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June 26, 2017

Ms. Stephanie Coffin  
Acting Director  
Division of Preparedness and Response  
Office of Nuclear Security and Incident Response  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**Subject:** NEI Comments on the Draft Regulatory Basis for "Rulemaking for Emergency preparedness for Small Modular Reactors and Other New Technologies." [Docket ID NRC-2015-0225]

**Project Number: 689**

Dear Ms. Coffin:

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI)<sup>1</sup> appreciates the opportunity to provide comments on the subject Draft Regulatory Basis for "Rulemaking for Emergency preparedness for Small Modular Reactors and Other New Technologies." The purpose of this letter is to provide the attached comments which recommend several changes to improve the clarity and completeness of the document.

NRC indicates that the reason for issuing this regulatory basis is to support a rulemaking that would develop new emergency preparedness (EP) requirements for small modular reactors (SMRs) and other new technologies (ONTs), such as non-light water reactors (non-LWRs). The industry agrees that current emergency preparedness (EP) regulations do not adequately address the advances in reactor designs and reactor safety research, and the potential attributes of SMR or non-LWR designs. Therefore, the industry believes that the proposed rulemaking is an important component for applicants to have the necessary clarity of the regulatory process and reducing unnecessary regulatory burden on applicants and licensees.

We appreciate the NRC staff's consideration of these comments. If you have any questions concerning this letter or the attached comments, please contact me or Thomas Zachariah (202.739.8058; [txz@nei.org](mailto:txz@nei.org)).

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<sup>1</sup> The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations and entities involved in the nuclear energy industry.

Mr. Michael E. Mayfield

June 26, 2017

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Sincerely,

A handwritten signature in black ink, appearing to read "Michael Tschiltz". The signature is fluid and cursive, with the first name "Michael" written in a larger, more prominent script than the last name "Tschiltz".

Michael D. Tschiltz

Attachment

c: Ms. Vonna L. Ordaz, NRO, NRC  
Ms. Deborah A. Jackson, NRO/DEIA, NRC  
Ms. Amy E. Cabbage, NRO/DEIA/ARPB, NRC  
Mr. William D. Reckley, NRO/DEIA/ARPB, NRC  
Mr. Robert Kahler, NSIR/DPR/POB  
Mr. Joseph Anderson, NSIR/DPR/RLB  
Ms. Patricia Milligan, NSIR/DPR  
NRC Document Control Desk

# **Industry Comments on NRC Draft Regulatory Basis for Rulemaking for Emergency Preparedness for Small Modular Reactors and Other New Technologies**

## Summary Comment

The industry agrees that current emergency preparedness (EP) regulations do not adequately address the advances in reactor designs and reactor safety research, and their applications to small modular reactors (SMRs) and other new technologies (ONTs). Absent a change to these regulations, SMR and ONT facilities would be subject to existing EP requirements which would impose an unnecessary regulatory burden on applicants and licensees. For this reason, a rulemaking is essential to provide a new set of EP regulations and guidance appropriate for SMRs and ONTs, and minimize the need for applicants to seek exemptions from current requirements.

In keeping with the NRC's 2014–2018 Strategic Plan (NUREG-1614), EP regulations should recognize the technological advancements and improved safety features embedded in advanced reactor designs. The potential attributes of a SMR or non-LWR design, such as a smaller core size, reduced power density, lower probability of severe accidents, slower accident progression, and smaller accident offsite consequences per module, warrant an appraisal of existing EP regulations and identification of needed changes. In particular, updated requirements for the determination of the size of the Emergency Planning Zones (EPZs), and the extent of onsite and offsite emergency planning, are needed for SMRs and ONTs.

A dose-at-distance approach should be used to determine the appropriate EPZ size for a given facility, and the industry agrees with the proposed application of the principles outlined in NUREG-0396 and the Environmental Protection Agency (EPA) Protective Action Guides (PAG) Manual to do this. This approach is science-based and avoids subjective or indeterminate characterizations of risk. The anticipated designs for SMR and non-LWR facilities will have reduced potential for accident-related releases and significantly lower offsite consequences from such releases. The limited accident impact on public health and safety provides a sound technical basis for smaller EPZs and different EP program requirements.

The industry supports the staff's recommended rulemaking to establish a technology-neutral and appropriate set of EP regulations for SMRs and ONTs. When finalized and effective, the new rule will provide for regulatory stability and predictability, and eliminate the need to request exemptions from EP requirements. The industry is prepared to participate in the development of any new or revised guidance necessary to implement the final rule.

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## Questions for Public Comment

### **Scope of the Draft Regulatory Basis**

- (1) Is the NRC considering an appropriate approach for each objective described in the draft regulatory basis?

Yes. Given the safety advances being incorporated into SMR and ONT designs, the NRC's EP regulations should be revised to acknowledge differences in radiological risk due to the type and size of a nuclear facility.

