

18 As noted earlier today, existing  
19 transmission lines and some basic infrastructure such  
20 as roads and storm water retention structures, remain  
21 from the site's previous use.

22 Although the Atomic Safety and Licensing  
23 Board issued a limited work authorization in May 1983,  
24 the Breeder Reactor was never built. And the site is  
25 not currently used for power generation. Next slide,

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1 please.

2           Having selected it as the preferred site,  
3 TVA undertook a comprehensive environmental review of  
4 the Clinch River site. TVA worked closely with the  
5 Tennessee Department of Environment and Conservation  
6 and the State Historic Preservation Officer within the  
7 Tennessee Historical Commission, federally recognized  
8 Indian Tribes, the U.S. Fish and Wildlife Service, the  
9 U.S. Army Corps of Engineers, and other stakeholders  
10 in preparing the environmental report.

11           In doing so, TVA was able to leverage  
12 numerous existing agreements and relationships, to  
13 ensure a thorough and comprehensive approach. For  
14 example, TVA has established protocols with state --  
15 with the State Historic Preservation Offices from each  
16 of the seven states that make up the TVA power service  
17 area.

18           For the Clinch River SMR project, TVA  
19 established a programmatic agreement with the  
20 Tennessee State Historic Preservation Office for  
21 management of the resources on the Clinch River site,  
22 through the completion of plant construction.

23           TVA also currently maintains relationships  
24 with each of the federally recognized Indian Tribes  
25 that have been identified as having an interest in the

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1 TVA power service area.

2 These ongoing relationships, which  
3 encompass all TVA activities, ensure a thorough and  
4 comprehensive approach to the management of these  
5 cultural and historic tribal resources. Next slide,  
6 please.

7 TVA's environmental review of the direct,  
8 indirect, and cumulative impacts of the proposed  
9 project in onsite and offsite areas potentially  
10 affected by the project, identified no critical  
11 habitats. Most of the impacts were determined to be  
12 small, because they either would not be detectable, or  
13 would be minor.

14 Two areas showed small to moderate  
15 impacts. These areas are socioeconomic impacts,  
16 primarily from increased traffic during construction,  
17 and stresses on public infrastructure during both  
18 construction and operations. And cultural resources,  
19 because potentially eligible archeological sites and  
20 the Melton Hill Dam immediately upstream of the site,  
21 which is listed on the National Register of Historic  
22 Places, maybe impacted by construction. Next slide,  
23 please.

24 In order to complete the various  
25 environmental and cultural resource reviews, and

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1 analysis required for the relevant portions of the  
2 ESPA, TVA communicated and interacted frequently with  
3 the NRC staff. These multiple interactions, which  
4 included site visits, public meetings, a readiness  
5 review, an environmental audit, were critical to the  
6 integrity of the process and its results.

7 NRC staff issued its final EIS for the  
8 Clinch River site in April 2019. TVA's own  
9 environmental review process, as briefly described  
10 today, and set forth in detail within the ESPA,  
11 supports the NRC staff's conclusions and  
12 recommendation that the NRC issue an early site permit  
13 for the Clinch River site.

14 This concludes our presentation.

15 CHAIRMAN SVINICKI: Thank you to the TVA  
16 witnesses for this panel. I will now as the NRC staff  
17 witnesses for the Environmental Panel to please come  
18 and occupy the chairs behind their name tents.

19 And then please proceed in the order in  
20 which you've decided amongst yourselves to begin.  
21 I'll continue to talk while you open your binders.  
22 And not have awkward silence.

23 (Laughter)

24 CHAIRMAN SVINICKI: And while you pour  
25 yourself water.

1 (Laughter)

2 CHAIRMAN SVINICKI: Having a cold myself,  
3 I have sympathy for that. Okay. All right, please  
4 proceed.

5 MS. DOZIER: Good afternoon Commissioners.

6 CHAIRMAN SVINICKI: Oh, there you go.

7 MS. DOZIER: We can go ahead and move to  
8 slide two, please. My name is Tamsen Dozier from the  
9 Division of Licensing, Siting, and Environmental  
10 Analysis of the Office of New Reactors.

11 I managed the environmental review of the  
12 TVA's application for an ESP at the Clinch River  
13 Nuclear Site. With me today is Kenneth Erwin, the  
14 Chief of the Environmental Review Branch, in the same  
15 division.

16 On behalf of the Environmental Review  
17 Team, Ken and I will present to you this afternoon a  
18 summary of the process used for developing the  
19 environmental impact statement, or EIS, the  
20 identification and analysis of alternatives, a summary  
21 of the environmental impacts at the proposed site, any  
22 additional notable information regarding the review,  
23 and the conclusions and recommendations presented in  
24 the final EIS. Next slide, please.

25 As was stated in this morning's overview

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1 panel, the proposed federal action for TVA's  
2 application is the issuance of an ESP for approval of  
3 the Clinch River nuclear site as suitable for the  
4 future demonstration of the construction and operation  
5 of two or more SMRs that fall within the PPE.

6 The purpose and need for the NRC's  
7 proposed action of issuing an ESP is the early  
8 resolution of the environmental and site safety  
9 issues. The purpose and need for the Agency's action  
10 is further informed by the Applicant's purpose and  
11 need for the project.

12 The National Environmental Policy Act, or  
13 NEPA, requires federal agencies to use a systematic  
14 approach to consider environmental impacts of major  
15 agency decisions. The NRC has determined that  
16 issuance of an early site permit is a major federal  
17 action that requires an EIS.

18 In addition, the staff's environmental  
19 review addresses requirements of the Endangered  
20 Species Act, the National Historic Preservation Act,  
21 and other environmental statutes.

22 Detailed guidance for conducting the  
23 environmental review is found in NUREG 1555, the  
24 Environmental Standard Review Plan, and in numerous  
25 regulatory guides and interim staff guidance

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1 documents. Next slide, please.

2 TVA anticipates the use of two or more  
3 SMRs at the site with a maximum total electrical  
4 output of eight hundred megawatts electric to  
5 demonstrate the capability of small modular reactor  
6 technology.

