AFFIRMATION ITEM

RESPONSE SHEET

TO: Brooke P. Clark, Secretary

FROM: Chairman Hanson

SUBJECT: SECY-22-0001: Rulemaking: Final Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies

Approved X **Disapproved** ____ **Abstain** ____ **Not Participating** ____

COMMENTS: **Below** ____ **Attached** X **None** ____

Christopher T. Hanson

Digitally signed by Christopher T. Hanson
Date: 2022.08.23 11:16:37 -04'00'

Entered in STARS
Yes X
No ____

Signature
Christopher T. Hanson

Date 08/23/2022

Chairman Hanson's Comments on SECY-22-0001, "Final Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies"

I commend the staff for providing the Commission a thoughtfully articulated final rule, which provides alternative emergency preparedness (EP) requirements for small modular reactors (SMRs) and other new technologies (ONTs). It is the culmination of many years of effort by the staff working with stakeholders to advance the EP regulatory framework for these designs. This rule contributes to NRC's ability to review and license advanced reactors effectively and efficiently. I approve publication of the draft final rule as I explain below.

Simply stated, the NRC has always established its regulatory requirements to address the particular hazards presented by the facilities it licenses and regulates. The requirements vary for different types of facilities, but the standard is always the same—ensuring reasonable assurance of the adequate protection of the public health and safety. As the staff explains, the NRC's existing, deterministic regulations for EP at commercial nuclear power reactors were developed for large light water reactors (LWRs), and as such are based on the risk profile presented by large LWRs, which is similar across the existing fleet. Separately, the NRC allows a graded approach to EP for gas-cooled reactors, research and test reactors (RTRs), and other non-power production and utilization facilities (NPUFs) consistent with their radiological risks.

SMRs and ONTs (defined in this rule to include non-LWRs licensed as power reactors, new non-power reactors, and medical radioisotope facilities) have wide ranging designs and risk profiles, and as such it makes sense to have EP requirements to account for their diversity. Their design attributes include smaller reactor cores, lower radionuclide inventories, and smaller, slower fission product releases, which may lead to low or no offsite dose consequences. SMRs and ONTs also differ from large LWRs as they are more likely to be sited adjacent to industrial facilities not licensed by the NRC. The staff has ably taken into account these factors to establish an alternative framework that is technology-inclusive, risk-informed, and performance-based.

I recognize that the possibility of a site boundary plume exposure emergency planning zone (EPZ) is significantly different from 10-mile EPZs required for large LWRs. But I do not see this rule as scaling back EP requirements as compared to large LWRs. I view the draft final rule as creating a scalable framework for SMRs and ONTs commensurate with their risk profiles, which is more analogous to the way the NRC has reviewed EPZs for RTRs and NPUFs since the 1980s.

I reviewed the wide-ranging public comments from public interest groups, the Federal Emergency Management Agency (FEMA), Tribal Governments, and our State partners. In many cases, commenters supported a scalable, risk-informed approach to setting EPZs like the one proposed by the staff. They also endorsed continued support for state and local radiological emergency capabilities. Indeed, I agree there are valid reasons for robust support for offsite response capabilities even when NRC's technical evaluation determines that a site boundary plume exposure EPZ is acceptable, and this rulemaking does not eliminate preparedness for offsite response organizations.

Regardless of the size of the plume exposure EPZ, SMR and ONT licensees must establish and maintain effective communications with offsite response organizations that are counted on to respond to the facility in the event of an emergency. Licensees must also provide site familiarization training to those organizations and may include them in exercises and drills. To the extent licensees include offsite organizations as part of EP, they will need to support those organizations to ensure their ability to respond. The NRC will continue to focus on preparedness to ensure adequate protective measures can and will be taken in the event of a radiological emergency, and we will continue to coordinate with FEMA.

Chairman Hanson's Comments on SECY-22-0001, "Final Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies"

While requiring formal offsite radiological emergency plans where there is no offsite plume exposure might increase public confidence, it does not increase public safety. Therefore, the NRC does not have a regulatory basis to impose such requirements. When there is no technical justification for a regulatory requirement, we call into question our independence and credibility by wading into policy issues outside our purview. Nonetheless, state and local entities may choose to develop and maintain capabilities without an NRC requirement aimed at SMR and ONT licensees. Furthermore, other federal agencies with an interest in spurring the deployment of new reactors may elect to provide resources to state and local agencies to support site-specific radiological EP programs.

I am confident that reasonable assurance of adequate protection of the public health and safety will be achieved through the NRC's rigorous review of site-specific emergency plans, analysis of potential hazards, licensees' demonstration of response capabilities through drills and exercises, and the NRC's inspection and enforcement program. The alternative EP requirements for SMRs and ONTs will be implemented to provide the same level of protection for the public as existing requirements provide for large LWRs. I therefore approve the draft final rule subject to the attached edits.

CTH edits

[7590-01-P]

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 50, 52, and 72

[NRC-2015-0225]

RIN 3150-AJ68

Emergency Preparedness for Small Modular Reactors and Other New Technologies

AGENCY: Nuclear Regulatory Commission.

ACTION: Final rule and guidance; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is amending its regulations to include new alternative emergency preparedness requirements for small modular reactors and other new technologies. This final rule acknowledges technological advancements and other differences from large light-water reactors that are inherent in small modular reactors and other new technologies. The NRC is concurrently issuing Regulatory Guide 1.242, "Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light-Water Reactors, and Non-Power Production or Utilization Facilities."

DATES: This final rule is effective on **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].**

ADDRESSES: Please refer to Docket ID NRC-2015-0225 when contacting the NRC about the availability of information for this action. You may obtain publicly-available information related to this action by any of the following methods:

- **Federal Rulemaking Website:** Go to https://www.regulations.gov and search for Docket ID NRC-2015-0225. Address questions about NRC dockets to Dawn Forder; telephone: 301-415-3407; email: Dawn.Forder@nrc.gov. For technical questions, contact the individuals listed in the FOR FURTHER INFORMATION CONTACT section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly-available documents online in the ADAMS Public Documents collection at https://www.nrc.gov/reading-rm/adams.html. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, at 301-415-4737, or by email to pdr.resource@nrc.gov. For the convenience of the reader, instructions about obtaining materials referenced in this document are provided in the "Availability of Documents" section.

- **NRC's PDR:** You may examine and purchase copies of public documents, by appointment, at the NRC's Public Document Room (PDR), Room P1 B35, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. To make an appointment to visit the PDR, please send an email to PDR.Resource@nrc.gov or call 1-800-397-4209 or 301-415-4737, between 8:00 a.m. and 4:00 p.m. (ET), Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Soly Soto Lugo, Office of Nuclear Material Safety and Safeguards, telephone: 301-415-7528, email: Soly.SotoLugo@nrc.gov and Eric Schrader, Office of Nuclear Security and Incident Response, telephone: 301-287-

3789, email: Eric.Schrader@nrc.gov. Both are staff of the U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

SUPPLEMENTARY INFORMATION:

EXECUTIVE SUMMARY:

A. Need for the Regulatory Action

Certain existing requirements and guidance are focused on large light-water reactors (LWRs) and currently operating non-power reactors (also referred to as research and test reactors), as defined in part 50 of title 10 of the *Code of Federal Regulations* (10 CFR), "Domestic Licensing of Production and Utilization Facilities." Through this final rule, the NRC is amending its regulations to create an alternative emergency preparedness (EP) framework for small modular reactors (SMRs) and other new technologies (ONTs). These new alternative EP requirements and implementing guidance in Regulatory Guide 1.242 adopt a performance-based, technology-inclusive, risk-informed, and consequence-oriented approach. The new alternative EP requirements 1) continue to provide reasonable assurance that adequate protective measures can and will be implemented by an SMR or ONT licensee; 2) promote regulatory stability, predictability, and clarity; 3) reduce the need for requests for exemptions from EP requirements; 4) recognize advances in design and technological advancements embedded in design features; 5) credit safety enhancements in evolutionary and passive systems; and 6) credit the potential benefits of smaller sized reactors and non-LWRs associated with postulated accidents, including slower transient response times, and relatively small and slow release of fission products. This final rule and guidance could affect existing SMR and non-LWR applicants and licensees as well as SMRs, non-LWRs, and non-power production or utilization facilities that would be

licensed after the effective date of this final rule. Those applicants and licensees have the option to develop a performance-based EP program as an alternative to using the existing, deterministic EP requirements in 10 CFR part 50. This final rule does not include within its scope emergency planning, preparation, or response for large LWRs, fuel cycle facilities,[1] or currently operating non-power reactors. For the purposes of this final rule, large LWRs are reactors that are licensed to produce greater than 1,000 megawatts thermal power.

B. Major Provisions

Major provisions of this final rule and guidance include the addition of:

- A new alternative performance-based EP framework, including requirements for demonstrating effective response in drills and exercises for emergency and accident conditions;
- A requirement for a hazard analysis of any facility contiguous to or near an SMR or ONT, that considers any hazard that would adversely impact the implementation of emergency plans developed under this framework;
- A scalable approach for determining the size of the plume exposure pathway emergency planning zone; and
- A requirement to describe ingestion response planning in the emergency plan, including the offsite capabilities and resources available to prevent contaminated food and water from entering the ingestion pathway.