- (2) Section 3 of the draft regulatory basis discusses the regulatory concerns the NRC expects to address through rulemaking. Section 4 presents the intended regulatory changes to address those regulatory concerns and discusses alternatives to rulemaking considered by the staff. Are there other regulatory concerns within or related to the scope of the rulemaking efforts (see Section 4) that the NRC should consider?

Yes. The regulatory basis should include a discussion of the NRC's statutory and regulatory authority to determine reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. This discussion would be similar to that contained in "Regulatory Improvements for Power Reactors Transitioning to Decommissioning, RIN Number: 3150-AJ59, NRC Docket ID: NRC-2015-0070, Draft Regulatory Basis Document," dated March 2017, at pgs. A-26 and A-27.

Some new reactor technologies, such as a High Temperature Gas-Cooled Reactor, may interface with an industrial end-user in addition to a power grid system. There are currently no regulations explicitly addressing this type of interface. The staff should assess this area and determine if additional regulations are necessary.

Are there other approaches or alternatives the NRC should consider to resolve those regulatory concerns?

No.

- (3) Are there any other alternatives for SMR and ONT EP beyond those discussed in the draft regulatory basis that the NRC should consider?

Yes. The NRC should consider the technical and legal feasibility of making more foundational changes to EP requirements based on the advances in emergency planning and preparedness that have occurred since 1980. For example, with respect to SMRs and ONTs, the NRC should consider whether changes can be implemented that allow the agency to base an EP reasonable assurance finding on State and local emergency plans developed in accordance with the National Preparedness Goal established by the U.S. Department of Homeland Security, and related Systems and Frameworks. These plans are sometimes referred to as "all hazards" or comprehensive emergency plans, and they provide a robust and flexible approach for responding to all types of disasters and emergencies. If feasible, this approach would obviate the need

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for a site Emergency Planning Zone (established as an NRC licensing requirement) and offsite REPP, and therefore greatly reduce the regulatory burden on licensees, offsite response agencies, and the NRC.

- (4) Are there other EP related issues that the staff should consider in further developing this regulatory basis?

Yes. The final regulatory basis document should address the following topics:

- NRC's primacy in imposing requirements defining the size of offsite Emergency Planning Zones (EPZ), and compelling development and maintenance of associated Radiological Emergency Preparedness Program (REPP) as a license condition for a facility.
- The requirement for an offsite REPP is contingent upon whether the plume exposure pathway EPZ includes any areas outside the licensee's site boundary (i.e., offsite areas). An offsite REPP would not be a regulatory requirement if the entire plume exposure pathway EPZ is within, or coincident with, the licensee's site boundary.
- Identify the local support services excluded from the scope of an offsite REPP because they are addressed in the onsite emergency plan and their interactions with a licensee are controlled by other regulations. For example, the requirements for tracking and reporting the dose received by onsite emergency responders are specified in 10 CFR Part 20.

The industry recommends that the final regulatory basis document (or an associated guidance document) address siting factors potentially influencing emergency planning requirements. Examples of these issues are identified in Enclosure 1 of NRC letter, "Next Generation Nuclear Plant - Assessment of Key Licensing Issues," dated July 17, 2014, and include:

- Co-location at an existing nuclear power plant site – the size of the EPZ would be influenced by the EPZ requirements for the other plant.
- Co-location of multiple reactors at a site – the size of the EPZ could be influenced by the configuration of the reactors on the site.
- Enhanced control of access to the site (e.g., the facility is located on a secure reservation).
- Co-location with an industrial facility – consider regulatory requirements and emergency programs for the industrial facility.
- Other site-specific conditions such as demography, topography, land characteristics, access routes, and local jurisdictional boundaries.

The NRC staff should also consider the requirements of 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events," and associated staff and industry guidance.<sup>2</sup> A licensee will be required to maintain capabilities for mitigating a spectrum of beyond-design

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<sup>2</sup> Refer to 80 Federal Register 70609, dated November 13, 2015, and SECY-16-0142, dated December 15, 2016.

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basis events. These capabilities provide an additional layer of defense-in-depth for protection of public health and safety, and may warrant changes to EP requirements.

The draft regulatory basis document uses the terms “projected” and “expected” when discussing potential accident-related offsite doses. The industry suggests that the appearance of these terms be reviewed to ensure correct and consistent use.

- (5) Is the scope of facilities to be included under the ONT umbrella (see Section 1.1) appropriate or can you suggest additions or deletions and the associated basis or rationale?

The scope of the document is intended to encompass, in part, SMRs; however, it does not provide the criteria for identifying an SMR design (i.e., the attributes that define a SMR). For example, there could be a distinction between “large” and “small” reactors in terms of MW thermal power rating. To ensure correct application of the proposed rule, the final regulatory basis document should describe the characteristics and parameters used to define a SMR, or point to a source document.