7 Reactor design features that were  
8 considered by the staff and their environmental impact  
9 analysis are described by the PPE presented by TVA,  
10 and evaluated by the staff.

11 The primary source of cooling water would  
12 be the Clinch River arm of the Watts Bar Reservoir.  
13 And TVA proposes using mechanical draft cooling towers  
14 to dissipate heat to the atmosphere.

15 Chapter Three of the EIS fully describes  
16 other elements of TVA's proposed project, which would  
17 be expected to have an interface with the environment,  
18 including transmission lines, and information  
19 regarding planned building activities.

20 TVA has proposed several objectives for  
21 their proposed demonstration project. The only TVA  
22 project objective that was considered by the review  
23 team in its generation of alternatives, was the  
24 objective to provide reliable power to a mission  
25 critical DOE or DoD facility.

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1 Other TVA objectives for future  
2 demonstration of SMR technology were not considered at  
3 the ESP stage, because the necessary design  
4 information was not yet available, or the objective  
5 was related to a review area which TVA has chosen to  
6 defer to the COL or CP review.

7 Ken Erwin will provide additional  
8 discussion regarding the factors considered in the  
9 generation of alternatives, a bit later in this panel.  
10 Next slide, please.

11 As we heard from TVA earlier today, the  
12 Clinch River nuclear site, located ten miles south of  
13 the Oak Ridge urban center comprises 935 acres. And  
14 is not currently used for power generation.

15 The site is the location of the now  
16 terminated Clinch River Breeder Reactor Project. And  
17 had been partially developed for that project.

18 Ground disturbance had affected  
19 approximately 240 acres before the project was  
20 terminated in 1983. The disturbance was redressed.  
21 And the site has not been noticeably disturbed in the  
22 interim. Next slide, please.

23 To prepare the EIS, we assembled a team of  
24 environmental experts with backgrounds in the  
25 necessary scientific and technical disciplines to

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1 conduct a review. The NRC contracted with Pacific  
2 Northwest National Laboratory to assist in preparing  
3 the EIS.

4 If a COL or CP is submitted, the permits  
5 from the Corps of Engineers maybe necessary to perform  
6 activities that affect water bodies. The Nashville  
7 district of the Corps therefore is a cooperating  
8 agency with the NRC on this review to verify that the  
9 information presented in the EIS is adequate to  
10 support a Department of the Army permit application  
11 should TVA submit such an application at a future  
12 date.

13 The NRC staff, its contractors, and staff  
14 from the Corps make up the environmental review team.  
15 Next slide, please.

16 The environmental review team followed a  
17 systematic approach to evaluate the impacts expected  
18 to occur at the proposed and alternative sites as a  
19 result of building and operating two or more SMRs.  
20 The NRC published a notice of intent to prepare an EIS  
21 in the Federal Register in April 2017, which initiated  
22 a 60 day scoping period.

23 The NRC staff conducted two public  
24 meetings near the proposed site. In addition to  
25 comments captured from those meetings, the NRC staff

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1 received an additional 74 pieces of correspondence  
2 with comments during the scoping period, which were  
3 considered in the preparation of the draft EIS.

4 In conducting its environmental review,  
5 the review team carried out independent analysis and  
6 evaluations based on information provided by the  
7 Applicant, which included supplemental or clarifying  
8 information submitted during the review in response to  
9 interactions during one full scope environmental audit  
10 and public meetings.

11 The review team made visits to the  
12 proposed and alternative sites. And interviewed  
13 stakeholders near the area, including but not limited  
14 to, community organizations and local governments.

15 The NRC staff consulted with federal,  
16 state, and local authorities, including the U.S. Fish  
17 and Wildlife Service, the Tennessee Historical  
18 Commission, and several federally recognized Indian  
19 Tribes. The review team also used information from  
20 independent sources in developing the draft EIS, which  
21 was issued in April 2018.

22 During the 75 day comment period, the NRC  
23 staff held two public meetings in Kingston, Tennessee  
24 to present its preliminary findings and accept  
25 comments on its draft document. Approximately 115

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1 people attended these public meetings.

2 In addition to oral comments at the public  
3 meetings, the NRC received over 25 hundred letters and  
4 emails containing written comments. Comments received  
5 were considered in preparing the final EIS, which was  
6 issued in April of this year. Appendix E of the final  
7 EIS describes how comments received on the draft EIS  
8 were dispositioned.

9 I will now turn to Ken Erwin, who will  
10 present a summary of the staff's environmental  
11 evaluations and the various resource areas that we  
12 considered in this review.

13 MR. ERWIN: Thank you Tammy and good  
14 afternoon everyone. As Tammy mentioned, my name is  
15 Kenneth Erwin. I'm the Branch Chief of the  
16 Environmental Technical Review Branch in the Office of  
17 New Reactors. Next slide, please.

18 The staff evaluated, in detail, reasonable  
19 alternatives that could meet the purpose and need of  
20 the proposed project. The staff evaluated the no  
21 action alternative, alternative sites, and alternative  
22 system designs.

23 The Applicant chose not to evaluate energy  
24 alternatives in its environmental review for this  
25 early site permit, which is permitted by regulation.

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1 Therefore, the NRC staff did not evaluate energy  
2 alternatives in its environmental impact statement.

3 If TVA applies for a future license, the  
4 environmental review of that application would include  
5 an assessment of energy alternatives. Next slide,  
6 please.

7 The purpose and need for an early site  
8 permit is the early resolution of issues. It is  
9 informed by the Applicant's purpose and need,  
10 specifically TVA's objective to demonstrate the  
11 capability of SMR technology to provide reliable power  
12 on or near a mission critical facility.

13 There would be no environmental impacts  
14 associated with not issuing the ESP. However, this  
15 would not accomplish any of the intended benefits  
16 either. Next slide, please.

17 This slide shows the process for  
18 identifying alternative sites. The process starts by  
19 defining and identifying a region of interest, in this  
20 case, TVA's power service area.

