

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

In the Matter of)	
)	
Tennessee Valley Authority)	Docket No. 52-047-ESP
)	
(Clinch River Nuclear Site))	
_____)	

**INTERVENORS' MOTION FOR LEAVE TO FILE
CONTENTION 4 (INADEQUATE DISCUSSION OF
ENVIRONMENTAL IMPACTS OF SPENT FUEL POOL FIRES)
AND CONTENTION 5 (IMPERMISSIBLE DISCUSSION OF ENERGY
ALTERNATIVES AND NEED FOR THE PROPOSED SMR)**

Diane Curran
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.
1725 DeSales Street N.W., Suite 500
Washington, D.C. 20036
240-393-9285
dcurran@harmoncurran.com

May 21, 2018

TABLE OF CONTENTS

I. INTRODUCTION.....1

II. FACTUAL AND PROCEDURAL BACKGROUND.....1

III. CONTENTIONS.....3

Contention 4: Inadequate Discussion of the Environmental Impacts of Pool Fires.....3

 1. Statement of the Contention.....3

 2. Brief Summary of Basis for the Contention.....4

 a. Legal and factual basis for requiring discussion of pool fire impacts.....4

 b. TVA’s Environmental Report and Draft EIS.....5

 c. Significant design differences and non-conservatism disregarded
 in Draft EIS.....7

 i. Significantly different fuel discharge pattern may affect heat level
 in the pool.....7

 ii. Assumptions related to quantity of fuel stored in pool are not
 conservative.....10

 d. Assumption that 10-Mile EPZ would be evacuated is not conservative.....11

 3. Demonstration that the Contention is Within the Scope of the Proceeding.....11

 4. Demonstration that the Contention is Material to the Findings NRC Must Make to
 issue an ESP for the proposed TVA SMR.....12

 5. Concise Statement of the Facts or Expert Opinion Supporting the Contention, Along
 With Appropriate Citations to Supporting Scientific or Factual Materials.....12

New Contention 5 – Impermissible Discussion of Energy Alternatives and Need for
the Proposed SMR.....12

 1. Statement of Contention.....12

 2. Basis statement.....13

 a. Requirements of NEPA.....13

b.	Regulatory requirements for NEPA compliance in ESP proceedings.....	15
c.	Environmental Report and Draft EIS.....	16
d.	The Draft EIS' discussion of energy alternatives and the need for the proposed SMR violates NEPA and NRC implementing regulations.....	20
e.	The Draft EIS' claims regarding the benefits of the proposed SMR are not supported or valid.....	22
3.	Demonstration that the Contention is Within the Scope of the Proceeding.....	27
4.	Demonstration that the Contention is Material to the Findings NRC Must Make to issue an ESP for the proposed TVA SMR.....	27
5.	Concise Statement of the Facts or Expert Opinion Supporting the Contention, Along With Appropriate Citations to Supporting Scientific or Factual Materials.....	27
IV.	INTERVENORS HAVE GOOD CAUSE TO FILE THIS MOTION AFTER THE INITIAL DEADLINE FOR HEARING REQUESTS.....	29
V.	CONSULTATION PURSUANT TO 10 C.F.R. § 3.232.....	29
VI.	CONCLUSION.....	29

**INTERVENORS' MOTION FOR LEAVE TO FILE
CONTENTION 4 (INADEQUATE DISCUSSION OF
ENVIRONMENTAL IMPACTS OF SPENT FUEL POOL FIRES)
AND CONTENTION 5 (IMPERMISSIBLE DISCUSSION OF ENERGY
ALTERNATIVES AND NEED FOR THE PROPOSED SMR)**

I. INTRODUCTION

Pursuant to 10 C.F.R. §§ 2.309(c) and 2.309(f), Intervenors Southern Alliance for Clean Energy (“SACE”) and Tennessee Environmental Council (“TEC”) hereby request the Atomic Safety and Licensing Board’s (“ASLB’s”) leave to file new Contentions 4 and 5. Both contentions address deficiencies in the Draft Environmental Impact Statement (“Draft EIS”) recently issued by the U.S. Nuclear Regulatory Commission (“NRC”) Staff for Tennessee Valley Authority’s (“TVA’s”) application for an Early Site Permit (“ESP”). NUREG-2226, Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site (Draft Report for Comment, April 2018). If granted, the ESP would allow TVA to bank the Clinch River Nuclear Site as a potential site for construction and operation of a small modular reactor (“SMR”).

Contention 4 challenges the adequacy of the Draft EIS’ discussion of the environmental impacts of spent fuel pool accidents risks and Contention 5 challenges the Draft EIS’ impermissible inclusion of information about the technical and economic benefits of building and operating the proposed SMR. As discussed in Sections III and IV below, Contentions 4 and 5 meet the NRC’s standards for admissibility of contentions, as well as the NRC’s “good cause” standard for filing of contentions after the original deadline for hearing requests.

II. FACTUAL AND PROCEDURAL BACKGROUND

On June 12, 2017, Intervenors submitted a hearing request and petition to intervene on TVA’s ESP application for siting of an SMR at the Clinch River Site. Petition to Intervene and

Request for Hearing (“Hearing Request”). Intervenors’ Hearing Request included Contention 2, which challenged TVA’s failure to address the consequences of spent fuel pool fires in its Environmental Report; and Contention 3, which challenged the ER for discussing the relative technical advantages of SMRs in comparison to other energy alternatives on the ground that TVA had explicitly elected to omit those issues from the Environmental Report.

In LBP-17-08, the ASLB found Intervenors had standing and admitted Contentions 2 and 3. *Tennessee Valley Authority* (Clinch River Nuclear Site Early Site Permit Application), LBP-17-08, __ NRC __ (Oct. 25, 2017) (“LBP-17-08”). The ASLB concluded that Contention 2 was an admissible “contention of omission.” *Id.*, slip op. at 27. With respect to Contention 3, the ASLB found that Intervenors had raised an admissible issue of whether information included in TVA’s Environmental Report, while lawful under NRC regulations applicable to environmental reports, would be impermissible under 10 C.F.R. § 51.75(b) if it were later included in the Draft EIS. *Id.*, slip op. at 31.

In response to an appeal of LBP-17-08 by TVA, the Commission affirmed the admission of Contention 2 and reversed the admission of Contention 3 in CLI-18-05. *Tennessee Valley Authority* (Clinch River Nuclear Site Early Site Permit Application), CLI-18-05, __NRC __ (May 3, 2018). In reversing the ASLB’s decision, the Commission held that “[t]he determining factor is TVA’s statements, in the Environmental Report, that it has chosen to defer a discussion of need for power and energy alternatives until the combined license application, which it is permitted to do under 10 C.F.R. § 51.50(b)(2).” *Id.*, slip op. at 15.

On April 20, 2018, the NRC posted the Draft EIS on its Agencywide Documents Access and Management System. The NRC Staff notified the Board and parties of the posting by letter dated April 23, 2018. Letter from Anne Hove to Paul Ryerson, *et al.*, re: In the Matter of

TENNESSEE VALLEY AUTHORITY (Clinch River Nuclear Site Early Site Permit Application) Docket No. 52-047-ESP. Notice of the availability of the Draft EIS was published on April 26, 2018 at 83 Fed. Reg. 18,354.