### **Performance-Based Approach**

- (1) What are the benefits and drawbacks of a performance-based EP approach, other than those described in this draft regulatory basis document?

The industry agrees with the benefits and is overall supportive of a performance-based approach identified in the draft regulatory basis; we have noted a few potential drawbacks below.

The development of a rule may be hampered by the NRC staff’s and the industry’s lack of familiarity or experience with a new approach, and could slow down an ongoing certification or licensing process assessing a topic being addressed in the rule.

The exemption process, while costly, is well-known and may be preferred by some applicants. For example, a designer may determine that meeting a new risk-informed and performance-based requirement is more burdensome than demonstrating that an existing deterministic requirement is not required (as an exemption) or is met in another way (as an alternative measure).

A performance-based approach may place an undue regulatory burden on certain advanced reactor designs. Some companies are proposing reactors that are much smaller than the commercial fleet, and even smaller than a typical small modular reactor. The reactors in these designs are on the size and power scale of a non-power or research and test reactor. There is a concern that new performance-based regulation could increase the compliance costs compared to what is acceptable for non-power and research and test reactor EP. The staff should assess the regulatory burden that could be imposed on very small reactor designs by the proposed performance-based approach, and make needed changes.

- (2) Should NRC continue research to establish performance-based criteria in the EP area? Examples of such research are in SECY-14-0038.

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Yes.

The draft regulatory basis document describes the application of a performance-based approach but does not include a discussion regarding how the proposed rule requirements would be risk-informed. The final document should identify the rule aspects that are risk-informed and how this was accomplished. The staff could make use of previous determinations concerning the acceptability of a risk-informed EP framework such as NRC letter, "Next Generation Nuclear Plant - Assessment of Key Licensing Issues," dated July 17, 2014.<sup>3</sup>

In Section 3.6, it states that identifying suitable performance-based criteria will include consideration of the 16 emergency planning standards in 10 CFR 50.47(b). This discussion should be expanded to address the differences necessary to accommodate a scalable approach to EPZ sizing (e.g., how some standards may apply in whole or in part depending upon whether the EPZ boundary incorporates offsite areas). The final basis document should describe the aspects of each standard that may be scaled relative to the size of the EPZ.

- (3) Is it appropriate to establish combined risk-informed and performance-based criteria, and can you suggest EP areas or methods where they could successfully be implemented?

Yes; the regulatory basis should establish combined risk-informed and performance-based criteria. Risk-informed criteria should be considered in methodologies used to size EPZs and may be beneficial in the development of other EP requirements.

Concerning risk-informed criteria, the regulatory basis could identify which requirements are risk-significant because of their higher relative importance to the timely and effective implementation of the site emergency plan. This would facilitate subsequent development of a graded approach to inspection and enforcement processes. Specific emergency plan and program elements may also benefit from risk-informed requirements and guidance.

The preceding comment notwithstanding, the industry notes that the development of a technical basis necessary to risk-inform a particular EP requirement may take considerable time. For example, both NUREG/CR-7154, "Risk Informing Emergency Preparedness Oversight: Evaluation of Emergency Action Levels—A Pilot Study of Peach Bottom, Surry and Sequoyah," and NUREG/CR-7195, "Risk-Informed and Performance-Based Oversight of Radiological Emergency Response Programs," were multi-year efforts. The industry supports incorporation of risk-informed criteria to the extent that the rulemaking is not unduly delayed by the development of supporting technical bases.

With respect to performance-based criteria, the regulatory basis could address both periodic drill and exercise demonstration requirements and program performance indicators. Drills and exercises would allow demonstration of response proficiency in emergency plan functions such as command and control, notifications and

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<sup>3</sup> Refer to the discussion in Enclosure 1.

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communications, protection of site personnel, accident/event mitigation and radiological assessment. The availability of offsite support could also be demonstrated through periodic drill and exercises participation by local first responder agencies such as law enforcement, firefighting and medical emergency services. EP program performance indicators could provide objective measures of performance in areas like emergency response staffing, facility and equipment availability, drill and exercise participation, proficiency with emergency classifications and notifications, and off-hours staff augmentation.