21 Next, candidate areas within a region of  
22 interest were selected by applying exclusionary  
23 criteria based on TVA's project objective to provide  
24 reliable power to a mission critical DoD or DOE  
25 facility.

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1           This resulted in six candidate areas,  
2           which were then evaluated using criteria that might  
3           make the licensing and permitting of SMRs impractical,  
4           which as cooling water availability and proximity to  
5           targeted customers. As a result, four of these  
6           candidate areas were eliminated.

7           Next, possible alternative sites were  
8           identified within the two remaining areas, using  
9           criteria such as land availability and land use plans.  
10          This resulted in four alternative sites for  
11          evaluation.

12          The NRC staff evaluated the methodology  
13          TVA used in selecting the alternative sites. And then  
14          evaluated the environmental impacts that would result  
15          if two or more SMRs were constructed and operated at  
16          each of the four alternative sites. Next slide,  
17          please.

18          The candidate areas and alternative sites  
19          are shown on this figure. Ultimately, three candidate  
20          areas were selected from the Oak Ridge Reservation,  
21          including TVA's proposed site, and one additional  
22          candidate site was selected from the Department of  
23          Defense Red Stone Arsenal site.

24          These sites are circled in black on the  
25          figure shown. In this figure, the three sites on Oak

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1 Ridge are within the one circle in the upper right of  
2 the figure. Next slide, please.

3 The review team concluded that TVA  
4 employed a reasonable process consistent with the NRC  
5 guidance in the SRP to identify and consider potential  
6 alternative sites in the region. The review team  
7 visited each of the alternative sites, including the  
8 proposed site to gather information.

9 The review team then compared the  
10 environmental impacts at each alternative site, with  
11 the proposed site. While there were slight  
12 differences in impacts to various resource areas  
13 between the site and the alternative sites, none of  
14 the alternative sites were environmentally preferable  
15 to the proposed site.

16 The review team also evaluated design  
17 alternatives, including alternative intake and  
18 discharge designs, alternative heat dissipation  
19 systems, and alternative circulating water supply  
20 systems.

21 The alternative system designs evaluated  
22 were either obviously unsuitable or were not  
23 environmentally preferable to the proposed design.  
24 Next slide, please.

25 Many resource areas at the proposed site

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1 were studied and assigned an impact level by the staff  
2 subject matter experts. This slide illustrates  
3 physical resource areas commonly analyzed in an  
4 environmental review.

5 For a small impact, the effects are not  
6 detectable or too small to destabilize or noticeably  
7 alter any important attributes of the resource. For  
8 a moderate impact, the effect is sufficient to alter  
9 noticeably, but not destabilize important attributes  
10 of the resource.

11 And for an impact to be considered large,  
12 the effect must be clearly noticeable and sufficient  
13 to destabilize important attributes of the resource.

14 In addition, the staff evaluated  
15 postulated acts and impacts to the environment for  
16 three different emergency planning zone boundary  
17 assumptions, the site boundary, the two mile, and ten  
18 mile, and determined that the difference between  
19 exposure levels from all three distances were similar.  
20 These analyses were based on the exemption requests  
21 and current regulations. Next slide, please.

22 This slide shows the impact associated  
23 with the proposed project on each resource area where  
24 the impact was small or none. As you can see, many  
25 resource areas were small or none. Next slide,

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1 please.

2 This slide shows the resource areas with  
3 moderate or large impacts associated with the proposed  
4 project. In its evaluation of these potential  
5 impacts, the review team relied on TVA's compliance  
6 with mitigation measures and controls that would limit  
7 adverse environmental impacts including one,  
8 compliance with applicable federal, state, and local  
9 laws, ordinances, and regulations.

10 Two, compliance with other applicable  
11 requirements of permits or licenses required. Three,  
12 compliance with existing TVA processes and procedures.

13 Four, incorporation of environmental  
14 requirements in construction contracts. And five,  
15 identification of environmental resources and  
16 potential impacts during the ESP process and TVA's  
17 environmental report.

18 Next, I will discuss the staff's findings  
19 in two areas that were moderate too large. Next  
20 slide, please.

21 Section 106 of the National Historic  
22 Preservation Act requires federal agencies to consider  
23 the effects of undertakings on historic properties  
24 that are listed or eligible for listing on the  
25 National Register of Historic Places.

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1           If historic and cultural resources are  
2 present, staff determines that resource's eligibility  
3 for listing in consultation with the State Historic  
4 Preservation Office, American Indian Tribes that  
5 attach cultural and religious significance to historic  
6 properties, and other interested parties.

7           The NRC coordinated its Section 106  
8 consultation through NEPA pursuant to 36 CFR 800.8.  
9 The EIS contains NEPA conclusions and NHPA Section 106  
10 conclusions.

11           The NRC consulted with 20 American Indian  
12 Tribes, the Tennessee Historical Commission, and the  
13 Advisory Council on Historic Preservation. Next  
14 slide, please.

15           The staff concluded that the combined  
16 impact from construction and preconstruction  
17 activities would be moderate to large.

18           However, preconstruction activities are  
19 not regulated by the NRC, and constitute the primary  
20 contribution to this impact determination. Impacts  
21 from NRC authorized construction would be small.

22           While preconstruction impacts are not  
23 within the NRC's regulatory authority, NRC staff  
24 reviewed TVA's NHPA Section 106 compliance activities.  
25 As a federal land managing agency, TVA has section --

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1 NHPA Section 106 compliance requirements.

2           Accordingly, TVA initiated its NHPA  
3 Section 106 consultation with the Tennessee Historical  
4 Commission and Tribes, and executed a programmatic  
5 agreement that outlines the potential adverse effects  
6 to an unknown number of registered eligible properties  
7 and sites. Because specific project plans have not  
8 been finalized, the PA describes TVA's ongoing NHPA  
9 Section 106 compliance process.

10           Staff concluded that there would be no  
11 effect on historic properties from NRC authorized  
12 construction activities, because any impacts on  
13 historic properties are primarily associated with  
14 preconstruction activities, and wouldn't be subject to  
15 TVA's PA.