C. Costs and Benefits

[1] Emergency planning requirements for facilities licensed under 10 CFR part 70, "Domestic Licensing of Special Nuclear Material," are set forth in § 70.22(i).

The NRC prepared a final regulatory analysis of the expected quantitative costs and benefits of this final rule and associated guidance as well as the qualitative factors considered in the NRC's rulemaking decision. The conclusion from the analysis is that this final rule and associated guidance result in net averted costs to the industry and the NRC ranging from $7.98 million using a 7-percent discount rate to $14.9 million using a 3-percent discount rate.

The regulatory analysis considered qualitative aspects, such as greater regulatory stability, predictability, and clarity to the licensing process. These benefits result from applicants and licensees not needing to use the exemption process to establish EP criteria commensurate with design- and site-specific considerations. Another qualitative consideration is promoting a performance-based regulatory framework that specifies requirements to be met and provides flexibility to an applicant or licensee regarding the information or approach needed to satisfy those requirements.

For more information, the final regulatory analysis is available as indicated in the "Availability of Documents" section of this document.

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I. Background

In December 2016, the NRC developed and published "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness," with a goal to further develop the NRC's non-light-water reactor (non-LWR) regulatory, technical, and policy infrastructure to be ready to review potential licensing applications for non-LWR technologies. This final rule contributes to the NRC's efforts to optimize non-LWR regulatory readiness. In particular, the NRC's objective for this final rule is to create alternative emergency preparedness (EP) requirements that: 1) continue to provide reasonable assurance that adequate protective measures can and will be implemented by a small modular reactor (SMR) or other new technology (ONT) licensee; 2) promote regulatory stability, predictability, and clarity; 3) reduce the need for requests for exemptions from EP requirements; 4) recognize advances in design and technology advancements embedded in design features; 5) credit safety enhancements in evolutionary and passive systems; and 6) credit the potential benefits of smaller sized reactors and non-LWRs associated with postulated accidents, including slower transient response times, and relatively small and slow release of fission products.

Within the "Supplementary Information" section of this document, the NRC uses the term "ONTs" to refer to new technologies, such as non-LWRs and medical radioisotope facilities licensed under part 50 of title 10 of the *Code of Federal Regulations* (10 CFR). Further, within this document, the NRC uses the term "existing" or "current" in the context of the NRC's regulations to mean the requirements in § 50.47, "Emergency plans," and appendix E to 10 CFR part 50, "Emergency Planning and Preparedness for Production and Utilization Facilities," before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]** and, when referring

to applicants or licensees for an SMR or ONT facility, to mean applicants or licensees for an SMR or ONT facility as of **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

This final rule also defines "non-power production or utilization facility" (NPUF) to clarify the applicability of the performance-based EP framework. The definition includes production or utilization facilities, licensed under § 50.21(a), § 50.21(c), or § 50.22, as applicable, that are not nuclear power reactors or production facilities as defined under paragraphs (1) and (2) of the definition of *Production facility* in § 50.2. In the context of this final rule, medical radioisotope facilities licensed under 10 CFR part 50 are included within this definition of NPUF. The term "non-power production or utilization facility" is used in this final rule to distinguish between those medical radioisotope facilities licensed as production or utilization facilities under 10 CFR part 50 and other facilities to be used for the production of medical radioisotopes licensed under the regulations in 10 CFR parts 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," 40, "Domestic Licensing of Source Material," and 70, "Domestic Licensing of Special Nuclear Material." Those facilities licensed under 10 CFR parts 30, 40, or 70 are subject to existing emergency planning requirements in those parts. Relevant 10 CFR part 70 fuel facility emergency planning considerations (e.g., inadvertent criticality accidents and hazardous chemical exposures) applicable to 10 CFR part 50 production facilities have been incorporated into this final rule and associated guidance. As such, the scope of this final rule is limited to those ONT facilities (e.g., non-LWRs licensed as power reactors, new non-power reactors, and medical radioisotope facilities) for which the NRC expects to receive license applications under 10 CFR parts 50 or 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." Those NPUFs that are not considered ONTs (i.e., currently operating non-power reactors) are not within the scope

of this final rule. Currently operating non-power reactors continue to implement existing emergency planning requirements and guidance.

A. Existing Emergency Preparedness Framework for Nuclear Power Reactors

Appendix E to 10 CFR part 50 identifies the specific items currently required to be included in emergency plans. Additionally, § 50.47 provides EP requirements for nuclear power reactors, including planning standards for onsite and offsite emergency response plans. Other relevant regulations include paragraphs (q), (s), and (t) of § 50.54, "Conditions of licenses."

For large LWRs, the most notable guidance documents for the development and maintenance of emergency plans are: NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," dated November 1980, which provides guidance and evaluation criteria for the development and evaluation of operating power reactors' and offsite response organizations' (OROs) radiological emergency response plans; NUREG-0654/FEMA-REP-1, Revision 2, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," dated December 2019, which reflects changes to NRC regulations, guidance, and policies, as well as advances in technology and best practices that occurred since issuance of the 1980 version; Regulatory Guide (RG) 1.219, Revision 1, "Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors," dated July 2016, which provides guidance for operating power reactor licensees implementing requirements in § 50.54(q) for evaluating and making changes to emergency plans; NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 13.3, "Emergency Planning," dated March 2007, which provides the criteria that

the NRC uses in reviewing applicants' emergency plans as described in the applications' safety analysis reports; and NUREG-0800, Section 14.3.10, "Emergency Planning - Inspections, Tests, Analyses, and Acceptance Criteria," dated March 2007, which provides the criteria that the NRC uses in reviewing 10 CFR part 52 applicants' proposed inspections, tests, and analyses applicable to emergency planning that the licensee performs, and the associated acceptance criteria. This regulatory framework has defined the EP programs for the current operating fleet of power reactors for several decades. These standards have been effectively used in practice and provided a basis to draw from in developing this EP regulatory framework for SMRs and ONTs.

Currently, applicants for light-water SMR ~~LWR~~ licenses can use the guidance used by large LWRs described in the preceding paragraph. Applicants for non-LWR licenses can use NUREG-0654/FEMA-REP-1, Revision 1 or 2; RG 1.219, Revision 1; and RG 1.233, Revision 0, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors," which provides guidance on the selection of licensing-basis events; classification and special treatments of structures, systems, and components; and assessment of defense in depth.

B. Existing Emergency Preparedness Framework for Non-power Production or Utilization Facilities

The EP requirements applicable to a particular applicant or licensee can vary depending on the type of facility. In the August 19, 1980, final rule, "Emergency Planning" (45 FR 55402) (referred to herein as the "1980 Final Rule"), the NRC established in appendix E to 10 CFR part 50 emergency planning requirements for research and test reactors (RTRs) that reflected the lower potential radiological hazards

associated with these facilities. The RTRs and other NPUFs must meet the emergency planning requirements of §§ 50.34(a)(10), 50.34(b)(6)(v), and 50.54(q) and appendix E to 10 CFR part 50. The requirements of § 50.47 do not apply to RTRs and other NPUFs. Additionally, in section I.3. of appendix E to 10 CFR part 50, the NRC differentiates between emergency planning requirements for nuclear power reactors and those for other facilities, stating that the size of emergency planning zones (EPZs) and the degree to which compliance with sections I through V of appendix E to 10 CFR part 50 is necessary are determined on a case-by-case basis for facilities other than power reactors.

Further, footnote 2 of appendix E to 10 CFR part 50 provides that RG 2.6, "Emergency Planning for Research and Test Reactors," is used as guidance for the acceptability of RTR emergency response plans. Regulatory Guide 2.6 was initially issued in January 1979 and most recently updated to Revision 2, "Emergency Planning for Research and Test Reactors and Other Non-power Production and Utilization Facilities," in September 2017. Consistent with the radiological risks associated with operating power levels between 5 watts thermal and 20 megawatts thermal (MWt) for currently operating RTRs, RG 2.6, Revision 2 endorses the use of the emergency planning guidance based on source term and power level contained in American National Standards Institute (ANSI) and American Nuclear Society (ANS) standard ANSI/ANS-15.16-2015, "Emergency Planning for Research Reactors." Similarly, RG 2.6, Revision 2 endorses the use of ANSI/ANS-15.16-2015 for other NPUFs. The ANSI/ANS-15.16, originally developed in 1982, and updated in 2008 and 2015, provides specific criteria and guidance for RTRs to comply with the applicable requirements set forth in §§ 50.34, "Contents of applications; technical information," and 50.54, and appendix E to 10 CFR part 50.