Additional industry suggestions are listed below:

- A risk-informed regulation could provide requirements for determining the credibility of extreme external events and associated potential consequences.
- The final regulations should be flexible enough to accommodate a reactor design with an approved mechanistic source term small enough to not require additional measures for reducing the potential dose at the site boundary (see related comment under Performance-Based Approach, #1).
- Section 3.2 refers to SECY-93-092, "Issues Pertaining to the Advanced Reactor (PRISM, MHTGR, and PIUS) and CANDU 3 Designs and Their Relationship to Current Regulatory Requirements," and its discussion of a "mechanistic source term." The SECY discusses the development of a mechanistic source term "using best-estimate phenomenological models of the transport of the fission products from the fuel through the reactor coolant system, through all holdup volumes and barriers, taking into account mitigation features, and finally, into the environs." The EP rule basis document, or associated guidance documents, should address the level of conservatism to be used in determining source terms and the use of "best estimate approaches" when evaluating accident doses for EP sizing.
- While the draft document describes the inclusion of a wide spectrum of potential accidents, including severe accidents, there is no explanation regarding the scope of these events, for example, by describing the expected frequency cut-offs for the various accident categories. The ranges or cut-off points for various frequency categories should be given in the final document or provided in an associated guidance document.

### **Regulatory Impacts**

- (1) Section 5 of the draft regulatory basis presents the staff's initial consideration of costs and other effects for several key aspects of the potential regulatory changes. This initial assessment is limited; therefore, the staff is seeking data and input relative to expected or unintentional effects from the desired regulatory changes. What would be the potential effects on stakeholders, such as applicants, licensees, and the public, from implementing any of the desired regulatory changes described in this draft regulatory basis? The staff is also seeking comments on reasonable cost estimates for implementation of the EP regulations for SMRs and ONTs, including one-time startup cost and annual cost.

The industry finds the cost estimates presented in the draft regulatory basis to be reasonable with one exception, the amount for "Initial plan development with ORO." The industry assumes this is the all-inclusive cost of establishing an offsite REPP for a

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site, exclusive of the costs for an Evacuation Time Estimate (ETE) and an Alert Notification System (ANS). We believe the approximate cost of this effort would be \$5,000,000 per site.

With respect to the scaled averted costs shown in Table 5-4, the industry notes that once the EPZ boundary encompasses any offsite area, and thus requires an offsite REPP, the associated offsite EP costs make a large step change upwards. This step change reflects the financial support necessary for State planning participation and infrastructure, and FEMA assistance and evaluation. These costs do not vary significantly as a function of EPZ area. Following the initial step change, offsite EP costs would further increase in approximate proportion to the size of the EPZ (e.g., to reflect additional communities and sirens).

We suggest that the bases and details related to the methodology and historical data used to prepare Section 5.1.2 be made publicly available as supplemental information.

- (2) What would the cost be for licensees under 10 CFR Part 52, "Licenses, Certifications and Approvals for Nuclear Power Plants," to be licensed under the proposed performance-based EP approach? What would be the cost difference between this new EP approach and the current EP approach in 10 CFR Part 50?

Since the details of the proposed performance-based EP framework have not yet been developed, any estimate of cost differences between the existing framework and a performance-based framework would be speculative at this time.

- (3) What effects, other than cost, would result from the rulemaking action under consideration?

The proposed rulemaking action, if implemented, would facilitate the availability of additional power generation technologies to U.S. electric power producers. Likewise, the action would increase the likelihood that industrial and public-sector users may choose a nuclear power technology to support their production or service needs (e.g., a reactor to generate process heat or run a desalination facility). More broadly, the rulemaking action under consideration would contribute to improved outcomes in the areas of:

- U.S. innovation and technology leadership
- U.S. global influence and national security
- Jobs and infrastructure (e.g., enhance grid flexibility and stability)
- Air quality and sustainable development
- Use of clean power outside the home, such as electric automobiles
- Climate change

### **Cumulative Effects of Regulation**

- (1) In light of any current or projected CER challenges, what should be a reasonable effective date, compliance date, or submittal date from the time the final rule is published to the actual implementation of any new proposed requirements, including changes to programs, procedures, or the facility?

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It is anticipated that some applicants will be seeking exemptions from, or employing alternative methods to meet, existing NRC EP requirements. The final regulatory basis should provide clarity with regard to the processing of applications submitted before the rulemaking is complete, and address the integration of approved alternate methods and exemptions with the requirements of the final rule. The final regulatory basis should also recognize that existing applicants, entities with applications in progress prior to the final rule effective date, will adhere to their committed compliance dates established through a licensing process (e.g., Part 50 or Part 52) since these dates may be different from those specified in the final rule.

- (2) If current or projected CER challenges exist, what should be done to address this situation? For example, if more time is required to implement the new requirements, how much time would be sufficient, and why is such a timeframe necessary?

See response to Question #1, above.

- (3) Do other regulatory actions (e.g., orders, generic communications, license amendment requests, inspection findings of a generic nature) by the NRC or other agencies influence the implementation of the potential proposed requirements?

Yes. The Federal Emergency Management Agency (FEMA) has established the Threat and Hazard Identification and Risk Assessment (THIRA) process for use by communities in understanding potential risks and response capabilities, including those associated with a "radiological release." The regulatory basis should make clear that, from a licensing perspective, the NRC retains primacy for assessing the risk and consequences of an offsite radiological release from a production or utilization facility, and determining offsite emergency preparedness requirements. A State or community may elect to perform a THIRA related to a site hosting an SMR or ONT, and revise their plans accordingly; however, these plans and their associated capabilities are not part of a REPP unless they have been established to meet an NRC requirement.