16           The staff's NEPA conclusion determined  
17 that impacts from NRC authorized construction  
18 activities and operation and maintenance related  
19 activities would be small, and would be subject to  
20 TVA's cultural resource management practices. Next  
21 slide, please.

22           TVA conducted a traffic impact analysis to  
23 determine traffic impacts around the site. This study  
24 analyzed deterioration of the level of service on  
25 roads and intersections in Roane County, and indicated

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1 that without mitigation, traffic around the site would  
2 deteriorate at four intersections near the site for an  
3 extended period of time when construction employment  
4 was at or near its peak levels.

5 During this time, traffic delays could  
6 exceed 15 minutes at some intersections during workday  
7 commuting hours. With mitigation, the review team  
8 expects the local impact on traffic would be reduced,  
9 but adverse impacts would still be noticeable.

10 These delays could require commuters to  
11 temporarily adapt to deteriorated conditions during  
12 peak construction employment. Next slide, please.

13 Cumulative impacts result when the  
14 environmental effects associated with the proposed  
15 project are added to the effects associated with past,  
16 present, and near future projects. These impacts can  
17 result from the combination of effects that might have  
18 been individually minor, but become collectively  
19 noticeable when affecting the same resource over time.

20 The staff evaluated the direct and  
21 indirect impacts from the project in Chapter Four and  
22 Five of the EIS, and the cumulative impacts in Chapter  
23 Seven to the resources from past, present, and future  
24 projects in the same region.

25 The cumulative analysis did not change the

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1 impacts to most resources. For some resource areas,  
2 the impacts increased from small to moderate due to  
3 past activities.

4 Cumulative impacts were also evaluated for  
5 each alternative site. The review team concluded that  
6 cumulative impacts for each alternative site were  
7 generally comparable.

8 And that no site is clearly preferable to  
9 another from an environmental perspective. In such a  
10 case, the proposed site prevails, because none of the  
11 alternatives is clearly environmentally preferable.

12 I will now turn the presentation back over  
13 to Tammy Dozier.

14 MS. DOZIER: Thank you Ken. Next slide,  
15 please. If an ESP is issued, and a future applicant  
16 references the ESP for the Clinch River site, a  
17 supplemental EIS will be prepared.

18 A supplement to the ESP EIS will include  
19 an evaluation of all issues deferred from the ESP,  
20 such as an assessment of energy alternatives, benefits  
21 and costs, and any issues not resolved in the ESP FEIS  
22 such as the evaluation of severe accident mitigation  
23 design alternatives, which is design specific, and an  
24 evaluation of water treatment alternatives.

25 The supplement to the ESP FEIS would also

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1 include an analysis of the issues that were resolved  
2 in this proceeding, for which new and significant  
3 information is identified during the future review.  
4 Next slide, please.

5 Chapter Ten of the EIS presents the NRC  
6 staff's conclusions regarding the environmental  
7 impacts at the proposed and alternative sites.

8 To summarize the staff findings, the staff  
9 concluded that the environmental impacts would be  
10 small for most resource areas. And that none of the  
11 environmental alternative sites would be  
12 environmentally preferable. Next slide, please.

13 For the reasons stated today in our  
14 presentation, the staff recommendation related to the  
15 environmental aspects of the proposed action is that  
16 the ESP should be issued. That concludes our  
17 presentation.

18 CHAIRMAN SVINICKI: Well thank you very  
19 much to the NRC witnesses for those presentations for  
20 this Environmental Panel. We will begin the questions  
21 with Commissioner Wright.

22 COMMISSIONER WRIGHT: Thank you. Thank you  
23 for your presentations.

24 This question I'm going to ask probably  
25 both TVA and the staff. So, one unique aspect of this

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1 proceeding is that TVA has its own National Historic  
2 Preservation Act Section 106 requirements. And that's  
3 not normally the case for our applicants and  
4 licensees.

5 And I understand TVA has executed its own  
6 programmatic assessment or agreement with Tennessee,  
7 with the Tennessee Historical Commission, and with the  
8 tribes. And this agreement's going to govern the  
9 process by which TVA will comply with Section 106 for  
10 the project.

11 So, to TVA, have you encountered any  
12 difficulties with your Section 106 consultation  
13 efforts so far? And, if so, how did you deal with  
14 these challenges?

15 MS. HORTON: No. We work with the  
16 Tennessee SHPO routinely, on a daily basis, and this  
17 programmatic agreement arrangement there was some back  
18 and forth. But we worked out all the details. And  
19 it's been pretty routine.

20 COMMISSIONER WRIGHT: Well, good.

21 Then I get back to the staff. Has this  
22 unique circumstance or arrangement impacted the  
23 staff's environmental review?

24 MR. ERWIN: Thank you for the question.

25 The staff did a very extensive

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1 consultation process. We consulted with 20 American  
2 Indian tribes, the Tennessee Historical Commission,  
3 and other interested parties. And I think it was very  
4 extensive and it did not impact the review in any  
5 negative manner.

6 COMMISSIONER WRIGHT: Okay, very good.

7 Thank you, that's all I have.

8 CHAIRMAN SVINICKI: Thank you very much  
9 again for your presentations.

10 This is a fairly general question for the  
11 NRC staff witnesses. Does the approach regarding the  
12 plant parameter envelope, what are the uniquenesses  
13 that that poses for the environmental review? We  
14 explored that quite a bit with the safety panel, but  
15 what are the dimensions of that that pose any novelty  
16 for you in moving forward on your environmental  
17 review?

18 MS. DOZIER: So, the plant parameter  
19 envelope from an environmental standpoint is not just  
20 the PD. So, the PPE, if you look at it, it basically  
21 defines the reactor. But there are other components  
22 of the project that are described in Chapter 3 of the  
23 environmental report and in the EIS, so, all of that  
24 together, PPE and the other project descriptions.

25 We did not have any -- the project design

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1       itself did not present any challenge. There were not  
2       design-specific challenges for the staff. It doesn't  
3       much matter if it's a PPE or an actual design.