III. CONTENTIONS

Contention 4: Inadequate Discussion of the Environmental Impacts of Pool Fires

1. Statement of the Contention: The Draft EIS is inadequate to satisfy the National Environmental Policy Act (“NEPA”) because its conclusion that environmental impacts of a spent fuel pool accident are small is based on non-conservative or otherwise invalid assumptions that are based on the design characteristics of a light water reactor (“LWR”) and compliance by TVA with all current emergency planning requirements.

First, the NRC Staff makes assumptions about patterns of fuel usage and storage at LWRs that differ significantly from the characteristics of at least one SMR design included in the proposed “plant parameter envelope” (“PPE”) on which the Staff’s environmental analysis is based. The Draft EIS fails to analyze those key differences. Second, the NRC Staff makes assumptions in the Draft EIS about the PPE with respect to the quantity of fuel stored in the pool that are neither conservative nor bounding for at least one of the SMR designs that comprise the PPE. Finally, the Draft EIS’s environmental analysis is based on the non-conservative assumption that the ten-mile emergency planning zone (“EPZ”) around the proposed SMR will be evacuated, when in fact the NRC currently is considering a request by TVA to relax that requirement. Accordingly, the Draft EIS fails to support its assertion that the risk profile for spent fuel pool fires at an LWR is bounding for the proposed SMR.

2. Brief Summary of Basis for the Contention:

a. Legal and factual basis for requiring discussion of pool fire impacts.

As discussed in Intervenors' 2017 Hearing Request, the consequences of spent fuel pool fires must be considered in any environmental analysis of the impacts of reactor operation, because the NRC has not ruled out their likelihood as remote and speculative. *State of New York v. NRC*, 681 F.3d 471, 483 (D.C. Cir. 2012). *See also* NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants at 1-28 (2013) ("License Renewal GEIS") (concluding the environmental impacts of pool fires are "comparable to those from the reactor accidents at full power.").

It is well established that the radiological consequences of a pool fire are potentially catastrophic. For instance, radioactive fallout from a pool fire could displace as many as four million people out to 500 miles. NUREG-2161, Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor at 169 (2014) (ADAMS Accession No. ML13297070) ("Spent Fuel Pool Study"). In the 2013 License Renewal GEIS, the NRC also concluded that the environmental impacts of a pool fire are "comparable to those from the reactor accidents at full power." *Id.* at 1-28. The potential for reactor accidents to have significant adverse public health effects within at least a ten-mile radius -- including early and latent fatalities -- is discussed in NRC's emergency planning guidance documents. *See* NUREG-0396, Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants (1978) and NUREG-0654/FEMA-REP-1, Rev. 1, Criteria for Protective Action Recommendations for Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants (1980).

b. TVA's Environmental Report and Draft EIS

In its Environmental Report, TVA claimed that the design of the spent fuel storage pool(s) for the proposed SMR has “spent fuel pool cooling without the need for active heat removal.” Environmental Report at 9.3-2. But the Environmental Report did not state that the cooling system renders pool fires remote and speculative. Therefore, Intervenors asserted in Contention 2 that spent fuel pool fire impacts must be considered in the Environmental Report.

The Draft EIS constitutes the first environmental document in which TVA or the NRC Staff has addressed the probability or consequences of a pool fire at the proposed TVA SMR. In the Draft EIS, the NRC asserts that it “has reviewed the past NRC studies concerning spent fuel accidents, TVA’s PPE values regarding spent fuel inventory and spent fuel pool characteristics, and the Fukushima actions in regard to spent fuel level instrumentation and mitigation.” *Id.* at 5-87. The “past NRC studies” relied on in the Draft consist of the following EISs and technical studies of fuel storage at LWRs:

- NUREG-1437, Rev. 0, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (“License Renewal GEIS”) (1996);
- NUREG-1437, Rev. 1, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (“License Renewal GEIS”) (2013);
- NUREG-2157, Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel (2014);
- NUREG-1738, Technical Study of Spent Nuclear Fuel Pool Accident Risks of Decommissioning Nuclear Power Plants (2001); and
- NUREG-2161, Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel for a U.S. Mark I Boiling Water Reactor (2014) (“Spent Fuel Pool Study”).

Draft EIS at 5-85 – 5-86.

The “PPE values regarding spent fuel inventory and spent fuel pool characteristics” considered in the Draft EIS include the following:

- Each reactor would be re-fueled every two years;
- Fuel would not be stored in the pool for more than six years (then transferred to an independent spent fuel storage installation); and
- A dedicated spent fuel pool would hold approximately 288 fuel assemblies, a “smaller amount of spent fuel” than NRC considered in its LWR environmental and risk analyses.

Draft EIS at 5-86. According to the Draft EIS, these PPE values “encompass four light water SMRs under development in the United States at the time of the preparation of the [Environmental Report] – the BWXT mPower™ SMR (Generation mPower LLC), Holtec SMR-160 (Holtec SMR, LLC), NuScale SMR (NuScale Power, LLC), and Westinghouse SMR (Westinghouse Electric, LLC) (TVA 2016-TN5002). The Draft EIS does not attribute any of the listed PPE elements to a particular SMR design, other than to assert that the PPE values “encompass” all four designs. *Id.*

Based on these EISs, technical studies, and PPE design assumptions, the NRC Staff asserts that it “expects the risks from spent fuel pool accidents for a design bounded by the PPE would be lower than the risks of a spent fuel pool severe accident for a large LWR.” *Id.* at 5-87. As the Draft EIS further explains:

The already remote risk of spent fuel pool fires for large LWRs, as described in the 1996 version of NUREG-1437 (NRC 1996-TN288) (1996) and confirmed in the 2013 version (NRC 2013-TN2654), would be more remote for the SMRs considered in developing the PPE based on the best available information about those SMR designs because (1) the spent fuel pools are assumed to be located underground, (2) the fuel transfer would be expedited because the pool would be significantly smaller than that of a large LWR and therefore the number of spent fuel assemblies in the pool would be much lower; and (3) implementation of the NRC orders improves the safety of the spent fuel pools and provides mitigating strategies for preventing spent fuel pool fire. Therefore, because the impact from spent fuel pool fires is considered SMALL for large LWRs, it is also SMALL for the SMRs considered for the CRN Site.

Draft EIS at 5-87.

c. Significant design differences and non-conservatism disregarded in Draft EIS

The Draft EIS disregards significant design differences between the LWR designs on which the NRC Staff bases its environmental conclusions and at least one of the designs included in the PPE: the NuScale design. Intervenor focus on the NuScale design here because it is more developed than some of the other designs and because TVA relied on it in applying for an exemption to the NRC's emergency planning requirements. *See* letter from J.W. Shea, TVA to NRC re: Response to Request for Additional Information Related to Emergency Planning Exemption Requests in Support of Early Site Permit Application for Clinch River Nuclear Site, Enclosure 1 at 1 (Aug. 24, 2017) (ML17237A175) (citing "the availability of substantially more detailed technical information on accident progression and source term for this design than for the other designs considered in the formation of the PPE."). The Staff also makes assumptions about the PPE with respect to the quantity of fuel stored in the pool that are not conservative in light of the NuScale design.

i. Significantly different fuel discharge pattern may affect heat level in the pool.