- (4) Are there unintended consequences? Does the potential proposed action create conditions that would be contrary to the potential proposed action's purpose and objectives? If so, what are the consequences and how should they be addressed?

We have not identified any unintended consequences from the potential proposed action.

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| <b>Affected Section</b> | <b>Comment/Basis</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Recommendation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Generic              | <p>The NRC draft regulatory basis emphasizes a performance-based approach for SMR EP. Though this industry agrees with this emphasis, consideration should be given to having a combined risk-informed, performance-based approach. Risk-informed thinking is fundamental to an effective method for establishing the size of a SMR EPZ.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>Modify the draft guidance in a number of places to replace the phrase "performance-based approach" to "combined risk-informed, performance-based approach". Other areas where risk-informed could particularly be used include accident selection in Section 3.2 and multi-module effects in Section 3.5. Additionally, when dose consequences are considered as a primary criterion, frequency considerations should also be included. For example, page 2-1 states "consequences, tempered by probability considerations", where-as the 2<sup>nd</sup> bullet on page 4-4 only discusses consequences.</p> |
| 2. Generic              | <p>The Draft Regulatory Basis is silent as it relates to 10 CFR 50.54(s)(3), relating to the NRC's finding of reasonable assurance and a review of FEMA findings and determinations as to whether State and local emergency plans are adequate and capable of being implemented.</p> <p>In the Decommissioning Draft Reg Basis, NRC states:</p> <p><i>"...the NRC staff is proposing that if formal offsite REP is not required by regulation, then such findings and determinations by FEMA would not be needed in order for the NRC to make determinations regarding reasonable assurance under 10 CFR 50.54(s)(2)(ii). Several ANPR comments made assertions that once formal offsite REP is no longer required, the requirements under 10 CFR 50.54(s)(2)(ii) and (s)(3) are no longer applicable.</i></p> | <p>Please address the applicability of 10 CFR 50.54(s)(3) in the Regulatory Basis. The rule should specify that an offsite plan is not necessary for a SB EPZ, and a similar discussion should occur in the regulatory basis.</p>                                                                                                                                                                                                                                                                                                                                                                               |

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| Affected Section | Comment/Basis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Recommendation                                |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
|                  | <p><i>In the Low Power rule (47 FR 30232; July 13, 1982), findings and determinations on the state of offsite EP were not needed to support issuance of a license for fuel loading and low power testing because there was sufficient time in which to take action to protect the public in even the worst-case accident. Similarly, for decommissioning power reactors, when formal offsite REP programs are no longer required (i.e., starting in Level 2), findings and determinations on the state of offsite EP from either the NRC or FEMA would no longer be required in order for the NRC to make licensing determinations regarding reasonable assurance under 10 CFR 50.54(s)(2)(ii).</i></p> <p><i>Therefore, the NRC staff is considering changes to clarify that 10 CFR 50.54(s)(3) applies only when offsite REP programs are required by regulation. <b><u>This amendment would be generally applicable and not specific to decommissioning sites (e.g., it may apply in the future to the regulatory framework for small modular reactors or other new reactor technologies).</u></b> Further, 10 CFR 50.54(s)(2)(ii) would continue to apply to licensees as a condition of the license during decommissioning.”</i></p> |                                               |
| 3. Generic       | It is not clear why existing technologies, which can benefit from this rulemaking, have been excluded. This rulemaking should be available for use by any applicant that can demonstrate that their technology complies with the rule language.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Allow today’s technology to utilize option 2. |
| 4. Generic       | Introduction of term “Other Nuclear Technologies” could be                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Suggest simplifying to “SMRs and Advanced     |