4                   CHAIRMAN SVINICKI: Thank you for that  
5       response.

6                   And as has been referenced previously, the  
7       Applicant deferred its assessments of the need for  
8       power particularly. But out of that would have grown  
9       an assessment of the benefits of the proposed action.  
10      And so the staff, in Section 10.2 of the final EIS,  
11      discusses the relationship between the short-term uses  
12      and kind of the long-term productivity of natural  
13      resources and other assets.

14                   How did the staff approach that? Not, and  
15      again, there's nothing deficient about differing on  
16      the need for power and that assessment, but how did  
17      you approach reaching your conclusions in Section  
18      10.2?

19                   MS. DOZIER: So, in Section 10.2 the  
20      difference between the short-term use and the long-  
21      term productivity there were two ways we could have  
22      approached it. And we, the staff chose because you  
23      postulate a -- the building and operation activities  
24      in order to reach impact determinations, we postulated  
25      that those would occur for that balance. And then we

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1 evaluated and looked at it.

2 So, there are aspects of the assuming that  
3 there's, you know, the need for, for the project does  
4 come into that. But that's the approach that the  
5 staff chose to take.

6 CHAIRMAN SVINICKI: Okay. Thank you for  
7 that.

8 And then I had posed to the safety panel  
9 from the attributes that they look at did they have  
10 any reflections on the consideration of alternative  
11 sites? Or, were there any kind of close calls there?  
12 And I was reminded that that comes more squarely into  
13 play for the environmental review, although there can  
14 be technical attributes of the site that would make it  
15 preferable to host the project.

16 But is there anything? You talked about  
17 it a bit, actually, in your presentation already, but  
18 were there any kind of unique pros and cons you raised  
19 regarding alternative sites that TVA looked at?

20 MR. ERWIN: Yes. So, the staff did look.  
21 It's main criteria was proximity to its federal  
22 customers, to a DoD or DOE facility. I believe TVA  
23 looked at other factors related to, like, contiguous  
24 land masses of 120 acres, seismology, population  
25 density, availability of cooling water, things of that

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1 nature.

2 CHAIRMAN SVINICKI: Okay. But it sounds  
3 like, again, Ms. Bradford offered the staff's  
4 conclusion that none of the alternative sites was  
5 environmentally preferable.

6 MR. ERWIN: That's correct.

7 CHAIRMAN SVINICKI: Okay. Thank you for  
8 that.

9 I think that those are the questions that  
10 I have for this panel. And next we will hear from  
11 Commissioner Baran.

12 COMMISSIONER BARAN: But only briefly.  
13 Well, thank you for your presentations. They were all  
14 very informative, both sets of panelists, so I don't  
15 have any questions.

16 CHAIRMAN SVINICKI: Thank you.

17 Commissioner Caputo.

18 COMMISSIONER CAPUTO: At this point, at  
19 this point I think I really only have one on karst.

20 So, in the FSER the staff cites the  
21 Applicant's statement that "for future combined  
22 license application a detailed geologic mapping and  
23 subsurface exploration program would be implemented to  
24 characterize these excavations for safety-related  
25 structures at the Clinch River site with regard to

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1 presence or absence of karst features."

2 So, to put that, I think, a little closer  
3 to layman's terms, the staff found that while the  
4 Applicant provided a description of the local  
5 geological hazards as part of the application, the  
6 issue of karst features will be thoroughly evaluated  
7 at the COL stage.

8 Why is it appropriate to defer any  
9 detailed evaluation of karst features until the COL?

10 MS. DOZIER: So, did you say you were  
11 reading from the EIS that says that or the SAR?

12 COMMISSIONER CAPUTO: It says FSER.

13 MS. DOZIER: FSER, okay. Okay, so that was  
14 the safety evaluation. However, we did look at karst  
15 in that.

16 So, the EIS does do a description of  
17 geology for the purposes of the groundwater  
18 measurement. Okay. So, so karst is a feature that we  
19 do look, and so we do heavily look at that for  
20 purposes of groundwater.

21 So, since that is a -- would then be a  
22 groundwater question for us I will then defer that to  
23 our hydrologist Phil Meyer.

24 CHAIRMAN SVINICKI: Yes, as you're making  
25 your way to the microphone I would just remind you to

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1 please state your name, and please confirm that you  
2 were sworn in earlier this morning.

3 MS. DOZIER: And maybe possibly repeat the  
4 question since it is from the FSER, it's not something  
5 we're as familiar with as the EIS.

6 COMMISSIONER CAPUTO: So, the question is  
7 --

8 CHAIRMAN SVINICKI: Well, just can you  
9 state your name and confirm?

10 MR. MEYER: Yes. My name is Phillip Meyer.  
11 I am a hydrologist at Pacific Northwest National  
12 Laboratory. And I have been sworn in.

13 CHAIRMAN SVINICKI: Thank you.

14 COMMISSIONER CAPUTO: Thank you. So, the  
15 question is just that while there is a description of  
16 the geologic hazards in the application, a detailed  
17 review of karst features is going to be deferred until  
18 a license application stage. Why is that appropriate?

19 MR. MEYER: So, I won't address the safety  
20 issues or specific safety issues related to the nature  
21 of the subsurface.

22 From the environmental perspective we look  
23 at the effects of, the potential effects of karst on  
24 the reaction of the excavation and g-water, and the  
25 excavation to potential transport or other water users

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1 that might be affected by, say, dewatering of the  
2 excavation.

3 So, because the subsurface is unknown to  
4 some extent, you can only do so much investigation,  
5 but once the site is excavated, more will be revealed.  
6 And in the EIS we talk about how TVA has potentially  
7 options to mitigate effects of the potential karst  
8 features or fractures that might affect the flow.

9 They have chances to mitigate that during  
10 the excavation from the environmental impacts. And  
11 also, they can do monitoring so the extent of the  
12 impacts of, say, dewatering on that would be, they  
13 would be able to assess that during the excavation.

14 So, these are some things that come up  
15 during the construction that you can't, you can't know  
16 until you actually do that.