First, the Draft EIS completely neglects a significant factor in pool fire risks: the different length of the average decay time of the spent fuel inventory in the NuScale SMR pool as compared to a LWR. Decay time is an important factor in spent fuel pool fire risk analysis because "[t]he only significant heat source initially would be the decay heat." NUREG-1738 at A1A-2. As shown in Figure 1A-1 of NUREG-1738, decay heat, which decreases with time after fuel is discharged to the pool, is a key factor in determining how long it would take for a pool fire to start:

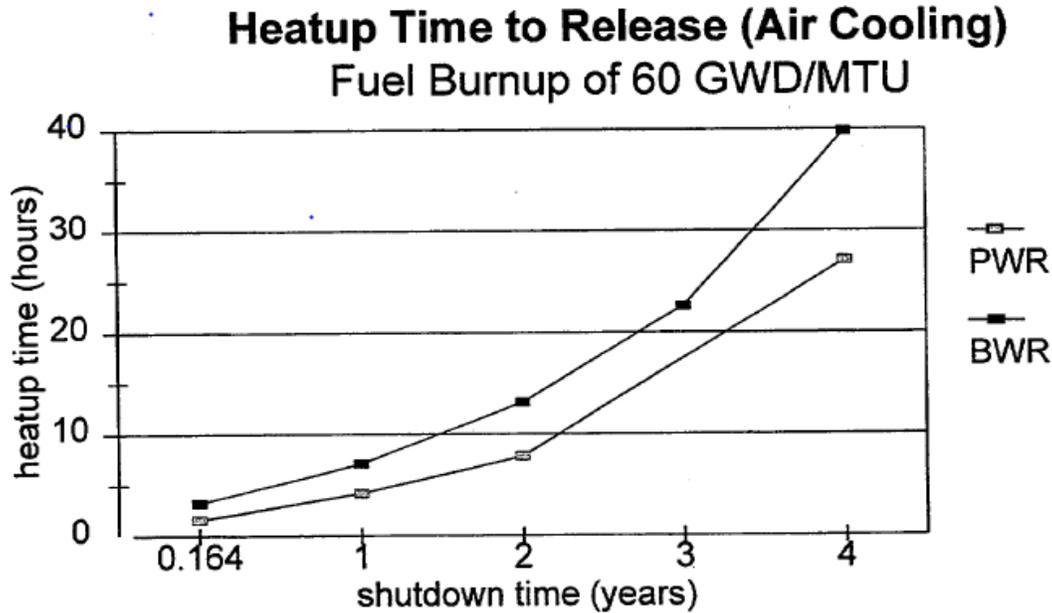


Figure 1A-1 Heatup time from 30 °C to 900 °C

Figure 1A-1 is explained by the NRC Staff as follows:

Figure 1A-1 shows that for the configuration modeled, and for decay times of less than about 2 years for PWRs and 1.5 years for BWRs (assuming burnup of 60 GWD/MTU), it would take less than 10 hours for a zirconium fire to start or for significant fission product releases to begin once the fuel was fully uncovered and the fuel was cooled by an air flow of about two building volumes per hour. The figure also shows that after 4 years, PWR fuel could reach the point of fission product release in about 24 hours.

Id. at A1A-4. Similarly, the 2014 Spent Fuel Pool Study found that spent fuel is only susceptible to a radiological release within a few months after the fuel is moved from the reactor to the spent fuel pool.” *Id.* at iii-iv. Thus, the amount of time that has passed after discharge of fuel to the pool is a significant factor in the speed at which uncovered spent fuel will ignite.

In addition to affecting the speed at which an accident occurs, decay time also affects the number of early fatalities that may occur in a spent fuel pool accident. As stated in NUREG-1738, “[a]pproximately 85 percent of all the ruthenium in the pool is in the last core off-loaded since the ruthenium-106 half-life is about 1 year.” NUREG-1738, Figure 3.7-1 and Figure ES-1,

show that ruthenium-related fatalities are highest during the months directly following shutdown, *i.e.*, when the fuel in the pool is hottest.

The Staff bases its environmental analysis on the assumption that TVA will refuel each SMR at a frequency of two years. Draft EIS at 5-86. Two years is also the refueling cycle for the reference LWR studied in the Spent Fuel Pool Study. *Id.* at D-32. But the NuScale design – which the NRC Staff claims is encompassed by the Draft EIS’ environmental analysis -- is distinctly different from the reference LWR with respect to its reactor design and refueling pattern. While the reference LWR in the Spent Fuel Study was assumed to discharge 296 fuel assemblies to a pool of 30,055 assemblies every two years, the NuScale design calls for twelve separate reactors that would discharge fuel to a single pool. Although each reactor will be on a two-year refueling schedule, refueling of all twelve reactors will be “staggered,” *i.e.*, fuel will be discharged to the fuel every two months rather than every two years.¹ In contrast to an LWR pool, in which the hottest fuel is present only once every two years, the hottest fuel will be added to the SMR pool every two months. This pool loading pattern will result in different probabilities of zirconium fire ignition over an operating cycle than those used in NUREG-2161 and other past NRC studies to estimate public health and environmental impacts of pool fires at large LWRs. The Draft EIS completely fails to address the risk implications of this significant design difference from the large LWRs analyzed in previous NRC studies.

¹ As stated by NuScale in a 2012 article in Nuclear Technology:

The 12-module NuScale plant uses an in-line refueling approach in which each module is refueled once every 2 years. Refueling is performed remotely using underwater flange stud tensioning/detensioning tools. That is, refueling operations would occur in a staggered manner at roughly 2-month intervals.

José N. Reyes, NuScale Plant Safety in Response to Extreme Events, Nuclear Technology Vol. 178 at 1 (May 2012). http://www.nuscalepower.com/images/our_technology/nuscale-safety-nucl-tech-may12-pre.pdf (last visited May 21, 2018).

ii. Assumptions related to quantity of fuel stored in pool are not conservative.

The Draft EIS' finding of small impact from spent fuel pool fires is based in part on the conclusion that "spent fuel transfer would be expedited because the pool would be significantly smaller than that of a large LWR and therefore the number of spent fuel assemblies in the pool would be much lower." *Id.* at 5-87. This conclusion is based, in turn, on two key assumptions: that the pool would hold only 288 fuel assemblies, and that the fuel would not remain in the pool more than six years. *Id.* at 5-86. But neither the NRC Staff nor TVA cites any regulatory requirements to support these assumptions. Although the pool would hold up to 288 assemblies per module, the required capacity would be proportionately larger if multiple modules were at the site. Also, the NRC places no regulatory limit on the size of a spent fuel pool. Nor do NRC regulations contain any requirement to expedite transfer of fuel from storage pools before capacity limits are reached. TVA's Environmental Report asserts that NRC requires fuel to remain in the pool for at least five years (TVA Environmental Report at 5.7-12) – but this is a minimum requirement, not a limit. And at least one other SMR design that TVA used to develop its surrogate plant, such as mPower, would have a spent fuel pool sized to store all spent fuel discharges over the lifetime of the plant.