In October 1983, the NRC issued NUREG-0849, "Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors." Consistent with ANSI/ANS-15.16, NUREG-0849 provides areas of review, planning standards, and evaluation items for the NRC to evaluate compliance with the applicable emergency planning requirements, previously described. Notably, the guidance contained in both ANSI/ANI-15.16 and NUREG-0849 addresses EPZs for RTRs ranging from the operations boundary[2] to 800 meters from the operations boundary for facilities up to 50 MWt. Both guidance documents state that the EPZs for facilities operating above 50 MWt are to be considered on a case-by-case basis. Section 12.7, "Emergency Planning," of the non-power reactor standard review plan, NUREG-1537, Parts 1 and 2, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-power Reactors" and the Interim Staff Guidance augmenting NUREG-1537, Parts 1 and 2, for the licensing of radioisotope production facilities and aqueous homogeneous reactors provide additional emergency planning considerations for NPUFs. For example, this additional guidance includes relevant radioisotope production facility emergency planning considerations (e.g., hazardous chemicals) contained in the Interim Staff Guidance augmenting NUREG-1537 based on NUREG-1520, Revision 1, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility."

These criteria and guidance provide a basis for NPUF applicants and licensees to develop acceptable emergency response plans for their facilities. This existing regulatory framework for EP at NPUFs provides the planning necessary to reflect the lower potential radiological hazards associated with the operation of these facilities compared to large LWRs. These EP standards provide additional information for

[2] As defined in ANSI/ANS-15.16-2015, "operations boundary" refers to the area within the site boundary such as the reactor building (or the nearest physical personnel barrier in cases where the reactor building is not a principal physical personnel barrier) where the reactor chief administrator has direct authority over all activities.

developing the consequence-oriented approach to establishing EPZs and the planning commensurate with the radiological risk for SMRs and ONTs.

C. Evolution of the Emergency Preparedness Regulatory Framework for Small Modular Reactors and Other New Technologies

The use and regulation of small reactors and other advanced reactor designs have been active topics of discussion between the NRC and the nuclear reactor industry for more than 30 years. The NRC has worked with stakeholders to develop an initial framework for the implementation of performance-based EP regulations and licensing of non-LWR designs, culminating in the current EP rulemaking activities. This section describes the history of small and advanced reactor designs that led to this final rule.

1. Emerging Interest in Advanced Nuclear Reactor Technology

Concurrent with large LWR deployment and design evolution, the United States and other countries have developed and promoted several different reactor designs that are either light-water SMRs with passive safety features or reactors that do not use light-water as a coolant. This latter category is commonly referred to as non-LWR technology. Advanced designs using non-LWR technology include liquid-metal-cooled reactors, gas-cooled reactors, and molten-salt-cooled reactors. These advanced designs could have a rated thermal power ranging from low to very high and may apply modular construction concepts.

As advanced reactor technology evolved in the 1980s and early 1990s, the NRC considered the prospect of a regulatory regime for these emerging technologies. On July 8, 1986, the Commission issued a policy statement, “Regulation of Advanced Nuclear Power Plants, Statement of Policy” (51 FR 24643), outlining the Commission’s early thoughts on the regulation of advanced reactor designs. In the policy statement, the Commission provided a high-level framework for the review and consideration of

advanced reactor designs. Following issuance of the policy statement, the NRC published NUREG-1226, "Development and Utilization of the NRC Policy Statement on the Regulation of Advanced Nuclear Power Plants" in June 1988 to provide guidance on implementing and utilizing the policy statement. With the issuance of this initial guidance came questions concerning EP requirements for such designs.

In response, the NRC staff proposed in SECY-93-092, "Issues Pertaining to the Advanced Reactor (PRISM, MHTGR, and PIUS) and CANDU 3 Designs and Their Relationship to Current Regulatory Requirements,"[3] dated April 8, 1993, that no change to existing EP regulations for advanced reactors was then needed. The NRC staff noted that regulatory direction would be given at or before the start of the design certification phase of advanced reactors so that design implications for EP could be addressed in the licensing process.

The Commission agreed and stated in the Staff Requirements Memorandum (SRM) for SECY-93-092, dated July 30, 1993, that it was premature to reach a conclusion on EP for advanced reactors and that existing regulatory requirements should be used for ongoing review processes. However, the Commission directed that:

> [T]he staff should remain open to suggestions to simplify the emergency planning requirements for reactors that are designed with greater safety margins. To that end, the staff should submit to the Commission recommendations for proposed technical criteria and methods to use to justify simplification of existing emergency planning requirements.

In response to the Commission's direction, the NRC performed an evaluation to develop technical criteria and methods for EP for evolutionary and advanced reactor designs. The evaluation focused on evolutionary and passive advanced LWR designs due to the availability of design and risk assessment data and because applicants were

[3] "PRISM," "MHTGR," "PIUS," and "CANDU" are abbreviations for Power Reactor Innovative Small Module, Modular High-Temperature Gas-Cooled Reactor, Process Inherent Ultimate Safety, and CANadian Deuterium-Uranium, respectively.

pursuing certification of these designs. In SECY-97-020, "Results of Evaluation of Emergency Planning for Evolutionary and Advanced Reactors," dated January 27, 1997, the staff determined that the rationale upon which EP for current reactor designs is based, that is, potential consequences from a spectrum of accidents, is appropriate for use as the basis for EP for evolutionary and passive advanced LWR designs and is consistent with the Commission's defense-in-depth safety philosophy.

In the early 2000s, performance-based EP became an important component of LWR licensing and relicensing discussions. As part of an EP exemption request review, in SECY-04-0236, "Southern Nuclear Operating Company's Proposal to Establish a Common Emergency Operating Facility at its Corporate Headquarters," dated December 23, 2004, the staff noted the following:

> [A]s part of the top-down review of Emergency Preparedness, the staff has identified 10 CFR 50 Appendix E section E.8 and 10 CFR 50.47(b)(3) as opportunities to enhance the emergency preparedness regulatory structure. The staff will propose rulemaking to remove "near-site" from the regulations, as a more performance-based requirement is appropriate….

The Commission agreed, highlighting the potential value of performance-based EP for LWRs in the SRM for SECY-04-0236, dated February 23, 2005, as follows:

> The staff should consider revising 10 CFR Part 50 to make the requirements for EOFs [emergency operations facilities] more performance-based to allow other multi-plant licensees to consolidate their EOFs, if those licensees can demonstrate their emergency response strategies will adequately cope with an emergency at any of the associated plants.

In this decision, the Commission allowed for the development of a performance-based EP requirement.

In SECY-06-0200, "Results of the Review of Emergency Preparedness Regulations and Guidance," dated September 20, 2006, the staff sought Commission approval to explore the feasibility of a voluntary, performance-based EP regulatory regimen. Specifically, the staff stated:

> [A]s the EP program has matured and industry performance has improved, the staff recognized the benefits of a performance-based regulatory structure. Thus, the staff is proposing a new voluntary performance-based regulatory regimen. The staff has conceptualized the basis for a voluntary performance-based EP regulatory regimen…. This regimen could be adopted in lieu of the existing EP regulations contained in 10 CFR Part 50. The current regimen tends to emphasize compliance with, and control over, emergency plans and facilities. The performance-based regimen would focus licensee efforts on actual performance competencies, rather than control of emergency plans and procedures. Regulatory oversight would focus on licensee performance, instead of licensee processes and procedures. Creating a performance-based EP regulatory regimen could achieve a higher level of preparedness, as the regimen would focus on results and abilities rather than on means. The performance-based regimen would provide the NRC with enhanced oversight of the actual competencies important to protection of public health and safety while allowing licensees increased flexibility.

In SECY-06-0200, the staff also outlined several high-level performance-based concepts for large LWRs related to performance goals, staffing, and performance indicators (PIs). In the SRM for SECY-06-0200, dated January 8, 2007, the Commission approved several staff recommendations, including the staff's request to begin activities to explore a voluntary performance-based EP regulatory concept.

During the early development of a performance-based EP regulatory concept, the NRC published a "Policy Statement on the Regulation of Advanced Reactors," dated October 14, 2008 (73 FR 60612). The policy statement expressed the Commission's expectation that advanced reactor designers would ensure that security and emergency response are considered alongside safety during the early stages of plant design.

By 2014, the NRC had finalized its study and review of the potential to enhance the oversight of performance-based nuclear power plant EP programs as directed in the SRM for SECY-06-0200. In SECY-14-0038, "Performance-Based Framework for Nuclear Power Plant Emergency Preparedness Oversight," dated April 4, 2014, the staff stated:

> A systematic review and revision of EP requirements to employ a more performance-based oversight regimen (regulation, inspection, and enforcement) has the potential to enhance many aspects of emergency

> response and oversight. A performance-based oversight regimen could simplify EP regulations and focus inspection more fully on response-related performance rather than the current focus on plan maintenance and compliance.

Although the staff asserted that the performance-based framework would simplify EP regulations and focus inspections more on response-related performance, the staff recommended that the existing framework continue to be used with operating plants because changing the EP approach for those plants would require significant resources and could introduce regulatory uncertainty. Additionally, the staff recognized that existing EP programs provided reasonable assurance of adequate protection of public health and safety and therefore recommended maintaining the current EP regimen.