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| Affected Section                             | Comment/Basis                                                                                                                                                                                                                                                                                                       | Recommendation                                                                                                                                                                                                               |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              | unnecessarily confusing or restrictive.; Use of a new term that will be difficult to define in a way that it does not somehow preclude a future technology should be avoided. Any new reactor type should be able to benefit from application of this approach.                                                     | (Non-LWR) Reactors” in title, delete use of “ONT,” and cite example of other applicable technologies (e.g., SHINE) as currently done in discussion portion of document.                                                      |
| 5. Generic                                   | Distinction is made that large LWR reactors are excluded; SMR design characteristics are not defined.                                                                                                                                                                                                               | Consider a criteria-based definition, and not labels / names.                                                                                                                                                                |
| 6. Generic                                   | NRC should clarify how it will regulate the assumptions to be used in the dose calculations                                                                                                                                                                                                                         | Insert such clarification at the beginning of the document.                                                                                                                                                                  |
| 7. Section 2.1, page 2-1, and subsequent use | The draft uses the term “probability” with two meanings; referring to the likelihood of doses being exceeded and the likelihood of occurrence. This creates confusion between the conditional probability of exceeding a dose given a specific scenario, and the likelihood of such a scenario occurring over time. | Change “probability” to “frequency” (or “frequency of occurrence” if needed) when referring to likelihood of accidents occurring randomly in time. This terminology is slightly more accurate by including the time element. |
| 8. Section 2.1, page 2-2                     | There is no quantitative definition of life-threatening doses that are referred to in Section 2.1. In NUREG-0396, this dose was 200 rem whole body.                                                                                                                                                                 | Reference the quantitative definition of life-threatening dose provided by NUREG-0396.                                                                                                                                       |
| 9. Section 2.1, page 2-3                     | The basis for the task force selecting releases as early as 30 minutes after event initiation for EP requirements should be explained.                                                                                                                                                                              | Insert an additional sentence that explains the basis for concluding that EP should be based on releases as early as 30 minutes after initiation of the event.                                                               |
| 10. Section 3-1                              | The smaller size, <del>lower power densities</del> , lower probability of severe accidents, slower accident progression, and smaller accident offsite consequences per module that characterize SMR and non-LWR designs have led DOE, SMR designers, and                                                            | Not all SMRs are expected to have lower power densities.                                                                                                                                                                     |

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| Affected Section                     | Comment/Basis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Recommendation                                                                                                                                                                                                                                                             |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | <p>potential operators to revisit the determination of the appropriate size of the EPZs, the extent of onsite and offsite emergency planning, and the number of response staff needed. Other topics raised by the industry involve the potential to revise alert and notification requirements and the appropriateness of the protective action requirements in 10 CFR 50.47(b)(10).</p>                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                            |
| <p>11. Section 3.2,<br/>page 3-1</p> | <p>Section 3.2 mentions the determination of appropriate accidents to be evaluated, which is consistent with SECY-15-0077, page 8. However, other than the need to go beyond DBAs, there are not any supporting details on how such a determination should be accomplished. The application of risk-informed thinking and use of design- and plant-specific PRA are fundamental to this determination. The body of severe accident research and mechanistic source term analysis tools which have been developed over the last several decades should also be employed. This approach for determining appropriate accidents to be evaluated for the EPZ basis represents a necessary and important update to what was done 40 years ago in NUREG-0396.</p> | <p>It is recommended that, within Section 3.2, additional paragraphs or a subsection be added on the regulatory issues associated with determining appropriate accidents to be evaluated. It is recommended that the details in the basis of this comment be included.</p> |
| <p>12. Section 3.2,<br/>Page 3-1</p> | <p>The draft guidance states, <i>"The conditions under which the use of design-specific and event-specific mechanistic source terms can be justified and used in licensing non-LWRs would have to be supported by experimental data to confirm the bounding parameters of the source term." ... "Hence, applicants may use mechanistic source term analysis methods to demonstrate the ability of the enhanced safety features of plant designs to</i></p>                                                                                                                                                                                                                                                                                                 | <p>Experimental data implies small model demonstrations similar to what GE and Westinghouse performed in the 1950s and 1960s. Source term bounding conditions have been demonstrated and the first quoted sentence in Section 3.2 be deleted.</p>                          |

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| Affected Section                                                                                                   | Comment/Basis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Recommendation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                                                                                                                    | <i>mitigate accident releases."</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 13. Section 3.2,<br>page 3-2                                                                                       | It is stated that experimental data is necessary to confirm the bounding parameters of the source term. It is not clear what type of experimental data may be considered necessary. For example, this could be requiring irradiation testing of fuel to determine initial inventory or testing of fission product retention in piping or containment vessels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Further discuss the regulatory issue associated with a need for experimental data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 14. Section 3.6                                                                                                    | <b>For a licensee</b> , the preliminary criteria for defining the performance-based regulation include:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Add words in <b>bold</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 15. Sec. 4.2, Option<br>2, Page 4-1<br><br>and<br><br>Sec. 5.1.2,<br>Potential Effect<br>on Licensees,<br>Page 5.4 | There seems to be some inconsistencies between Section 5.1.2 and Section 4.2.<br><br>Specifically, the last paragraph before Table 5-4:<br><br><i>Table 5-4 shows the revised estimate of averted costs to industry for scenarios where the plume exposure pathway EPZ is outside the site boundary but with a radius of less than 10 miles. In these scenarios, to be conservative, the costs listed in Table 5-3 are no longer considered averted costs. Additionally, the evacuation time estimates and initial plan development costs are no longer considered as averted costs. The remaining averted cost in this regulatory basis is from the less extensive ANS required due to the smaller plume exposure pathway EPZ relative to the 10 mile radius plume exposure pathway EPZ currently in regulations. Table 5-4 scales the averted industry implementation costs from Table 5-2, based on the area of the plume exposure pathway EPZ in square miles, relative to the area of a plume exposure pathway EPZ with a 10 mile radius. <b>Finally, this</b></i> | Please clarify the intent of the proposed rulemaking as it relates to the sizes of the EPZs and the anticipated need for licensees to submit regulatory exemptions. It is suggested that the new rule unambiguously should provide for a variable size, not leave it up to the staff to decide between that option and one with pre-established, fixed sizes. That is, a scalable approach should be used for any size (not four discrete size options); the approach should be described consistently; and the approach should eliminate the need for exemptions. |