Recently-issued documents from NuScale indicate that not only is the NuScale design generally capable of storing spent fuel for more than six years, but it appears that the design of the pool has not yet been finalized. On May 19, 2018, NuScale issued a graphic presentation on "Spent Fuel Safety," which stated that: "The NuScale spent fuel pool provides storage for up to 10 years of spent fuel storage, plus temporary storage for new fuel assemblies." *See* Attachment 1. On the same date, NuScale issued a different graphic presentation, entitled "Safety Features of the NuScale Design," which states: "The spent fuel pool provides storage space for up to 15

years of accumulated spent fuel assemblies, plus temporary storage for new fuel assemblies.” *See* Attachment 2. These presentations underline the non-conservative nature of the Draft EIS’ assumptions regarding pool capacity and the length of time the fuel will remain in the SMR pool.

d. Assumption that 10-Mile EPZ would be evacuated is not conservative.

The Draft EIS is not conservative because it does not address the environmental impacts of a pool fire if the ten-mile emergency planning zone (“EPZ”) required by NRC regulations is cut back to two miles or the site boundary, as has been requested by TVA in Part 6 of its COL application. The studies on which the NRC relies for the Draft EIS assume the ten-mile EPZ is evacuated. *See, e.g.,* Spent Fuel Pool Study at x, 155.² The only exception is NUREG-1738, whose purpose was to determine whether the requirements for emergency planning in a ten-mile EPZ could safely be relaxed for decommissioning LWRs. NUREG-1738 showed that differences in accident consequences could be significant between evacuated and non-evacuated EPZs, depending on how soon after reactor shutdown the accident occurs. *See* Table 3.7-1, which shows that for a high ruthenium pool accident occurring within 30 days after discharge of fuel, evacuation of the EPZ could reduce the number of early fatalities from 192 to seven. This difference is significant and warrants examination in the Draft EIS, just as the NRC Staff did for reactor accidents. *See* note 2 above.

3. Demonstration that the Contention is Within the Scope of the Proceeding: This contention is within the scope of this ESP proceeding because it seeks consideration of the consequences of a type of severe accident that NRC views as reasonably foreseeable and therefore must address in the EIS for the proposed ESP.

² In contrast, for reactor core melt accidents, the NRC evaluated a range of scenarios, including evacuation of a ten-mile EPZ, evacuation of a two-mile EPA, and evacuation of a site-boundary EPZ. *Id.* at 5-74 – 5-75.

4. Demonstration that the Contention is Material to the Findings NRC Must Make to issue an ESP for the proposed TVA SMR: The contention is material to the findings that NRC must make in order to issue an ESP for the proposed TVA SMR because it relates to the question of whether the Draft EIS has addressed all reasonably foreseeable impacts of operating an SMR in its Environmental Report, as required by NEPA. *State of New York*, 681 F.3d at 483.

5. Concise Statement of the Facts or Expert Opinion Supporting the Contention, Along With Appropriate Citations to Supporting Scientific or Factual Materials: The facts supporting this contention, and the citations relied on by Intervenors, are stated above. In addition, Intervenors rely on the attached Declaration of Dr. Edwin J. Lyman (May 21, 2018). *See* Attachment 3.

New Contention 5 – Impermissible Discussion of Energy Alternatives and Need for the Proposed SMR

1. Statement of Contention:

The Draft EIS violates NEPA and NRC implementing regulations 10 C.F.R. §§ 51.75(b), 51.20(b), 51.104, and 52.21, by impermissibly incorporating and claiming to be “informed by” assertions by TVA regarding the economic, technical, and other benefits of the proposed SMR, including need for power and alternative energy sources. *See* Section 1.3 at 1-9 – 1-10. The Draft EIS also violates these NEPA regulations by presenting the “no-action” alternative as foregoing benefits (including the asserted benefits of operating the SMRs) rather than avoiding environmental impacts. *Id.* at xxxiii, 1-12, 9-2.

Because TVA elected not to address the need for power and energy alternatives in its Environmental Report, CLI-18-05, slip op. at 15, discussion of the benefits associated with *building and operating* the SMR is prohibited from the Draft EIS by Section 51.57(b). By the same token, the Draft EIS’ inclusion of construction and operation-related benefits in its

“Purpose and Need” statement (Draft EIS at 1-9 – 1-10) goes far beyond the siting related benefits that are may be listed under 10 C.F.R. § 51.75(b) and the Commission’s supporting rationale. Final Rule: Licenses, Certifications, and Approvals for Nuclear Power Plants, 72 Fed. Reg. 49,352, 49,430 (Aug. 28, 2007).

In addition, by incorporating TVA’s assertions regarding the construction and operation-related benefits of the proposed SMR, at the same time as it claims *not* to have evaluated the need for power and energy alternatives, the NRC Staff raises a strong inference that it has included TVA’s information in the Draft EIS without conducting its own independent evaluation, in violation of 10 C.F.R. § 51.70.

Finally, Intervenors contend that the Draft EIS’ assertions regarding the need for the proposed SMR and the benefits of the proposed SMR in relation to other energy alternatives are not supported, adequately analyzed, or valid. Yet, Intervenors are prohibited by 10 C.F.R. § 52.21 from challenging the assertions as a result of TVA’s and the NRC Staff’s formal claims not to have addressed them in the Draft EIS. Intervenors respectfully submit that the NRC would violate NEPA’s public participation requirements by including and claiming to rely on technical information in the Draft EIS, without permitting interested members of the public an opportunity to challenge the reliability of that information in a hearing. 10 C.F.R. §51.104.

2. Basis statement:

a. Requirements of NEPA

NEPA implements a “broad national commitment to protecting and promoting environmental quality.” *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 87 (1998) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 348 (1989) and citing 42 U.S.C. § 4331). NEPA has two key purposes: to ensure that the

agency “will have available, and will carefully consider, detailed information concerning significant environmental impacts” before it makes a decision; and to guarantee that “the relevant information will be made available to the larger audience that may also play a role in the decision-making process and implementation of that decision.” *Robertson*, 490 U.S. at 349.

In fulfilling NEPA’s first purpose of evaluating the environmental impacts of its decisions, a federal agency is required to take a “hard look” at potential environmental consequences by preparing an EIS prior to any “major Federal action[] significantly affecting the quality of the human environment.” *Robertson*, 490 U.S. at 349; 42 U.S.C. § 4332(c). The “hallmarks of a ‘hard look’ are thorough investigation into environmental impacts and forthright acknowledgment of potential environmental harms.” *National Audubon Society v. Dept. of the Navy*, 422 F.3d 174, 185 (4th Cir. 2005). In addition, the agency must “rigorously explore and objectively evaluate the projected environmental impacts of all reasonable alternatives for completing the proposed action.” *Van Ee v. EPA*, 202 F.3d 296, 309 (D.C. Cir. 2000). In considering alternatives, the agency must examine the “alternative of no action.” 40 C.F.R. § 1502.14.