In the SRM to SECY-14-0038, dated September 16, 2014, the Commission directed that:

> The staff should be vigilant in continuing to assess the NRC's emergency preparedness program and should not rule out the possibility of moving to a performance-based framework in the future. The Commission notes the potential benefit of a performance-based emergency preparedness regimen for small modular reactors, and the staff should return to the Commission if it finds that conditions warrant rulemaking.

2. Approach to Emergency Preparedness for Small Modular Reactors and Other New Technologies

In the late 2000s, the discussion of modernizing EP and developing alternative performance-based requirements for LWRs merged with the NRC's ongoing discussions of advanced reactor designs. By this time, several advanced reactor designs were under discussion in the U.S., including the U.S. Department of Energy's (DOE's) Next Generation Nuclear Plant and SMR programs, and by private sector companies seeking to introduce an alternative to large LWRs. By 2010, the NRC began considering the possibility of developing a performance-based approach to EP for SMRs and ONTs. In SECY-10-0034, "Potential Policy, Licensing, and Key Technical Issues for Small Modular Nuclear Reactor Designs," issued on March 28, 2010, the staff identified EP as

a key technical issue for the licensing of SMRs and other advanced reactor designs. The enclosure to the SECY stated that resolution of offsite EP requirements would be of interest to the Federal Emergency Management Agency (FEMA) and the public, as well as to applicants trying to support their business case at the design certification stage.

Contemporaneous with the issuance of SECY-10-0034, the NRC held a series of public meetings with other Federal agencies, industry leaders, and key stakeholders to discuss potential policy, licensing, and technical issues associated with advanced reactor designs. Summaries of the October 8-9, 2009, and July 28, 2010, meetings are available in ADAMS, as provided in the "Availability of Documents" section of this document. Discussions included the proposed framework of potential EP requirements. Emergency preparedness was a significant policy issue for SMR designers because SMR designs may have reduced accident consequences offsite per reactor module, potentially forming the basis for smaller EPZs relative to large LWRs.

The staff discussed the public's input from those meetings in SECY-11-0152, "Development of an Emergency Planning and Preparedness Framework for Small Modular Reactors" on October 28, 2011. The paper informed the Commission of the staff's proposed actions to develop an emergency planning and preparedness framework for SMR facilities. In the document, the staff stated its intent to develop a technology-neutral (now technology-inclusive), dose-based, consequence-oriented EP framework for SMR sites that would take into account the various designs, modularity, and co-location of these facilities with other NRC-licensed facilities and industrial facilities not licensed by the NRC, as well as the size of the EPZs. The staff also stated that "[t]he staff will work with stakeholders to develop general guidance on calculating the offsite dose, and is anticipating that the industry will develop and implement the detailed calculation method for review and approval by the staff."

In response to SECY-11-0152, the Nuclear Energy Institute (NEI) prepared a white paper to provide perspective to the NRC and SMR developers in establishing EPZs for SMRs. In the "White Paper on Proposed Methodology and Criteria for Establishing the Technical Basis for Small Modular Reactor Emergency Planning Zone," submitted in December 2013, NEI noted the NRC expectation in SECY-11-0152 that SMR license applicants will provide a well-justified technical basis for NRC's review and consideration. The 2013 White Paper was designed to "discuss a generic methodology and criteria that can be adopted and used by the SMR developers and plant operating license applicants for establishing the design-specific and site-specific technical basis for SMR-appropriate EPZs." In the paper, NEI stated that the intent of the paper was to "serve as a vehicle to support the continuing dialogue with the staff that should result in a mutually agreeable methodology and criteria, and thus provide the SMR developers and applicants sufficient guidance as they proceed to develop their design-specific and site-specific technical basis." As stated in the paper, NEI's approach was rooted in the following:

> (1) the expectation of enhanced safety inherent in the design of SMRs (e.g., increased safety margin, reduced risk, smaller and slower fission product accident release, and reduced potential for dose consequences to population in the vicinity of the plant); (2) the applicable SECY-11-0152 concepts including utilization of existing emergency preparedness regulatory framework and dose savings criteria of NUREG-0396; and (3) the significant body of risk information available to inform the technical basis for SMR-appropriate EPZ, including severe accident information developed since NUREG-0396 was published in 1978, and information from the design-specific and plant-specific probabilistic risk assessments (PRAs) which will support SMR design and licensing.

The NEI 2013 White Paper addressed only SMRs with light-water-cooled and moderated designs and the plume exposure pathway EPZ. It did not address other designs or the ingestion pathway EPZ (IPZ). The NRC reviewed the White Paper and discussed the development of the regulatory framework with NEI and stakeholders; however, the NRC did not endorse the paper.

In the enclosure to SECY-10-0034, the staff stated, “Should it be necessary, the staff will propose changes to existing regulatory requirements and guidance or develop new guidance concerning reduction of offsite emergency preparedness for SMRs in a timeframe consistent with the licensing schedule.” In 2015, the NRC determined that SMR EP issues were a key concern for potential SMR and ONT applicants, and that addressing those issues would enhance regulatory predictability for both applicants and the NRC. In May 2015, the staff sought Commission approval to initiate rulemaking to revise the EP regulations and guidance for SMRs and ONTs. In SECY-15-0077, “Options for Emergency Preparedness for Small Modular Reactors and Other New Technologies,” dated May 29, 2015, the staff proposed a consequence-oriented approach to establishing EP requirements commensurate with the potential consequences to public health and safety and the common defense and security at SMR and ONT facilities. The staff stated that the need for EP is based on the projected offsite dose in the unlikely occurrence of a severe accident. In SRM-SECY-15-0077, the Commission approved the staff’s recommendation to proceed with rulemaking, keeping a performance-based framework in mind as previously directed in SRM-SECY-14-0038. The Commission further directed that, for any SMR reviews conducted prior to the establishment of a regulation, the staff should be prepared to adapt an approach to EPZs for SMRs under the exemption process.

In June 2015, NEI issued a White Paper supporting the NRC proposal in SECY-15-0077 and recommending the revision of EP regulations and guidance for SMR facilities. In “White Paper: Proposed Emergency Preparedness Regulations and Guidance for Small Modular Reactors Facilities,” dated July 2015, NEI provided proposed revisions to the planning standards set forth in § 50.47 and appendix E to 10 CFR part 50 as well as associated EP guidance. The proposed revisions were developed by NEI to “constructively inform the staff’s deliberations concerning the

development of an SMR EP framework, and serve as a basis for future public meeting engagement." The NRC has considered NEI's recommendations in the development of this final rule.

In addition to the NEI white papers, the NRC has had several interactions with the public concerning licensing issues related to SMRs and ONTs, including joint DOE-NRC Workshops on Advanced Non-Light-Water Reactors held on September 1-2, 2015, and June 7-8, 2016. The NRC held these workshops to obtain stakeholder feedback regarding the proposed rule and inform the public on the proposed approach. Additional information on these workshops may be found in their summaries.

3. Rulemaking Activity

In response to SRM-SECY-15-0077, on May 31, 2016, the staff submitted a rulemaking plan to the Commission (SECY-16-0069, "Rulemaking Plan on Emergency Preparedness for Small Modular Reactors and Other New Technologies") to propose rulemaking to address EP for SMRs and ONTs. In SECY-16-0069, the staff provided a proposed rulemaking schedule, outlining the need to develop EP requirements for SMRs and ONTs commensurate with the potential consequences to public health and safety posed by these facilities. On June 22, 2016, the Commission issued SRM-SECY-16-0069 approving the staff's rulemaking plan.

On August 22, 2016, the NRC held a public meeting to request feedback from stakeholders on a potential performance-based approach for EP for SMRs and ONTs. The participants supported a performance-based approach for EP, indicating that it would be more effective because it would focus on achieving desired outcomes. Participants also favored the performance-based approach because it would allow for innovation and flexibility in addressing the EP requirements. The potential need for an entire new suite of guidance documents, including the process by which licensees make changes to their emergency plans (i.e., change process), was the only disadvantage

identified by participants as it would require additional up-front work to reflect the new approach. A summary of this public meeting is available in ADAMS, as provided in the "Availability of Documents" section of this document. After considering the feedback received from the stakeholders in support of the performance-based approach to EP, the NRC developed a draft regulatory basis that included an option to proceed with rulemaking to implement this approach.

On April 13, 2017, the NRC issued a draft regulatory basis for a 75-day public comment period (82 FR 17768). In the draft regulatory basis, the NRC requested feedback from the public on questions related to the scope of the draft regulatory basis, performance-based approach, regulatory impacts, and cumulative effects of regulation (CER). In addition, the NRC held a public meeting on May 10, 2017, to discuss the draft regulatory basis with interested stakeholders. A summary of this public meeting is available in ADAMS, as provided in the "Availability of Documents" section of this document.