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|                  | <p><i><u>analysis assumes that licensees would still submit exemption requests, as the rulemaking would not be able to consider all possible plume exposure pathway EPZ size scenarios.</u> Therefore, these exemption requests are also not considered as an averted cost if the plume exposure pathway EPZ is outside the site boundary."</i></p> <p>Table 5-4 also includes costs for an EPZ ranging from 1 to 10 miles. Then in the paragraph after Table 5-4, the document refers to an EPZ with a radius of 4 miles or less and states that if the plume exposure pathway EPZ has a radius of 4 miles or less from the site boundary, this regulatory basis shows that the costs of the rulemaking are estimated to be less than the averted costs shown above, indicating this rulemaking will be quantitatively cost effective.</p> <p>However, Section 4.2 Option 2: Conduct Rulemaking of the Draft Reg Basis cites the discrete EPZ size examples from SECY-11-0152 as follows:</p> <ol style="list-style-type: none"> <li>1. Site Boundary if doses are less than 1 rem TEDE at site boundary</li> <li>2. 2 miles if doses are greater than 1 rem TEDE offsite but less than 1 rem TEDE at 2 miles</li> <li>3. 5 miles if doses are greater than 1 rem TEDE at 2 miles but less than 1 rem TEDE at 5 miles</li> <li>4. 10 miles if doses are greater than 1 rem TEDE at 5 miles</li> </ol> <p>Additionally, the last bullet in Section 4.2 states that an objective</p> |                |

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| <b>Affected Section</b>                 | <b>Comment/Basis</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Recommendation</b>                                                                                                                                                                                                                                                            |
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|                                         | <p>to the performance-based approach to EP regulation includes the elimination of the current regulatory need to request exemptions from EP requirements. The bullet specifically states: "A performance-based approach to EP regulation that is generically established without site- or design-specific information about source terms, fission products, or projected offsite dose has the potential to eliminate any need to consider exemptions for SMRs and ONTs." This statement appears to conflict with Section 5.1.2, cited earlier in this comment.</p> <p>This is confusing for two reasons:</p> <p>1) Is the intent of rulemaking to potentially allow for 4 EPZ sizes as described in Section 4.2 or any size EPZ between Site Boundary and 10 miles as described in Section 5.1.2?</p> <p>2) Is the intent of the rulemaking to eliminate the need for licenses to request exemptions, or to tailor requested exemptions to a specific EPZ size?</p> |                                                                                                                                                                                                                                                                                  |
| <p>16. Sec. 4.2, Option 2, Page 4-3</p> | <p>The regulatory basis is ambiguous regarding the specifying of an ingestion pathway EPZ, stating that a scaled approach commensurate with the scaling of the plume exposure EPZ "may be appropriate," and further stating that "if the plume exposure pathway EPZ is the site and bounded by the site boundary [i.e., if the offsite projected dose would not exceed the EPA PAGs at the site exclusion area boundary], no ingestion exposure pathway EPZ may be necessary." The discussion then goes on to</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>Revise the rulemaking regulatory basis to state clearly that: (a) it is appropriate to scale the ingestion pathway EPZ consistent with a scaled plume exposure pathway EPZ, and (b) for a site-boundary plume exposure pathway EPZ, no ingestion pathway EPZ is required.</p> |

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|                                                                   | <p>provide justification of such an approach, i.e.:</p> <p><i>Reinforcing this premise, the United States has had considerable experience with the expedient large-scale quarantining of foods in response to contamination outbreaks of E. coli, salmonella, bovine spongiform encephalopathy (mad cow disease), and others. The successful quarantine and removal from public access of contaminated food and water products in response to biological contamination suggest that for SMRs and ONTs, the response to prevent ingestion of contaminated foods and water, were it deemed necessary, could be performed in a similar manner.</i></p> <p>Industry strongly agrees with this rationale, but the regulatory basis does not reach a conclusion as to the acceptability of the approach for which this justification is provided. Consistent with the original intent of the IPZ (i.e., to account for “a longer-term response need”) and the intent of this rulemaking to reflect EP requirements commensurate with the reduced risks of new technologies, the regulatory basis should more strongly conclude that scaling the IPZ consistent with the approach used to scale the PEP IPZ, and should state definitively that no IPZ is required for a site boundary PEP EPZ.</p> |                                                                                                                                                                                             |
| 17. Section 4.2, page 4-2, paragraph 4 and page 4-3, under “Small | Co-location of SMRs is addressed in these locations. It is confusing to consider co-location with existing nuclear reactors and other industrial facilities together. There is a clear risk with other reactors but the connection to other industrial facilities is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Separate co-location with existing nuclear reactors from other industrial facilities. Add an example of how EPZ distance could be affected by another industrial facility. Additionally add |