In fulfilling NEPA’s second purpose of public participation, the agency’s environmental analysis must be published for public comment “to permit the public a role in the agency’s decision-making process.” *Robertson*, 490 U.S. at 349-50; *Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 443 (4th Cir. 1996). NRC’s Part 51 regulations also allow interested members of the public to participate in the environmental decision-making process through the NRC’s hearing process. 10 C.F.R. §51.104.

In order for an EIS to serve its functions of informing decisionmakers and the public, it is essential that the EIS not be based on misleading assumptions. *Hughes River Watershed*

Conservancy, 81 F.3d at 446 (rejecting EIS that contained misleading projections of a project’s economic benefits). Misleading assumptions “can defeat the first function of an EIS by impairing the agency’s consideration of the adverse environmental effects of a proposed project,” and the second function by “skewing the public’s evaluation of a project.” *Id.* (citing *South Louisiana Environmental Council, Inc. v. Sand*, 629 F.2d 1005, 1011-12 (5th Cir. 1980)).

b. Regulatory requirements for NEPA compliance in ESP proceedings

Because an ESP approves only the banking of a site and not construction or operation of any nuclear facility, the NRC allows the applicant to defer consideration of the relative costs and benefits of construction and operation, need for power, and energy alternatives. 10 C.F.R. § 51.50(b)(2). If an applicant elects to postpone consideration of these issues, NRC regulations limit the discussion of alternatives and benefits in the EIS to issues related to the siting of the facility:

The draft environmental impact statement must not include an assessment of the economic, technical, or other benefits (for example, need for power) and costs of the proposed action or an evaluation of alternative energy sources, unless these matters are addressed in the early site permit environmental report.

10 C.F.R. § 51.75(b). As explained by the Commission, the focus of a NEPA review at the ESP stage is limited to siting issues unless the applicant explicitly chooses to conduct a broader analysis:

Section 51.75 requires that the draft environmental impact statement must include an evaluation of alternative sites to determine whether there is any obviously superior alternative to the site proposed. *The draft environmental impact statement must also include an evaluation of the environmental effects of construction and operation of a reactor, or reactors, which have design characteristics that fall within the site characteristics and design parameters for the early site permit application, but only to the extent addressed in the early site permit environmental report or otherwise necessary to determine whether there is any obviously superior alternative to the site proposed.* The purpose of this change is to clearly delineate that the scope of the environmental review at the early site permit stage is, at a minimum, to address all issues needed for the NRC to perform its evaluation of the alternative sites. In addition, the applicant may choose to

address one or more issues related to construction and operation of the facility with the goal of achieving finality on those issues at the early site permit stage.

72 Fed. Reg. at 49,432-33 (emphasis added). Thus, *only if the applicant chooses to address the economic and technical benefits of construction and operation in its Environmental Report* may those issues be addressed in the EIS for an ESP.

A corollary to the prohibition against discussion of need for power and energy alternatives is the requirement that an EIS at the ESP stage must describe the “proposed action” and “purpose and need” in relation to the siting decision, not construction and operation of a reactor. As explained in the preamble to the 2007 Part 52 regulations:

*The environmental report and EIS for an early site permit must address the benefits associated with issuance of the early site permit (e.g., early resolution of siting issues, early resolution of issues on the environmental impacts of construction and operation of a reactor(s) that fall within the site characteristics, and ability of potential nuclear power plant licensees to “bank” sites on which nuclear power plants could be located without obtaining a full construction permit or combined license). The benefits (and impacts) of issuing an early site permit must always be addressed in the environmental report and EIS for an early site permit, regardless of whether the early site permit applicant chooses to defer consideration of the benefits associated with the construction and operation of a nuclear power plant that may be located at the early site permit site. This is because the “benefits * * * of the proposed action” for which the discussion may be deferred are the benefits associated with the construction and operation of a nuclear power plant that may be located at the early site permit site; the benefits which may be deferred are entirely separate from the benefits of issuing an early site permit. The proposed action of issuing an early site permit is not the same as the “proposed action” of constructing and operating a nuclear power plant for which the discussion of benefits (including need for power) may be deferred under § 51.50(b).*

Final Rule: Licenses, Certifications, and Approvals for Nuclear Power Plants, 72 Fed. Reg. at 49,430.

c. Environmental Report and Draft EIS

As noted by the Commission in CLI-18-05, TVA opted not to address alternative energy sources and need for power in its Environmental Report, as permitted by 10 C.F.R. § 51.50(b)(2). *Id.*, slip op. at 15. Nevertheless, TVA’s Environmental Report included discussions

of the need for the proposed SMR and the alleged preferability of SMR technology from the standpoints of security, reliability, and environmental protection. *See id.*, Chapters 1 and 9. In Contention 3, SACE challenged the lawfulness of these assertions under the National Environmental Policy Act (“NEPA”) and NRC implement regulations. Petition to Intervene and Request for Hearing at 11-24 (Jun. 12, 2017).

In October 2017, the ASLB admitted Intervenors’ Contention 3. LBP-17-08, slip op. at 33. The Commission later reversed the admission of Contention 3, however, concluding that TVA’s assertions regarding the need for power and energy alternatives were “extraneous” to “the determining factor” of TVA’s explicit election “to defer a discussion of need for power and energy alternatives until the combined license application.” *Id.*, slip op. at 15 (citing 10 C.F.R. § 51.50(b)(2)).

In April 2018, consistent with TVA’s election to defer the discussion of need for power and energy alternatives under 10 C.F.R. § 51.50(b)(2), and as provided by 10 C.F.R. § 51.75(b)(2), the NRC Staff issued a Draft EIS stating that it “does not include an assessment of the need for power or energy alternatives.” Draft EIS at 1-4. *See also id.* at 9-2 (“As stated in 10 CFR 51.50(b)(2) and 10 CFR 51.75(b) (TN250), the analysis of energy alternatives for the proposed TVA SMR project is not required for an ESP, was not addressed in the environmental report for the ESP application, and is therefore not addressed in this EIS.”).

In Section 1.3, addressing the “Purpose and Need for the Proposed Action,” the Draft EIS states that “[t]he primary purpose and need for the NRC proposed action (i.e., ESP issuance) is to provide for early resolution of site safety and environmental issues, which provides stability in the licensing process.” This limited statement of purpose and need is consistent with the

Commission’s regulatory framework for ESP environmental reviews, as set forth in the preamble to the 2007 Part 52 rulemaking. *See* discussion above at 18 and 72 Fed. Reg. at 49,430.