The NRC received comment submissions from 57 individuals and organizations on the draft regulatory basis and the associated regulatory analysis, including223 individual comments related to EP. The commenters included individuals, environmental groups, industry groups, a Tribal government, States, and FEMA. The NRC reviewed all comments submitted on the draft regulatory basis, grouped the comments into categories by comment topic, and developed a resolution for each topic. Comments included topics such as: consequence-based approach, co-location, dose assessment, EPZ and offsite EP, general rulemaking approach, siting of multi-module facilities, performance-based approach, regulatory analysis, scope of the draft regulatory basis, safety, and technology-inclusive approach. The NRC considered those comments and discussions from the public meeting as it finalized the regulatory basis. The NRC

published a notification in the *Federal Register* announcing the public availability of the regulatory basis on November 15, 2017 (82 FR 52862).

On May 12, 2020, the NRC published the proposed rule, "Emergency Preparedness for Small Modular Reactors and Other New Technologies," for a 75-day public comment period (85 FR 28436). On May 25, 2020, the NRC published a notification to correct the definition of "Non-power production or utilization facility" (85 FR 32308). The NRC held a public meeting on June 24, 2020, to engage with external stakeholders on the proposed rule and associated draft guidance document. Additional information about this public meeting is detailed in the meeting summary. The NRC received several requests to extend the comment period by 6 months or more due to the Coronavirus Disease 2019 (COVID-19) public health emergency. On July 21, 2020, the NRC extended the comment period by 60 days with a closing date of September 25, 2020 (85 FR 44025). The NRC received comment submissions from 2,212 individuals and organizations, including 2,087 form letters and form letters with non-substantive additional text. The staff's analysis identified 649 unique comments on the proposed rule and associated guidance, the regulatory analysis, and the environmental assessment. The commenters included State and local governments, Tribal governments and Tribal organizations, Federal agencies, members of the nuclear power industry, non-governmental organizations, and private citizens. A summary of the comments and the NRC's responses to the comments are available as indicated in the "Availability of Documents" section of this document. The NRC used these comments to develop this final rule.

II. Discussion

A. Objective and Applicability

This final rule creates alternative EP requirements that: 1) continue to provide reasonable assurance that adequate protective measures can and will be implemented by an SMR or ONT licensee; 2) promote regulatory stability, predictability, and clarity; 3) reduce the need for requests for exemptions from EP requirements; 4) recognize advances in design and technology advancements embedded in design features; 5) credit safety enhancements in evolutionary and passive systems; and 6) credit the potential benefits of smaller sized reactors and non-LWRs associated with postulated accidents, including slower transient response times, and relatively small and slow release of fission products. This final rule applies to existing and future SMR and ONT facilities. These applicants and licensees have the option to develop a performance-based EP program designed for SMRs and ONTs, as an alternative to complying with the existing, deterministic EP requirements in 10 CFR part 50.

This final rule does not include within its scope emergency planning, preparation, and response for large LWRs, which for the purposes of this final rule are those LWRs that are licensed to produce thermal power greater than 1,000 MWt ~~power~~; fuel cycle facilities; or currently operating non-power reactors. The current operating fleet of power reactors has an established EP regulatory framework under § 50.47 and appendix E to 10 CFR part 50. Emergency planning requirements for facilities licensed under 10 CFR part 70 are set forth in § 70.22(i). The NRC established in appendix E to 10 CFR part 50 emergency planning requirements for RTRs that reflect the lower potential radiological hazards associated with these facilities.

The plume exposure pathway EPZ for the current operating fleet of nuclear power reactors consists of an area about 10 miles (16 km) in radius and the IPZ for such facilities consists of an area about 50 miles (80 km) in radius. See current §§ 50.33(g) and 50.47(c). As discussed in the “Background” section of this document, in the early 2000s, the NRC anticipated that future SMR and ONT applications would reflect a wide

range of potential designs that have smaller source terms and incorporate EP considerations as part of the design. In its Policy Statement on the Regulation of Advanced Reactors (73 FR 60612), the Commission stated that it "expects that advanced reactors will provide enhanced margins of safety and/or use simplified, inherent, passive, or other innovative means to accomplish their safety and security functions." Under the current EP framework, §§ 50.33(g) and 50.47(c)(2) provide that the size of plume exposure pathway EPZs and IPZs for gas-cooled nuclear reactors and for reactors with an authorized power level less than 250 MWt may be determined on a case-by-case basis. Section I.3 of appendix E to 10 CFR part 50 states that the EPZs for facilities other than power reactors may also be determined on a case-by-case basis. In addition, applicants and licensees for power reactors may also request that the size of the EPZs and IPZs for their facilities be determined on a case-by-case basis by seeking an exemption under § 50.12, "Specific exemptions," from the requirements in §§ 50.33(g) and 50.47(c)(2) regardless of authorized power level. Furthermore, appendix E to 10 CFR part 50, provides the flexibility to determine other emergency planning considerations, such as organization, assessment actions, activation of emergency organization, emergency facilities, and equipment, on a case-by-case basis for certain facilities.

The NRC initiated this rule to seek a wide-range of public views and increase regulatory predictability and flexibility in the development of an alternative, generic approach that designers, vendors, and applicants may use to determine the appropriate EP requirements for SMRs and ONTs, for which emergency planning may otherwise be addressed on a case-by-case basis. In particular, this final rule provides additional predictability and flexibility for advanced reactor developers that use simplified or other innovative means to accomplish their safety functions and provide enhanced margins of safety. Large LWRs were not included by the NRC in the scope of this final rule

because an EP licensing framework already exists for those reactors, and licensees for those plants have not expressed a clear interest in changing that framework.

For clarity, this final rule defines the different types of affected facilities. The NRC amends § 50.2 to include the terms “small modular reactor,” “non-light-water reactor,” and “non-power production or utilization facility.” The NRC has included a definition of “non-light-water reactor” to address ONTs, including liquid-metal-cooled reactors, gas-cooled reactors, and molten-salt-cooled reactors. Having a separate definition for these non-LWR technologies clarifies the applicability of the existing EP standards and requirements in 10 CFR part 50, which are specific to LWRs, and maintains consistency between this final rule and the “Variable Annual Fee Structure for Small Modular Reactors” final rule (81 FR 32617; May 24, 2016).

The NRC evaluated the suitability of using the existing definition of “small modular reactor” in § 171.5, “Definitions” for the purposes of this EP final rule. The § 171.5 definition of “small modular reactor” means, for the purpose of calculating fees, the class of light-water power reactors having a licensed thermal power rating less than or equal to 1,000 MWt per module. This rating is based on the thermal power equivalent of a light-water SMR with an electrical power generating capacity of 300 megawatts electric or less per module. Although similar, this final rule’s definition of “small modular reactor” does not include reference to electrical power generating capacity. For the fee-related regulations in 10 CFR part 171, “Annual Fees For Reactor Licenses and Fuel Cycle Licenses and Materials Licenses, Including Holders of Certificates of Compliance, Registrations, and Quality Assurance Program Approvals and Government Agencies Licensed by the NRC,” the NRC determined that using the thermal power equivalent of electric power generating capacity would be equitable because SMRs should pay annual fees that are commensurate with the economic benefit received from their license (81 FR 32617). However, because electric power generating capacity is not a criterion the

NRC uses to determine EP requirements, this final rule's definition focuses on thermal power rating.

The NRC received a public comment on the proposed rule that the definition of "small modular reactor" should indicate that an SMR can have a licensed thermal power up to 1,000 MWt, and that this limit applies to each module in a facility rather than the total thermal power of all modules in a facility. The proposed rule's definition of "small modular reactor" provided that an SMR was a power reactor licensed to produce heat energy up to 1,000 MWt, which may be of modular design as defined in § 52.1, "Definitions." The NRC agreed that this definition could be subject to more than one interpretation and revised the definition of "small modular reactor" to read: "a power reactor, which may be of modular design as defined in § 52.1 of this chapter, licensed under § 50.21 or § 50.22 to produce heat energy up to 1,000 megawatts thermal per module." The "per module" language is also consistent with the definition of "small modular reactor" in § 171.5.

B. Need for Changes to Existing Regulatory Framework

As mentioned in the "Background" section of this document, in SECY-10-0034, the NRC identified potential policy and licensing issues for SMRs based on the preliminary design information supplied in pre-application interactions and discussions with SMR designers and the DOE. In general, these issues result from the key differences between the new designs and the current-generation large LWRs, such as rated thermal power, moderator, coolant, and fuel design. In SECY-10-0034, the NRC described designs discussed in pre-application interactions with DOE and SMR designers. The rated thermal power of these designs ranged from 30 MWt to 1,000 MWt. The designs included the use of helium gas, sodium, and light-water as coolants.

While some SMR designs employ conventional LWR radiological barrier designs, some designs may employ a non-traditional containment approach.

In addition to licensing issues associated with differences in designs, some of the licensing issues resulted from industry-proposed review approaches and industry-proposed modifications to current policies and practices, including standard review plans and design-specific review standards. The potential for smaller reactor core sizes, lower power densities, lower probability of severe accidents, slower accident progression, and smaller accident offsite consequences per module that characterize some SMR designs have led DOE, SMR designers, and potential operators to revisit the determination of the size of the EPZs, the extent of onsite and offsite emergency planning, and the number of onsite response staff needed.