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| <b>Affected Section</b>                   | <b>Comment/Basis</b>                                                                                                                                                                                                                                                                                                                       | <b>Recommendation</b>                                                                                                                                                                                       |
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| Module Reactors"                          | not clearly stated. Additionally, in this section, it is unclear whether a staff approach for co-location already exists or if it needs to be further developed.                                                                                                                                                                           | references to Section 3.4, which states there is still a need for guidance on co-location.                                                                                                                  |
| 18. Section 4.2, page 4-3                 | If the expected offsite dose is greater than 1 rem (10 mSv) TEDE <b>site boundary offsite</b> but less than 1 rem (10 mSv) TEDE at 2 miles (3 km), then the requirements for the plume exposure pathway EPZ would be limited to the 2-mile (3-km) zone.                                                                                    | Make change indicated in bold / with strikethrough.                                                                                                                                                         |
| 19. Section 4.2, page 4-3                 | If the expected offsite dose is greater than 1 rem (10 mSv) TEDE at 5 miles (8 km), the size of the EPZ would default to the current 10-mile (16-km) plume exposure pathway EPZ.                                                                                                                                                           | Explain basis of why the cutoff is at 5 miles, and why the licensee cannot have an EPZ between 5-10 miles. It's not clear why the EPZ is not defined by the radius where the dose does not exceed the TEDE. |
| 20. Section 4.2, page 4-2, last paragraph | There is an example presented for EPZ distance based on less severe accidents and the 1-rem PAG limit. However, there is no mention of more severe accidents, which could exceed 1 rem. Alternatively, the EPZ could be beyond site boundary even if all less severe accidents are less than 1 rem at the site boundary.                   | Clarify that examples do not tell the whole story of EPZ distance and that both less severe and more severe accidents are used.                                                                             |
| 21. Section 4.2, page 4-4, top paragraph  | The term "longer drainage times" for buried reactor buildings and pools should be revised to more accurately describe the behavior being described.                                                                                                                                                                                        | Replace the term "drainage" to "coolant loss" which more accurately describes any mechanism that results in a reduction of pool inventory.                                                                  |
| 22. Section 4.2, Page 4-4                 | Buried reactor structures and pools may have longer drainage times and correspondingly longer accident progression times. Passive safety features that do not depend on electric power also lead to longer accident progression time. These design aspects will determine the accident frequency, progression, and potential consequences. | Explain why a distinction is made for passive safety features.                                                                                                                                              |

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| 23. Section 4.2, page 4-4, 1st bullet  | Again, it is implied the EPZ distance is only based on PAG dose limits. However, as earlier stated in Section 2.1, the EPZ distance must also reduce early health effects from more severe accidents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Revise statement so that more severe accidents are mentioned and it is not implied that only PAG dose limits determine EPZ distance.                                                                                                                                                                                                                                               |
| 24. Section 4.2, page 4-5, last bullet | NRC has indicated in the draft rulemaking basis that the EPZ approach should be generically established and that this has the potential to eliminate any need to consider exemptions for SMRs. The industry understands this objective and supports its inclusion as well as the overall decision to proceed with Option 2. However, the rulemaking schedule is uncertain and thus the rulemaking timing may not coincide with the needs of the first NuScale plant COLA. On this basis, it is recommended that the rulemaking basis acknowledge the potential for an alternative in which EPZ is addressed by exemption prior to or in parallel with finalization of the rule. | The regulatory basis should support NRC decisions on EP for new SMR and ONT facilities using an exemption, if needed, in advance of final rulemaking. It is recommended that this is accomplished by modifying Section 4.3 to address the possibility that an exemption may be appropriate in the interim if rulemaking timing does not support the first SMR plant COLA schedule. |
| 25. Section 5.1.1                      | Editorial- Section 5.1.1, 2nd paragraph, 1st sentence- replace "is" with "as".                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Make editorial change.                                                                                                                                                                                                                                                                                                                                                             |
| 26. Section 5.1.1                      | Editorial- Section 5.1.1, 2nd paragraph, 2nd sentence- insert "and" before opportunity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Make editorial change.                                                                                                                                                                                                                                                                                                                                                             |