Despite having limited the “primary” purpose and need for issuance of the ESP to benefits of siting rather than construction, and despite having stated that the Draft EIS would not address need for power or energy alternatives, the Draft EIS goes on to assert that “[t]he NRC’s purpose and need is further informed by the applicant’s purpose and need,” and incorporates five full paragraphs of text from TVA’s Environmental Report. Draft EIS at 1-9 – 1-10. Each of these paragraphs contains TVA’s rationalization, on various grounds, for the need to build and operate the proposed SMR and its alleged benefits compared to other energy alternatives. For instance, the Draft EIS quotes TVA’s Environmental Report verbatim as follows:

TVA proposes to deploy two or more SMRs with a maximum total electrical output of 800 megawatt electric (MWe) for the site, to demonstrate the capability of SMR technology. *SMRs provide the benefits of nuclear-generated power in situations where large nuclear units, with an approximate electrical output exceeding 1000 MWe, are not practical, because of transmission system constraints, limited space or water availability, or constraints on the availability of capital for construction and operation.*

Draft EIS at 1-9 (emphasis added). *Compare* Environmental Report at 1-1. Similarly, the Draft EIS quotes -- almost verbatim -- TVA’s summary of the “four main objectives” of TVA’s proposed SMR “Project,” all of which relate to the need for the SMR and its alleged benefits as an energy alternative:

- Power generated by SMRs could be used for addressing critical energy security issues. Their use on or immediately adjacent to DoD or DOE [U.S. Department of Defense or U.S. Department of Energy] facilities, using robust transmission (e.g., armored transformers, underground transmission), could address national security needs by providing reliable electric power in the event of a major grid disruption. A more reliable electric power supply could be accomplished by the SMR operation in “power island” mode with robust transmission to critical facilities. In addition, intentional destructive acts (e.g., terrorist attacks) and natural phenomena (e.g., tornadoes, floods, etc.) could disrupt the grid and the ability to restore most generation sources. SMRs can provide reliable energy for extended operation.

Because nuclear reactors require fuel replenishment less frequently than other power generation sources (coal, gas, wind and solar), SMRs are less vulnerable to interruptions of fuel supply and delivery systems. TVA could demonstrate this “power islanding” and secure supply concept as part of the CR SMR project by utilizing controls, switching, and transmission capabilities to disconnect the SMR power plant from the electrical grid, while maintaining power from the SMR power plant to a specified DOE facility supplying reliable power that is less vulnerable to disruption from intentional destructive acts and natural phenomena.

- SMR technology can assist Federal facilities with meeting carbon reduction objectives. Energy-related carbon dioxide (CO₂) emissions account for more than 80 percent of greenhouse gas (GHG) emissions in the United States. Studies show that on average coal combustion generates approximately 894–975 grams of CO₂ per kilowatt-hour (g/kWh) of electricity generated. Natural gas generates an estimated 450–519 g/kWh. Nuclear power emission rates have been calculated to range from 6–26 g/kWh. [Citations in ER text omitted.]
- SMR design features include underground containment and inherent safe shutdown features, longer station blackout coping time without external intervention, and core and spent fuel pool cooling without the need for active heat removal. These key features advance safety by eliminating several design basis accident scenarios. Development of a security-informed design efficiently provides the same or better protection against the threats [operators of] large reactors must consider. Physical security is designed into the SMR plant architecture, incorporating lessons learned from significant shifts in security posture since 2001, and the opportunity to build more inherently secure features into the initial design.
- SMR power generating facilities are designed to be deployed in an incremental fashion to meet the power generation needs of a service area. Generating capacity can be added in increments to match load growth projections. For the CR SMR project, two or more SMRs would be constructed and brought into operation incrementally to achieve [a capacity of] up to 800 MW(e).

Id. at 1-9 – 1-10. *Compare* Environmental Report at 1-2 – 1-3.

Based on these asserted benefits of building and operating the SMR, the Draft EIS concludes that “[t]he NRC’s purpose and need is informed by the applicant’s objective to use the power generated by SMRs to address critical energy security issues for TVA Federal direct-served customers (which included only DoD or DOE facilities).” *Id.* at 1-10.

The Draft EIS also compares the SMR favorably to the no-action alternative by characterizing it as an action that would forego benefits rather than avoid adverse impacts:

In the no-action alternative, the action would not go forward. The NRC could deny the TVA request for an ESP. The no-action or permit denial alternative also is available to the USACE [United State Army Corps of Engineers] after a permit is submitted to the USACE. The no-action alternative is one that results in no activities requiring a USACE permit. It may be brought by (1) the applicant electing to modify his proposal to eliminate work under the jurisdiction of the USACE or (2) the denial of the permit. If the request and/or permit were denied, the construction and operation of a new nuclear power plant at the proposed CRN Site in accordance with the 10 CFR Part 52 (TN251) process referencing an approved ESP would not occur, *nor would any benefits intended by an approved ESP be realized.*

Draft EIS at 1-12 (emphasis added). Similarly, the Draft EIS states in Section 9.1 (No Action Alternative):

[T]he no-action alternative would accomplish none of the benefits intended by the ESP process, which would include (1) early resolution of siting issues prior to large investments of financial capital and human resources in new plant design and construction, (2) early resolution of issues related to the environmental impacts of construction and *operation of new nuclear units that fall within the plant parameters for small modular reactor (SMR) nuclear generating units.*

Id. at 9-1 (emphasis added).

d. The Draft EIS' discussion of energy alternatives and the need for the proposed SMR violates NEPA and NRC implementing regulations.

As discussed above, because TVA elected, pursuant to 10 C.F.R. § 51.50(b)(2), not to address the need for power and alternative energy sources in its Environmental Report, 10 C.F.R. § 51.75(b) prohibits the NRC Staff from discussing these topics in the Draft EIS. The Draft EIS violates that prohibition by reproducing and claiming to be “informed” by TVA’s one-sided assertions regarding the need for and comparative benefits of the proposed SMRs as an energy source. Draft EIS at 1-9 – 1-10. By presenting these rationalizations for the construction and operation of the proposed SMR, the NRC Staff violates both the plain language of 10 C.F.R. § 51.75 and the Commission’s regulatory framework for an EIS prepared at the ESP stage, which requires the EIS to focus on siting issues only. 72 Fed. Reg. 49,432-33. *See also Exelon Generation Co., L.L.C.* (Early Site Permit for Clinton ESP Site), *et al.*, CLI-05-17, 62 NRC 5, 48

(2005) (observing that at the ESP stage, “boards must merely weigh and compare alternative sites, not other types of alternatives (such as alternative energy sources.”).

By the same token, the Draft EIS’ discussion of the no-action violates 10 C.F.R. § 51.75(b) and its underlying principles, by presenting the effects of the “no-action” alternative as foregoing benefits that include operating the SMRs. *See Draft EIS*. at xxxiii, 1-12, 9-2. As the Commission observed in the 2007 rulemaking for new reactor licensing, the “benefits which may be deferred [*i.e.*, the benefits of operating a reactor] are “entirely separate from the benefits of issuing an early site permit.” 72 Fed. Reg. at 49,430. The regulations therefore preclude the Draft EIS from discussing the operation of the SMR as a foregone benefit of the no-action alternative.

The Draft EIS also violates NEPA’s requirement for NRC’s independence from TVA in the NEPA process, as set forth in 10 C.F.R. § 51.70(b). Section 51.70(b) provides that “[t]he NRC staff will independently evaluate and be responsible for the reliability of all information used in the draft environmental impact statement.” As discussed above, the Staff has elected *not* to conduct an independent inquiry into the need for proposed SMR or energy alternatives at the ESP stage; yet the Draft EIS quotes and claims to be “informed by” extensive assertions by TVA regarding the comparative benefits of the proposed SMR as an energy alternative. Draft EIS at 1-9- - 1-10.