Historically, licensees of small reactors have requested exemptions from EP regulations because those EP requirements would have imposed a regulatory burden on the applicants that was not necessary to protect the public health and safety due to the facilities' designs. The NRC anticipates that existing or future SMR and ONT applicants could also have designs that differ substantially from the existing fleet of large LWRs. These applicants could also request exemptions from EP requirements that are potentially unnecessary to protect the public health and safety. Although the exemption process provides the flexibility to address these existing or future applicants, regulating by exemption generally provides little opportunity for public engagement in the exemption process and can lead to undue burden and lack of predictability for applicants, licensees, and the NRC stemming from the applicant or licensee specific nature of exemption requests.

This final rule creates a transparent alternative EP regulatory framework for SMR and ONT applicants and licensees that continues to provide reasonable assurance that adequate protective measures can and will be implemented in a radiological emergency.

The final alternative EP requirements consider a wide range of views, acknowledge technological advancements and other differences from large LWRs inherent in SMRs and ONTs, and reduce regulatory burden by precluding the need for exemptions from EP requirements as applicants request permits and licenses. This final rule also supports the principles of good regulation, including openness, clarity, and reliability.

1. Technical Basis

This final rule is a performance-based, technology-inclusive, risk-informed, and consequence-oriented alternative approach to EP for SMRs and ONTs. These approaches form the basis for the NRC's final rule, and the following discussion addresses the technical basis for each.

a. Performance-Based Approach to Emergency Planning

The NRC's current regulatory framework for EP in 10 CFR part 50 requires that site-specific emergency plans be developed and maintained in compliance with 16 planning standards for nuclear power reactors. This deterministic structure does not provide performance standards, but the regulations and guidance for emergency response organizations (EROs) emphasize requirements for emergency plans and facilities. The existing EP requirements for large LWRs are based on decades of research on the risks posed by these facilities. The risks for these facilities are well understood, and, as such, a deterministic approach to regulating EP is an effective method for providing reasonable assurance that protective measures can and will be taken in a radiological emergency.

The NRC anticipates that existing and future SMR and ONT applications will use a wide range of potential designs and source terms. Advances in designs could enhance the EP for these facilities. At the same time, EP itself is improving through technological innovations like FEMA's Integrated Public Alert & Warning System. Because the technology for EP and certain SMR and ONT designs are ~~still~~ evolving, a

performance-based approach could allow for more regulatory flexibility, provide a basis for appropriate EP through review of design- and site-specific accident scenarios, and minimize the need for exemption requests that would otherwise be anticipated under a prescriptive regulatory framework. In this context, a performance-based approach bases the adequacy of EP upon the NRC's identification of emergency response functions that affect the protection of public health and safety and the licensee's successful execution of those functions. The NRC's performance-based framework, inspection and enforcement program, and design-specific review process provide reasonable assurance that protective measures can and will be taken in the event of an emergency at an SMR or ONT facility. The NRC has previously explored the idea of a performance-based EP framework, as discussed in the "Performance-Based Emergency Preparedness" section of this document, and the Commission noted that a performance-based approach was a potential benefit to regulating EP for SMRs. The performance-based approach could simplify EP regulations and focus inspections more fully on response-related performance.

The NRC also considered a graded approach to EP that would take into account the magnitude of any credible hazard involved, the particular characteristics and status of a facility, and the balance between radiological and non-radiological hazards. A graded approach to EP has a longstanding regulatory history. The 16 EP planning standards for nuclear power reactors, outlined in § 50.47(b), and the associated evaluation criteria in NUREG-0654/FEMA-REP-1, Revision 1 and NUREG-0654/FEMA-REP-1, Revision 2, are part of a continuum of planning standards for radiological EP. The existing regulations in § 50.47(c)(2) for EPZ size determinations for gas-cooled reactors and reactors with power levels less than 250 MWt, the EP regulations for production and utilization facilities other than nuclear power reactors in appendix E to 10 CFR part 50, and the EP regulations for fuel cycle facilities in § 70.22(i) and

independent spent fuel storage installations (ISFSIs) in § 72.32, “Emergency plan,” are also part of a graded approach to EP that is commensurate with the relative radiological risk, source term, and potential hazards, among other considerations.

b. Technology-Inclusive Approach to Emergency Planning

As previously mentioned, the NRC has licensed, reviewed, or had pre-application discussions with stakeholders supporting a range of technology types that are included in the scope of this final rule. Based on the information currently available to the NRC, unique design considerations (e.g., passive safety characteristics, advanced fuel types, and chemical processes) and the potential for multi-module facilities and siting contiguous to, or near, NRC-licensed facilities or facilities not licensed by the NRC could lead to a variety of accident frequencies, progression times, and potential consequences for SMRs or ONTs. To incorporate recent and potential technology advancements and reduce the need for future EP rulemaking, this final rule offers a technology-inclusive approach to EP for SMRs and ONTs. In this context, technology-inclusive means the establishment of performance requirements for any SMR or ONT applicant or licensee to use in its emergency plan, developed using methods of evaluation that are flexible and practicable for application to a variety of reactor technologies.

As described further in the “Performance-Based Framework” section of this document, the NRC’s final alternative framework for SMRs and ONTs consists of two major elements – an EPZ size determination process and a set of performance-based requirements. The size of an EPZ determined by this process is scalable based on factors such as accident source term, fission product release, and associated dose characteristics, and the same process can be applied to all SMR and ONT designs. Further, the performance-based requirements in § 50.160, “Emergency preparedness for small modular reactors, non-light-water reactors, and non-power production or utilization facilities,” do not contain any technology specific language. Rather, applicants and

licensees demonstrate how they meet the EP performance-based framework based on their design- and site-specific considerations through the implementation of a performance objective scheme and the conduct of drills and exercises.

c. Consequence-Oriented and Risk-Informed Approaches to Emergency Planning

This final rule offers a consequence-oriented approach to establish EP requirements for SMRs and ONTs. In this context, consequence-oriented means the principle of basing decisions regarding the scope of EP upon the potential consequences from a spectrum of accidents, including those that could result in an offsite radiological release. The decisions regarding EP should be based upon projected offsite dose from such accidents and the pre-determined plume exposure pathway EPZ for pre-planned protective measures.

The NRC reviewed the current EP requirements associated with various nuclear facilities, including large and small operating reactors, material facilities, fuel facilities, ISFSIs, NPUFs, and decommissioning large LWRs (including SECY-18-0055, "Proposed Rule: Regulatory Improvements for Production and Utilization Facilities Transitioning to Decommissioning," dated May 22, 2018). In this review, the NRC identified that all of the existing types of NRC-licensed nuclear facilities use a consequence-oriented approach and take into account other considerations, such as the likelihood of the accident, to establish the boundary of the plume exposure pathway EPZ (or other planning area). The consequence or dose considerations are based on the U.S. Environmental Protection Agency (EPA) early-phase Protective Action Guides (PAGs) (EPA-520/1-75-001), issued in September 1975. The PAGs were revised and republished as EPA-400-R-92-001 in May 1992, and a subsequent revision, EPA400/R-17/001, was issued in January 2017.

The general considerations from the existing planning basis for EP, established in NUREG-0396/EPA 520/1-78-016, "Planning Basis for the Development of State and

Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," introduced the concept of generic EPZs as the basis for preplanned response actions. These planning distance considerations were intended to result in dose savings to members of the public in the environs of a nuclear facility when the EPA PAGs were used as the threshold to trigger the preplanned protective measures in the event of a reactor accident that would result in offsite dose consequences. Planning should also be based upon knowledge of the potential consequences, timing, and radiological release characteristics from a spectrum of accidents, including severe accidents. The joint NRC-EPA task force that developed NUREG-0396 considered several possible rationales for establishing the size of the EPZs, including risk, cost effectiveness, and the accident consequence spectrum (e.g., dose and significant health effects). After reviewing these alternatives, the NRC-EPA task force concluded that the objective of emergency response plans should be to provide dose savings for a spectrum of accidents that could produce offsite doses in excess of the EPA PAGs for those members of the public who would most likely receive exposure as a result of a significant release.

In the 1980 Final Rule, based on the guidance in NUREG-0396, the NRC established plume exposure pathway and ingestion pathway EPZ requirements for large LWRs of about 10 miles (16 km) and 50 miles (80 km), respectively. The NRC also clarified that the size of the EPZ could be determined on a case-by-case basis for gas-cooled nuclear reactors and for reactors with an authorized power level less than 250 MWt. The NRC stated that this requirement was based on the lower potential hazard from these facilities (i.e., lower radionuclide inventory and longer times to release significant amounts of activity in many scenarios) and clarified that the radionuclides to be considered in planning for large LWR accident scenarios were set forth in NUREG-0396. Similarly, the NRC established in the 1980 Final Rule that the degree to

which compliance with sections I through V of appendix E to 10 CFR part 50 would apply to RTRs and fuel cycle facilities would be determined on a case-by-case basis because the radiological hazards to the public associated with the operation of RTRs and fuel cycle facilities involve considerations different than those associated with nuclear power reactors.