17 COMMISSIONER CAPUTO: Okay.

18 MR. MEYER: But I would suggest that if you  
19 want, if you want the perspective of the geotechnical  
20 perspective on safety of the structures, which I think  
21 is what that comment or that statement addresses, you  
22 should ask someone from safety review.

23 COMMISSIONER CAPUTO: Okay. But the  
24 description of karst that was in the application was  
25 adequate for you to make your findings with regard to

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1 groundwater?

2 MR. MEYER: From the environmental  
3 perspective, yes.

4 COMMISSIONER CAPUTO: Okay. Thank you.

5 CHAIRMAN SVINICKI: Well, thank you very  
6 much. Again, I thank all of the witnesses from this  
7 panel. I will, again, speak slowly while the tables  
8 are reset for the closing statements.

9 We will now recognize each party to the  
10 proceeding for the purpose of making a closing  
11 statement. And we're going to begin with TVA.

12 And we are slowly resetting the room here,  
13 so I'll just pause while we have time to get the  
14 appropriate presenters to each of the tables.

15 (Pause.)

16 CHAIRMAN SVINICKI: Again, we'll begin with  
17 TVA's closing statement. So, Mr. Shea or Mr. Stout,  
18 please proceed.

19 CLOSING STATEMENT ON BEHALF OF APPLICANT

20 MR. SHEA: Thank you, Commissioners, for  
21 the time and effort that you put forth in preparing  
22 for and conducting the hearing today. We appreciate  
23 the insights and the questions. And we'll ensure that  
24 any follow-up information that you may want is  
25 addressed properly.

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1 I would like to recognize the work done by  
2 the NRC staff. I believe this hearing has validated  
3 the exhaustive review done by the staff, and enables  
4 the Commission to confirm the staff's safety and  
5 environmental findings.

6 We agree with the staff's conclusion that  
7 the TVA early site permit application provides a  
8 reasonable assurance of adequate protection for public  
9 health and safety, and that the environmental  
10 considerations have been addressed, and that the  
11 Commission has the information necessary to make the  
12 required findings for the issuance of the Clinch River  
13 early site permit.

14 I'd also like to recognize the  
15 professionalism and thoroughness of the TVA team in  
16 preparing a quality application, addressing the  
17 information needs, and addressing open items required  
18 for the staff to complete the ESPA review. TVA, along  
19 with its contractors, invested several hundred  
20 thousand staff hours to prepare the application and to  
21 complete the review.

22 An early site permit assesses a site's  
23 suitability for potential construction and operation  
24 of a small modular reactor, and provides TVA the  
25 ability to continue its mission of technology

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1 innovation by engaging in new nuclear technologies  
2 development.

3 The ability to potentially demonstrate new  
4 nuclear technology is important to TVA and important  
5 to both the nuclear industry and the nation. The  
6 issuance of the early site permit is the next step to  
7 demonstrate that small modular reactors and other new  
8 nuclear technologies at the Clinch River site are  
9 viable options for future generations.

10 TVA will make a final decision on new  
11 nuclear generation at the Clinch River site in the  
12 future based on, among other factors, economics, and  
13 the viability and maturity of new nuclear advanced  
14 technologies.

15 Commissioners, thank you again for your  
16 efforts. Welcome any further questions you may have.  
17 And we look forward to a Commission vote and a permit  
18 issuance in the near future. Thank you.

19 CHAIRMAN SVINICKI: Thank you very much.

20 I now recognize the NRC staff for any  
21 closing statement they would like to make. Fred.

22 CLOSING STATEMENT ON BEHALF OF NRC STAFF

23 MR. BROWN: Thank you, Chairman and  
24 Commissioners. For the record, my name is Fred Brown.  
25 And with me on this panel is Anna Bradford.

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1           Through our SECY paper supporting this  
2 mandatory hearing, our final safety evaluation report,  
3 our final environmental impact statement, and our  
4 presentations today, we've provided an adequate basis  
5 for making the necessary findings set forth in 10  
6 C.F.R. 52.94 and 10 C.F.R. 51.105 to support the  
7 issuance of an early site permit for the Clinch River  
8 nuclear site.

9           Our review of the Clinch River nuclear  
10 site ESP application has been thorough and complete.  
11 The ACRS agrees with our conclusion that the early  
12 site permit for the Clinch River nuclear site should  
13 be approved.

14           I would like to revise and clarify two  
15 statements the staff made during the safety panel.

16           First, the proposed exemptions for the  
17 plume exposure pathway EPZ depend on TVA's sizing  
18 methodology, the dose criteria, and permit condition  
19 5. The proposed exemptions do not rely on the values  
20 in the PPE.

21           Secondly, in response to a question of  
22 whether the NRC could issue an ESP approving  
23 exemptions associated with the 2-mile EPZ but not a  
24 site boundary EPZ, the staff stated that the ESP could  
25 be issued but only after the application is revised to

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1 remove those portions associated with a site boundary  
2 EPZ.

3 While that is one way to proceed, the  
4 Commission could also issue an ESP that specifically  
5 identifies the portions of the application that are  
6 not being approved. This would be a complex  
7 undertaking, and the ESP would need to be very  
8 specific regarding the portions of the application  
9 that would not be approved but could be done.

10 Additionally, we will review the  
11 transcript and provide additional information on the  
12 record where we've committed to do so. I would like  
13 to take one minute at the -- here at the closing to  
14 discuss our use of the words "source term" during the  
15 panels today and in our written response to questions.

16 We often refer to source term as though it  
17 was a intrinsic value that's associated with a  
18 reactor's power level. And that's not the case. A  
19 better descriptor for the amount of radioactive  
20 material tied to power level would be core inventory  
21 where you can draw a comparison to the size of a  
22 reactor and its power level.

23 When we referred to source term, however,  
24 we were really referring to the output of a very  
25 detailed, and thorough, and specific analysis about a

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1 potential reactor design that could be sited under the  
2 methodology at the Clinch River site. And it would be  
3 a very thorough review that goes beyond the licensing  
4 requirements for design basis accidents. It's very  
5 broad in scope, as described in the TVA analysis, to  
6 evaluate what could go wrong with a reactor, how  
7 likely it would be and, if it did happen, what portion  
8 of the core inventory would be in a free form, how  
9 much core damage there would be and how much of the  
10 core inventory would be available.