By incorporating and claiming to be informed by TVA’s assertions regarding the construction and operation-related benefits of the proposed SMR, at the same time as it claims *not* to have evaluated the need for power and energy alternatives, the NRC Staff raises a strong inference that it has included and used TVA’s information in the Draft EIS without conducting its own independent evaluation, in violation of 10 C.F.R. § 51.70(b). The use in the Draft EIS of assertions that have not been independently verified by the NRC Staff violates 10 C.F.R. §

51.70(b). In addition, the Staff's implicit endorsement of TVA's assertions has the potential to violate NEPA by misleading the public into thinking the NRC has an independent basis to deem the information reliable, thereby impermissibly "skewing the public's evaluation of [the] project." *Hughes River Watershed Conservancy*, 81 F.3d at 446. Given the lack of an independent staff analysis of TVA's claims, and given the errors in these claims, these assertions should not be permitted in the final EIS.

In addition, the Draft EIS violates NEPA's public participation requirements by making unsupported, unverified, and demonstrably inaccurate factual claims that are not subject to challenge in this proceeding. 10 C.F.R. § 52.21. *See also Robertson*, 490 U.S. at 349 (noting NEPA's intention for the public to play a role "in the decision-making process and implementation of that decision."). By making claims in the Draft EIS that are insulated from challenge in this proceeding by § 52.21, the NRC Staff prevents Intervenors from fulfilling their right under 10 C.F.R. § 51.104(a)(2) to "take a position and offer evidence" on the adequacy of the EIS with respect to those statements. As demonstrated below in Section 2.d., Intervenors dispute the Draft EIS' claims regarding the need for power and energy alternatives, which are not supported, thoroughly analyzed, or valid.

e. The Draft EIS' claims regarding the benefits of the proposed SMR are not supported or valid.

The claims in the Draft EIS regarding the benefits of the proposed SMR are not supported, thoroughly analyzed, or valid. Therefore, even aside from the illegality of those claims under 10 C.F.R. § 51.75(b), they should not be permitted to remain in the Draft EIS. If Intervenors were not precluded from challenging these claims under 10 C.F.R. § 51.21, they would contest the claims in contentions in this proceeding, on many grounds, including, but not limited to:

- The Draft EIS cites TVA’s selective comparisons of SMRs with other energy technologies, but does not provide a comprehensive comparison. For instance, the Draft EIS compares SMRs with coal, gas, wind and solar on the factor of reliability. Draft EIS at 1-10. But it does not make a comprehensive analysis that addresses all relevant factors, such as carbon reduction, water use, air and water impacts, generation of waste products, and costs.
- The Draft EIS fails to acknowledge that solar and wind energy sources can meet all the other objectives listed by TVA (carbon reduction, safety, and incremental deployment), and have less deleterious environmental impacts, in particular, water use. In fact, based on Table 3.1-2 of the Environmental Report, which states that “[t]he expected (and maximum) rate of removal of water from a natural source to replace water losses from closed cooling water system” are “17,078 gpm (expected) [and] 25,608 gpm (maximum),” and assuming that TVA used a reactor capacity of 800 MW, the expected rate of water withdrawal translates to 1,281 gallons/MW/hour. That rate of water withdrawal is higher than almost any other form of electricity generation. A combined cycle natural gas plant will be about a factor of four lower.³ Solar photovoltaics (PV) and wind use negligible amounts of water; PV plants, for example, use about one gallon/MW/hour.
- To the extent that the Draft EIS compares SMRs with other energy sources on the factor of reliability, the comparison makes only partial sense. The Draft EIS asserts that “[b]ecause nuclear reactors require fuel replenishment less frequently than other power generation sources (coal, gas, wind and solar), SMRs are less vulnerable to interruptions

³ J. Macknick et al., *Operational water consumption and withdrawal factors for electricity generating technologies: a review of existing literature*, 7 ENVIRON. RES. LETT. 45802 (2012).

of fuel supply and delivery systems.” *Id.* at 1-9 – 1-10. While the statement is true for coal and gas, it is irrational in the case of wind and solar because they need no fuel replenishment. Renewable sources of power like solar and wind are, therefore, not vulnerable to fuel disruption. Although these are intermittent in nature, that concern can be addressed in a number of ways, in particular by incorporating on-site energy storage technologies.

- The Draft EIS asserts that:

Because nuclear reactors require fuel replenishment less frequently than other power generation sources (coal, gas, wind and solar), SMRs are less vulnerable to interruptions of fuel supply and delivery systems. TVA could demonstrate this “power islanding” and secure supply concept as part of the CR SMR project by utilizing controls, switching, and transmission capabilities to disconnect the SMR power plant from the electrical grid, while maintaining power from the SMR power plant to a specified DOE facility supplying reliable power that is less vulnerable to disruption from intentional destructive acts and natural phenomena.

Draft EIS at 1-10. But the Draft EIS lumps generation and transmission together, without justification. Reliance on SMR technology has nothing to do with the security of transmission systems. In addition, the Draft EIS fails to address the United States’ history of unsuccessful experimentation with small reactors, which suggests that SMRs are quite unlikely to be reliable sources of generating power in the first place.⁴ Prior experience that is particularly important to take note of is the Army’s Nuclear Power Program, which was started in the 1950s, and resulted in the construction of eight small reactors. The experiences with these reactors reveal the potential for failure implicit with SMRs. The PM-3A reactor at McMurdo Sound in Antarctica, for example, “developed several

⁴ M. V. Ramana, *The Forgotten History of Small Nuclear Reactors*, IEEE SPECTRUM, 2015, <http://spectrum.ieee.org/energy/nuclear/the-forgotten-history-of-small-nuclear-reactors> (last visited May 24, 2015); M. V. Ramana, *The checkered operational history of high temperature gas cooled reactors*, 72 BULLETIN OF THE ATOMIC SCIENTISTS 171–79 (2016).

malfunctions, including leaks in its primary system [and] cracks in the containment vessel that had to be welded.”⁵ The leaks from the plant resulted in significant contamination and nearly 14,000 tons of contaminated soil was physically removed and shipped to Port Hueneme, a naval base north of Los Angeles, for disposal. The Army eventually cancelled the program in 1976, due to poor economics as well as the realization that diesel generators were a superior option for supplying power to remote areas. The official history of the Army’s Nuclear Power Program termed the development of small reactors “expensive and time consuming.”⁶

- The Draft EIS asserts:

SMR technology can assist federal facilities with meeting carbon reduction objectives. Energy-related carbon dioxide (CO₂) emissions account for more than 80 percent of greenhouse gas (GHG) emissions in the United States. Studies show that on average coal combustion generates approximately 894-975 grams of CO₂ per kilowatt-hour (g/kWh) of electricity generated. Natural gas generates an estimated 450-519 g/kWh. Nuclear power emission rates have been calculated to range from 6 - 26 g/kWh.

Id. at 1-10. The Draft EIS’ unsupported assertion that nuclear power emission rates have been calculated to range from 6 to 26 grams per kilowatt hour is erroneous in two key respects. First, independent studies suggest that there is much uncertainty about the level of emissions associated with the generation of nuclear energy. A widely cited academic study shows that estimates of lifecycle emissions from nuclear power plants vary by over two orders of magnitude, from 1.4 to 288 g/kWh of CO₂, with a mean value of 66 g/kWh.⁷ Second, and more important, SMRs require more uranium fuel for each kWh of

⁵ LAWRENCE H. SUID, *THE ARMY’S NUCLEAR POWER PROGRAM: THE EVOLUTION OF A SUPPORT AGENCY* 111 (1990).