This final rule for SMRs and ONTs continues this consequence-oriented approach for determining the size of the plume exposure pathway EPZ. The primary purpose of the plume exposure pathway EPZ is to define the area where predetermined, prompt protective measures are necessary, which results in dose savings and a reduction in early health effects. In this final rule, the NRC establishes in § 50.33(g)(2)(i) two criteria for determining a plume exposure pathway EPZ size. The first criterion is that the plume exposure pathway EPZ is the area within which public dose, as defined in § 20.1003, "Definitions," is projected to exceed 10 millisieverts (mSv) (1 rem) total effective dose equivalent (TEDE) over 96 hours from the release of radioactive materials from the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology. The second criterion is that the plume exposure pathway EPZ is the area where predetermined, prompt protective measures are necessary.

The principle of using dose versus distance to determine EPZ size has been used in the past when the NRC licensed several small reactors with a reduced EPZ size of 5 miles (8 km). These reactors include the Fort St. Vrain high-temperature gas-cooled reactor (HTGR) (842 MWt), the Big Rock Point boiling water reactor (BWR) (240 MWt), and the La Crosse BWR (165 MWt). Pre-application discussions between the NRC and SMR designers have indicated that SMRs also could have reduced offsite dose consequences in the unlikely event of an accident. With the expected safety enhancements in SMRs and ONTs ~~designs and the potential for reduced accident source terms and fission product releases from SMRs and ONTs~~, this final rule provides

an alternative EP framework that allows SMR and ONT applicants to develop EPZ sizes commensurate with their accident source terms, fission product releases, and accident dose characteristics considering site-specific meteorology.

To support this final rule, the NRC conducted research on EPZ size determinations for SMRs and ONTs. Because of the potential variations in SMR or ONT designs, the NRC cannot conduct a comprehensive evaluation of source terms and spectra of accidents as part of this final rule. Instead, the research study, "Generalized Dose Assessment Methodology for Informing Emergency Planning Zone Size Determinations," dated June 2018, reviewed the dose assessment methodologies that informed the EPZ size determinations in NUREG-0396 and developed a general methodology for determining plume exposure pathway EPZ size based on NUREG-0396. Information from that review and a subsequent set of recommended analyses documented in "Required Analyses for Informing Emergency Planning Zone Size Determinations," dated June 2018, was used to develop the methodology described in Appendix A, "General Methodology for Establishing Plume Exposure Pathway EPZ Size," of RG 1.242.

This final rule requires applicants that choose to comply with § 50.160 to submit an analysis under § 50.33(g)(2) to provide the technical basis justifying the proposed plume exposure pathway EPZ size. The NRC evaluates each application on a case-specific basis. The "Emergency Planning Zones" section in this document contains additional discussion on the NRC's consequence-oriented approach to EPZ size determinations for an SMR or ONT facility.

The proposed rule included a plume exposure pathway EPZ in which public dose is projected to be above 10 mSv (1 rem) TEDE over 96 hours from the release of radioactive materials, resulting from a spectrum of credible accidents for the facility. The NRC received public comments concerning the need for clarification on the plume

exposure pathway EPZ determination requirements, including the 10 mSv (1 rem) TEDE over 96 hours from the release of radioactive materials and the definition of "spectrum of credible accidents." The NRC removed the ~~phrase~~ word "~~spectrum of~~ credible ~~accidents~~" in this final rule. The determination of whether accidents are credible for a facility is a part of the applicant's safety analysis required for its application. As part of the NRC's safety review of the application, the NRC reviews the applicant's assessment of licensing basis events, event likelihood, and public dose consequences. The NRC's determination of the acceptability of the applicant's assessment supports the agency's separate review of the applicant's emergency plan. For the purposes of this final rule, the spectrum of accidents includes the entire collection of event sequences considered in the design and licensing basis of the facility, including those related to security.

As a result of these comments on the proposed rule, the NRC revised the requirements by listing in § 50.33(g)(2)(i)(A) the major considerations for the radiological consequence analysis to be used in determining the plume exposure pathway EPZ size for the facility: accident likelihood and source term, timing of the accident sequence, and meteorology. Consideration of accident likelihood in combination with event sequences makes it possible to arrive at the spectrum of accidents ~~taken from the licensing basis events~~ used to develop the basis for the applicant's site-specific plume exposure pathway EPZ. Source terms are used to determine dose consequences. Timing of the accident sequence facilitates determining if prompt protective measures are warranted. Meteorology input is essential in determining the weather conditions that impact dose consequences due to atmospheric transport and dispersion of the radioactive plume. Meteorological inputs should consider, but not be limited to, wind speeds, wind directions, atmospheric stability, precipitation, and mixing height, for temporal and geographical representativeness. Regulatory Guide 1.242 provides guidance on these considerations and developing the dose-consequence analysis.

The NRC also added a second criterion to the plume exposure pathway EPZ size determination in § 50.33(g)(2)(i)(B): the plume exposure pathway EPZ is the area in which predetermined, prompt protective measures are necessary. This rule provision adds a functional criterion to the EPZ to be consistent with the planning basis approach in NUREG-0396 and Federal guidance contained in the EPA PAG Manual.

The risk-informed planning basis for EP, established in NUREG-0396, was endorsed in the Commission policy statement, "Planning Basis for Emergency Responses to Nuclear Power Reactor Accidents," dated October 23, 1979 (44 FR 61123), and incorporated in the 1980 Final Rule. In the policy statement, the Commission said, "Predetermined protective action plans are needed for the EPZs." As described in NUREG-0396, for very serious accidents, predetermined, prompt protective actions would be taken if projected doses, at any place and time during an actual accident, appeared to be at or above the applicable proposed PAGs, based on information readily available in the reactor control room (i.e., at predetermined emergency action levels).

The planning basis established in NUREG-0396 determined that the scope of the planning effort needs to include: 1) the distance to which detailed planning for predetermined protective actions is warranted, 2) the time dependent characteristics of potential releases and exposures, and 3) the radioactive materials potentially released. The specified planning distance ensures that the locations of at-risk populations are identified, the responsible authorities who would carry out these actions will be notified, and the means of communication to these authorities are included in the detailed planning. The time available between recognition of the initiation of a serious accident and the beginning of the radioactive release to the environment is critical in determining what predetermined protective actions would be appropriate.

The planning basis in NUREG-0396 used the accident analyses and assumptions of NUREG-75/014, “Reactor Safety Study – An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants,” (WASH-1400), Appendices III and IV; Appendix V; Appendix VI; and Appendices VII-X, dated October 1975. These analyses assume that the range of times for the onset of radiological accident conditions and the start of a major radiological release could be from less than an hour to several hours. The potential for a major atmospheric release would necessitate consideration of predetermined, prompt protective measures. The length of time from the initiation of an event to the time of release in relation to the ability for OROs to determine and initiate protective measures is key to reducing dose and providing for public health and safety. If OROs have sufficient time to determine what protective measures, if any, are necessary to take for releases occurring after a delay from the initiating event (e.g., several hours), then predetermined, prompt protective measures may not be necessary. As an example of an analysis of timing considerations, the Low-Power Rule (“Emergency Planning and Preparedness Requirements for Nuclear Power Plant Fuel Loading and Low-Power Testing,” Final Rule, 53 FR 36955; September 23, 1988) included an analysis on the need for predetermined, prompt protective measures. Due to the substantial reduction in the likelihood of an accident and potential accident consequences for low power testing as compared to continuous full power operation, the analysis for this example identified a time period of 10 hours from the start time of the initiating event to the start time of a potential major release as a reasonable amount of time for OROs to take appropriate response actions that provide for public health and safety without the need for predetermined, prompt protective measures.

This timing of a potential major release is the basis for requiring predetermined, prompt protective measures triggered by plant conditions or dose projections in response to a General Emergency declaration. Because SMRs and ONTs are expected

to have accident timing characteristics different from large light-water reactor technologies considered in NUREG-0396, and because technology important to emergency planning and response continues to improve, the NRC added a functional criterion to this final rule to ensure that the need for predetermined, prompt protective measures is evaluated in the planning considerations.

This final rule requires applicants and licensees choosing to comply with § 50.160 to describe in their emergency plan the information that demonstrates compliance with the elements set forth in § 50.160(b). This includes the capability to assess and classify emergency events, establish and maintain effective communications, assess radiological conditions in and around the facility, and recommend protective measures to offsite authorities as conditions warrant. If an applicant or licensee determines under § 50.33(g)(2)(i)(B) that pre-determined, prompt protective measures are warranted, which would occur only if § 50.33(g)(2)(i)(A) is also met, then an EPZ is required. The need for pre-determined, prompt protective measures is assumed to exist unless an applicant can demonstrate that the timing of accidents in relation to the proposed capabilities for assessment and notification are such that predetermined, prompt protective measures are not warranted. That is, the applicant must demonstrate that plant condition-based, predetermined, prompt protective measures are not required because sufficient time is available, and the capability exists, to initiate appropriate response actions offsite as conditions warrant. RG 1.242 provides guidance for the EPZ functional criterion.