11 It then goes on to evaluate how much of  
12 that core inventory would be released to the  
13 environment. And then that, that's the second step.

14 The third step then is a determination of  
15 what the associated dose offsite would be.

16 So, when we talk about source term it's  
17 not a value that's universal to any reactor of any  
18 type. It's a very specific value that's the result of  
19 a thorough, rigorous evaluation under the TVA proposed  
20 methodology that then allows us to draw conclusions  
21 that we would then compare as we've discussed  
22 extensively with the emergency planning zone basis of  
23 the agency over the years.

24 I hope that clarified our intent in the  
25 use of those two terms. We very much appreciate the

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1 opportunity to present to you to today. And this  
2 concludes the staff's presentation.

3 CHAIRMAN SVINICKI: Well, thank you for  
4 both of those closing statements and, in the case of  
5 the staff, for those clarification points that were  
6 just addressed.

7 Before we proceed to close, Commissioner  
8 closing remarks and then some procedural matters at  
9 the end, I would ask if my colleagues have any last  
10 questions that they would like to pose based on that?

11 (No response.)

12 CHAIRMAN SVINICKI: Okay, hearing none, I  
13 now would like to recognize folks for their actual  
14 closing remarks. That was just questions on the  
15 closing statements and other things.

16 So, are there closing, I would recognize  
17 folks for closing statements? Commissioner Baran.

18 COMMISSIONER BARAN: Sure. I just want to  
19 briefly thank the NRC staff for all of your hard work  
20 throughout their review of this application. And I  
21 want to thank all of today's participants for your  
22 thorough preparation for this important hearing. We  
23 appreciate it.

24 This is I think the ninth uncontested  
25 hearing we've had during my time on the Commission.

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1 I'd like to first state I thought today's hearing adds  
2 a lot of value to the agency's decision making  
3 process. So, thank you.

4 CHAIRMAN SVINICKI: Thank you very much.

5 Commissioner Caputo, closing remarks and  
6 thoughts.

7 COMMISSIONER CAPUTO: So I do have some  
8 closing remarks and thoughts. And I guess, sorry, a  
9 little too quick, I think, for me to our path.

10 I do have one question. In reflecting on  
11 this morning's conversations about sort of the  
12 precedential nature of reviewing TVA's methodology for  
13 a setting in a site EPZ, one question I have for you,  
14 I think in the staff's response to prehearing  
15 questions there was a reflection made that the  
16 methodology is consistent with previous Commission  
17 decision making.

18 Is there anything you can add to provide  
19 a little more context around that?

20 MS. BRADFORD: Yes. We believe it's  
21 consistent for several reasons.

22 One is the rule language itself already  
23 provides exceptions to the EPZ size for gas-cooled  
24 reactors as well as smaller reactors. So, in our mind  
25 that implies that a different EPZ size could be

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1 appropriate even for power reactors.

2 But more recently we have been  
3 communicating with the Commission since at least 2011  
4 about our thoughts on this type of approach. We sent  
5 an information paper up in 2011 that talked about,  
6 since SMRs at that time were becoming more an area of  
7 interest for the industry. We sent up an information  
8 paper talking about moving towards a consequence-  
9 oriented dose-based approach for EPZ size. That was  
10 an information paper, so we did not hear back from the  
11 Commission on that.

12 But we did in 2014 then send up a paper  
13 about performance-based EP framework in general for  
14 reactors. And the SRM we received back from that did  
15 indicate that, yes, the staff should considering  
16 moving towards a performance-based EP framework. And  
17 it even specifically noted that there might be  
18 potential benefit for SMRs specifically for  
19 performance-based EP framework.

20 And then most recently in 2015, as I'm  
21 sure you know, we sent up a paper asking for the  
22 Commission's approval to start that EPZ rulemaking for  
23 SMRs and other nuclear technologies. And we mentioned  
24 in there that this would be an approach that would be  
25 considered in that rulemaking.

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1           And the SRM, again as you know, that came  
2 back from the Commission told us to go ahead and  
3 proceed with that.

4           So, in our mind it's consistent with  
5 previous direction and communication from the  
6 Commission.

7           COMMISSIONER CAPUTO: So, recognizing that  
8 what we're dealing with today is the staff's review of  
9 a particular set of questions and their conclusions  
10 based on that review, there is a precedential nature  
11 to it.

12           MS. BRADFORD: Yes.

13           COMMISSIONER CAPUTO: And I want to sort of  
14 reflect on that a little bit.

15           In particular, as the agency strives for  
16 transformation and to increase our use of risk  
17 information to be more risk informed, this strikes me  
18 as one of those opportunities. And, you know, we'll  
19 deal with this in a fuller scope in the rulemaking.

20           But my own thoughts are that if applicants  
21 come to us with technologies that represent a  
22 significant improvement in safety, perhaps orders of  
23 magnitude in the case of advanced reactors, it seems  
24 to me only right and appropriate that we would  
25 consider those lower risk profiles in the context of

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1 setting an EPZ.

2 To give them, to require the same, same  
3 size of an EPZ given a distinctly lower risk profile  
4 I think would specifically not be risk-informed. And  
5 so that I think I would just leave as a statement.

6 I also want to add my compliments to the  
7 level of the staff's work in this review.

8 And I think for me one of the defining  
9 moments is to have a debate about risk, the measure of  
10  $10$  to the minus 6th,  $10$  to the minus 7th, I think here  
11 at the NRC perhaps we get used to sort of the  
12 technical nature of these discussions, and the  
13 computer modeling, and using these numbers, but I do  
14 think it's an amazing reflection of the capability of  
15 the staff, the tools at their disposal, advanced  
16 computer modeling, that allows a measure of rigor,  
17 that allows us to calculate risk to that level of  
18 refinement.