⁶ Suid, *supra*, at 93.

⁷ Benjamin K. Sovacool, *Valuing the greenhouse gas emissions from nuclear power: A critical survey*, 36 *ENERGY POLICY* 2950–63 (2008).

electricity generated.⁸ Because of their smaller size and higher area to volume ratio, SMRs will necessarily leak more neutrons from the core when compared to larger reactors. As a result, SMRs need more fuel for each kWh of electricity generated in comparison to the large LWRs that are most common around the world, and that are the basis for the emission estimates made so far (either the 6-26 g/kWh or the 1.4-288 g/kWh). Emissions of CO₂ associated with uranium mining, processing, and enrichment are the dominant contributions to the lifecycle emissions associated with nuclear power. Therefore, this increased need for fuel would result in a corresponding increase in the CO₂ emissions per kWh.

- The Draft EIS claims that TVA’s SMR design improves on spent fuel pool safety by providing for “spent fuel pool cooling without the need for active heat removal.” Draft EIS at 1-10. But this assertion does not mention other relevant information demonstrating that SMRs may require greater spent fuel storage capacity than LWRs, because they could generate a larger quantity of spent fuel for each kWh of electricity generated – additional impacts that should be compared with the safety benefits claimed by TVA. *See, e.g.*, Glaser et al., cited in note 8 above. For instance, TVA’s calculations in its Environmental Report appear to use a burnup value of 51 gigawatt-days per metric ton of uranium (“GWD/tU”). This value is much higher than some of the reported burnups of the designs of the four potential SMRs under consideration by TVA. For example, the International Atomic Energy Agency lists the burnup of the Holtec SMR design as 32

⁸ Alexander Glaser, Laura Berzak Hopkins & M.V. Ramana, *Resource Requirements and Proliferation Risks Associated with Small Modular Reactors*, 184 NUCLEAR TECHNOLOGY 121–29 (2013).

GWD/tU.⁹ At this relatively low burnup, the Holtec SMR will generate more spent fuel than an SMR design that has a burnup of 51 GWD/tU. In turn, this would mean that the fuel pool capacity and, possibly, dry storage capacity, will have to be increased.

This is only a partial list of deficiencies in the Draft EIS' discussion of need for the proposed SMR and energy alternatives, which Intervenors are precluded from raising in this hearing by 10 C.F.R. § 52.20. It would be extremely unfair to allow these statements to remain in the EIS, when Intervenors have been prevented from challenging their veracity in this proceeding.

3. Demonstration that the Contention is Within the Scope of the Proceeding: This contention is within the scope of this ESP proceeding because it seeks compliance with NEPA and NRC regulations for the implementation of NEPA in the EIS for the proposed SMR.

4. Demonstration that the Contention is Material to the Findings NRC Must Make to issue an ESP for the proposed TVA SMR: The contention is material to the findings that NRC must make in order to issue an ESP for the proposed TVA SMR because it relates to the question of whether the NRC's Draft EIS improperly addresses issues that are prohibited from inclusion in the Draft EIS, whether the statements in the Draft EIS regarding the technical and operational benefits of the proposed SMR have been independently verified, and whether Intervenors have been unfairly deprived of a hearing on unsupported and incorrect assertions in the Draft EIS.

5. Concise Statement of the Facts or Expert Opinion Supporting the Contention, Along With Appropriate Citations to Supporting Scientific or Factual Materials: The facts and expert opinion supporting this contention, and the citations relied on by Petitioners, are

⁹ IAEA, ADVANCES IN SMALL MODULAR REACTOR TECHNOLOGY DEVELOPMENTS 89 (2014).

stated above. This contention is supported by the attached declaration of Dr. M.V. Ramana. *See* Attachment 4.

IV. INTERVENORS HAVE GOOD CAUSE TO FILE THIS MOTION AFTER THE INITIAL DEADLINE FOR HEARING REQUESTS.

Intervenors satisfy the three requirements of 10 C.F.R. § 2.309(c) for establishing good cause to file Contentions 4 and 5 after the initial 2017 deadline for filing hearing requests on the proposed ESP. First, the information on which Contentions 4 and 5 is based “was not previously available.” 10 C.F.R. § 2.309(c)(1)(i). As discussed above in Section II, TVA’s Environmental Report did not contain any analysis of pool fire impacts, and Intervenors’ original Contention 2 was a contention of omission. The Draft EIS provides the first environmental analysis of spent fuel pool impacts that has been published in this proceeding.

Nor was the information on which Contention 5 is based previously available. The regulations on which Contention 5 is based – 10 C.F.R. §§ 51.75(b), 51.20(b), 51.104, and 52.21 – apply to the Draft EIS, not TVA’s Environmental Report. Until the NRC published the Draft EIS, Intervenors had no way of knowing whether the NRC Staff would comply with these regulations.

Second, the information upon which Contentions 4 and 5 is based is “materially different” from the information that was previously available. 10 C.F.R. § 2.309(c)(1)(ii). No spent fuel pool impact analysis for the TVA SMR pool had been published prior to issuance of the Draft EIS, and therefore it is materially different from what was previously provided. With respect to Contention 5, the information is materially different because it concerns compliance by NRC Staff with a completely different set of regulations than were applicable to the TVA SMR.

Finally, this motion has been submitted in a “timely fashion based on the availability of the subsequent information.” The Draft EIS was posted on ADAMS April 20, 2018, and this motion is being filed within 30 days. *See* Initial Scheduling Order at 4 (Dec. 7, 2017).

V. CONSULTATION PURSUANT TO 10 C.F.R. § 3.232

Although 10 C.F.R. § 2.309(c)(2)(i) appears to excuse Intervenors from consulting opposing counsel regarding this motion, Intervenors’ counsel consulted them in an abundance of caution. Counsel for both TVA and the NRC Staff stated they would oppose the motion.

VI. CONCLUSION

For the foregoing reasons, Intervenors’ Contentions 4 and 5 should be admitted to this proceeding.

Respectfully submitted,

 /signed electronically by/

Diane Curran
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.
1725 DeSales Street N.W., Suite 500
Washington, D.C. 20036
240-393-9285
dcurran@harmoncurran.com

May 21, 2018

CERTIFICATE OF SERVICE

I certify that on May 21, 2018, I posted copies of the foregoing INTERVENORS' MOTION FOR LEAVE TO FILE CONTENTION 4 (INADEQUATE DISCUSSION OF ENVIRONMENTAL IMPACTS OF SPENT FUEL POOL FIRES) AND CONTENTION 5 (IMPERMISSIBLE DISCUSSION OF ENERGY ALTERNATIVES AND NEED FOR THE PROPOSED SMR) and Attachments 1, 2, 3 and 4, on the NRC's Electronic Information Exchange System.

 /signed electronically by/

Diane Curran
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.
1725 DeSales Street N.W., Suite 500
Washington, D.C. 20036
240-393-9285
dcurran@harmoncurran.com