19 And just to put that in context, I want to  
20 mention something I found courtesy of NASA and Jet  
21 Propulsion Laboratory with regard to asteroid impact.  
22 This is a little bit of a sidebar. But I just want to  
23 put this in the context of the risk that we're  
24 evaluating here.

25 An asteroid impact large enough to degrade

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1 the global climate, leading to widespread crop failure  
2 and loss of life, such global environmental  
3 catastrophes which place the entire population of the  
4 Earth at risk, are estimated to take place several  
5 times per million years on average.

6 So, we are literally when we have a debate  
7 about the appropriate structure for emergency  
8 preparedness, whether it's an all hazards approach, or  
9 whether it's tailored for a radiation release, we are  
10 literally talking about a level of protection for the  
11 public that exceeds an asteroid impact that could  
12 destroy the planet.

13 So, I just want to sort of put that in  
14 context, that it's really to me I think amazing that  
15 our staff is capable of that level of rigor and has  
16 that expertise. And I think it really makes me proud  
17 to be part of this agency.

18 So, please, thank your team.

19 CHAIRMAN SVINICKI: Thank you,  
20 Commissioner.

21 Commissioner Wright.

22 COMMISSIONER WRIGHT: That's a tough one to  
23 follow.

24 (Laughter.)

25 COMMISSIONER WRIGHT: That was very good.

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1 I don't have a lot to say except thank  
2 you. I mean, I know the staff and the people behind  
3 the scenes that are helping to put it together, I  
4 mean, they've put in hours after hours of prep. And  
5 it doesn't go unrecognized by the commissioners here.  
6 And, you know, I do thank you.

7 The same thing goes for TVA and for the  
8 support team that you have as well. The interaction  
9 between TVA and our staff has been good, and it shows  
10 with the quality of the work product.

11 And just from my perspective I just want  
12 to say thank you, and leave it there.

13 CHAIRMAN SVINICKI: Well, thank you very  
14 much.

15 For myself, in terms of closing remarks  
16 and reflections I would note I didn't do a count,  
17 Commissioner Baran, so I've only got, I've got a few  
18 more of these under my belt than you, but not really  
19 that many. But, still, that's a significant number  
20 that have been done. And I don't know that I could  
21 have been confident that in my time here I would still  
22 be present when the Commission for these mandatory  
23 hearings was looking at something that would at least  
24 possibly encompass a small modular reactor or some  
25 much more advanced technology.

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1           So, I was part, as Ms. Bradford mentioned,  
2 of receiving papers in 2008, I think going back to a  
3 scoping of some of the novel issues that we thought as  
4 an agency we would confront for small modular and  
5 advanced technologies.     Emergency planning was  
6 definitely on that list of issues.

7           In 2011 the staff began to become a little  
8 bit more particularized in terms of its approach to  
9 that particular issue. But, you know, even going back  
10 prior to that, the Commission that preceded me and  
11 others knew that there would be novelty. And I think  
12 it's just reflective of anything that evolves.

13           And, certainly, when technology evolves  
14 it's generally really exciting. I was on my iPhone  
15 before I came down here. And we've got colleagues at  
16 the Federal Communication Commission that have dealt  
17 with a lot of evolving technology and how to right-  
18 size the regulatory framework. But, in general, if  
19 the technology as it evolves has to carry on its back  
20 the legacy of all the previous versions of the same  
21 technology it's really difficult for it to really move  
22 forward in any kind of timely or exciting way.

23           You know, if we had to carry around mobile  
24 phones that had spiral cords that came out of the  
25 bottom just in case the mobile signal wasn't available

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1 and we wanted to plug it into the wall, it would look  
2 a lot different than what we have today.

3 So, the staff is now in the trenches doing  
4 this hard work of confronting this novelty. So, I do  
5 want to compliment you all on that. And just for the  
6 continued meticulousness which you bring to this.

7 The discussion on RAIs earlier and the  
8 number, it was noteworthy to me. And I would tell TVA  
9 that the staff doesn't do that to do favors for  
10 anybody. So, I want to compliment you and your team  
11 in terms of the professionalism of presenting a  
12 complete application, of defending it through this  
13 process, because the staff makes you earn every, every  
14 inch of the way. They are here and they have embraced  
15 our mission of safety, environmental protection, and  
16 security in a very, very solid way. So, you earned  
17 every bit of whatever way, you know, fewer questions  
18 or whatever it is.

19 And I appreciate the feedback on the  
20 process because I think the audits were used regarding  
21 this review in a very, very efficient, effective way  
22 by the NRC staff. And, obviously, responded to in a  
23 very thorough way by TVA as the applicant.

24 So, again, I just want to thank everyone  
25 for the efforts that got us here today.

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1           And so, as I move into a few procedural  
2 matters of, certainly of interest to the parties here  
3 in closing, and for the information of the parties,  
4 the deadline for responses to any post-hearing  
5 questions will be August 28th, 2019, unless the  
6 Commission directs otherwise.

7           The Secretary plans to issue an order with  
8 post-hearing questions, if there are any, by August  
9 21st, 2019.

10           The deadline for transcript corrections  
11 will be August 26th, 2019.

12           The Secretary plans to issue an order  
13 requesting proposed transcript corrections by August  
14 19th.

15           As I mentioned this morning, the  
16 Commission expects to issue a final decision promptly,  
17 but with due regard to the complexity of the issues.

18           With that, the hearing is adjourned.  
19 Thank you.

20           (Whereupon, the above-entitled matter went  
21 off the record at 2:58 p.m.)

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of )  
)  
TENNESSEE VALLEY AUTHORITY )  
) Docket No. 52-047-ESP  
(Early Site Permit Application )  
for Clinch River Nuclear Site) )  
)  
(Mandatory Hearing) )

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **Memorandum from the Secretary Providing Hearing Transcript** have been served upon the following persons by Electronic Information Exchange.

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Dated at Rockville, Maryland,  
this 20<sup>th</sup> day of August, 2019

[Original signed by Herald M. Speiser ]  
Office of the Secretary of the Commission