The capability for taking protective measures is not dependent upon an established EPZ. The EPZ is a planning tool to ensure predetermined, prompt protective measures can and will be taken if accident conditions warrant. If both § 50.33(g)(2)(i) criteria are met, then an EPZ is required. However, if there is no need for predetermined, prompt protective measures, then the final rule still requires licensees

to develop and maintain capabilities to assess, classify, notify, and recommend protective measures as conditions warrant. In all cases, the NRC will not issue an initial operating license (OL) or combined license (COL) unless the NRC finds that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

This final rule does not provide for a specific IPZ. This final rule includes ingestion response planning requirements instead of an IPZ at a set distance as part of the performance-based framework. Ingestion response planning focuses planning efforts on identification of major exposure pathways for ingestion of contaminated food and water. This final rule requires applicants and licensees who comply with § 50.160 to describe in their emergency plan the licensee, Federal, State, and local resources for ingestion emergency response capabilities available to sample, assess, and implement a quarantine or embargo of food and water to protect against contaminated food and water entering the ingestion pathway. For those applicants and licensees using § 50.47(b) and appendix E to 10 CFR part 50, the IPZ requirements remain unchanged.

These ingestion emergency response capabilities are implemented either by the licensee within the site boundary or by Federal, State, and local authorities in the intermediate or later-stage response to an accident involving the release of radioactive material. The sampling, assessing, and imposing of a quarantine or embargo are longer-term issues. Federal and State authorities frequently issue precautionary actions or implement quarantines or embargos for non-radiological contamination of foods. Further, Federal resources are available upon request to State, local, and Tribal response to any nuclear or radiological incident. Current State and local plans include sampling, assessing, and implementing precautionary actions prior to exceeding dose thresholds or PAGs.

2. Performance-Based Framework

This final rule creates a new section, § 50.160, that provides a performance-based EP framework for SMRs and ONTs as an alternative to the current regulations. Under § 50.54(q)(2)(ii) in this final rule, licensees are required to follow and maintain either an emergency plan that meets the requirements in § 50.160 or an emergency plan that meets the requirements in appendix E to 10 CFR part 50 and, for nuclear power reactor licensees, the planning standards of § 50.47(b). Sections 50.34 and 52.79, "Contents of applications; technical information in final safety analysis report," stipulate that SMR and ONT applicants have the option to choose either approach.
Section 50.160 includes: 1) emergency response functions that must be demonstrated through the regular development and maintenance of performance objectives and periodic drills and exercises, 2) onsite and offsite planning activities to be met by applicants and licensees to which the provision applies, 3) requirements for considering credible hazards associated with contiguous or nearby NRC-licensed facilities and industrial facilities not licensed by the NRC, and 4) a requirement for applicants and licensees to determine and describe in the emergency plan the boundary and physical characteristics of the plume exposure pathway EPZ and ingestion response planning capabilities. Licensees complying with § 50.160 are required under § 50.160(b)(1) to demonstrate effective response in drills and exercises and describe in their emergency plans how they will maintain preparedness. To comply, emergency plans must include a description of how the emergency response functions in § 50.160(b)(1)(iii) and the planning activities in § 50.160(b)(1)(iv), if applicable, will be met.

The NRC has a long history of successful implementation of performance-based EP requirements (e.g., performance-based requirements for emergency facilities and staffing, and the Reactor Oversight Process).[4] Under this final rule's performance-based

[4] For further information on the Reactor Oversight Process, see: https://www.nrc.gov/reactors/operating/oversight.html.

approach to EP, performance and results are the primary basis for regulatory decisionmaking, and the applicant or licensee has the flexibility to determine how to meet the established performance criteria for an effective EP program. The performance-based regimen focuses on actual performance competencies, rather than control of emergency plans and procedures. Regulatory oversight focuses on performance, instead of processes and procedures. The performance-based regimen provides the NRC with enhanced oversight of the actual competencies important to the protection of public health and safety while allowing applicants and licensees increased flexibility.

The performance-based requirements in § 50.160 address the most risk-significant aspects of EP (e.g., classification, notification, protective action recommendation, mitigation), as well as several planning activities currently required under appendix E to 10 CFR part 50. Compliance with § 50.160 is demonstrated by performance during drills or exercises and the NRC's review of performance objectives and corrective actions. The NRC, in consultation with FEMA when an EPZ extends beyond the site boundary, ensures that reasonable assurance is maintained based on demonstrations of required emergency response functions through drills and exercises and NRC inspections. Between drills and exercises, licensees maintain a set of performance objectives to measure emergency response performance. See the "Reasonable Assurance" section of this document for a discussion of how this final rule maintains reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

In responding to a public comment related to risks associated with the loading and storage of irradiated fuel, the NRC determined that a conforming change is needed to 10 CFR part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater that Class C

Waste." A 10 CFR part 72 specific license ISFSI must comply with the EP requirements in § 72.32. Most power reactor licensees have 10 CFR part 72 general licenses for their ISFSIs. For these ISFSIs, § 72.32(c) provides that the emergency plan required by § 50.47 satisfies the EP requirements of § 72.32. This provision means that an emergency plan that meets the requirements of § 50.47 satisfies the EP requirements of § 72.32. This same policy applies to an ISFSI on the site of a power reactor whose licensee is complying with § 50.160. To allow for this, the NRC revised § 72.32(c) to clarify that the emergency plan that meets either the requirements in § 50.160 or the requirements in appendix E to part 50 and § 50.47(b) satisfies the EP requirements of § 72.32.

a. Application Process

Current applicants for a construction permit (CP), early site permit (ESP), OL, or COL are required to provide emergency planning information as described in § 50.33, § 50.34, § 52.17, "Contents of applications; technical information," and § 52.79. In particular, § 50.34(a)(10) requires applicants for CPs to describe within the preliminary safety analysis report (PSAR) their preliminary plans for coping with emergencies. Under § 52.17(b), ESP applicants must identify within their site safety analysis report physical characteristics of the proposed site that could pose a significant impediment to the development of emergency plans and, as applicable, measures for mitigating or eliminating the significant impediments. Within the site safety analysis report, ESP applicants also have the option of proposing either major features of emergency plans (under § 52.17(b)(2)(i)) or complete and integrated emergency plans (under § 52.17(b)(2)(ii)) for NRC review and approval. Applicants for OLs and COLs, as well as ESP applicants choosing to provide emergency plans under § 52.17(b)(2)(ii), must submit radiological emergency response plans of State and local governments wholly or partially within the plume exposure pathway EPZ and State governments wholly or

partially within the IPZ under § 50.33(g). Under §§ 50.34(b)(6)(v) and 52.79, OL and COL applicants also must include in their final safety analysis report (FSAR) their plans for coping with emergencies.

Because SMR and ONT licensees are given a choice between complying with either § 50.160 or complying with the requirements in appendix E to 10 CFR part 50 and, for nuclear power reactor licensees, the planning standards in § 50.47, this final rule includes a number of conforming changes to clarify application requirements for applicants choosing the performance-based requirements.

- Construction permit and OL applicants must include emergency planning information in their PSARs and FSARs, respectively, and § 50.34(a)(10) and (b)(6)(v) require that the information describe how the applicant complies with either appendix E to 10 CFR part 50 or § 50.160.

- In order to maintain applicability to applicants and licensees choosing to comply with § 50.160, the NRC has added references to § 50.160 in § 50.47(c)(1), § 50.47(c)(1)(i), and § 50.47(e).

- Combined license and ESP applicants must continue to include emergency planning information in their site safety analysis report and FSAR; §§ 52.17(b)(2), 52.18, and 52.79(a)(21) require that the information describe how the applicant complies with either the applicable requirements in § 50.47 and appendix E to 10 CFR part 50, or the requirements in § 50.160.

- Applicants choosing to comply with § 50.160 must describe how their emergency plans meet the requirements in § 50.160(b). A revision to § 52.1 clarifies that, for applicants choosing the performance-based approach, the definition for “major feature of the emergency plans” includes aspects of plans necessary to address the requirements of § 50.160(b).

- Section 50.33(g)(2)(ii)(A) clarifies requirements to submit State, local, and participating Tribal emergency response plans for SMR, non-LWR, and NPUF applicants. Namely, if the application is for an OL or COL, or for an ESP that contains plans for coping with emergencies, and the plume exposure pathway EPZ extends beyond the site boundary (as defined in § 20.1003), the applicant must submit State, local, and participating Tribal emergency response plans. For purposes of this final rule, the term "participating Tribal" government means a Federally recognized Tribal government that has decided to participate in FEMA's offsite radiological emergency preparedness (REP) program and act as an independent entity with its own radiological emergency plan. The NRC included participating Tribal emergency response plans in this requirement to reflect the Commission's January 9, 2017 "Tribal Policy Statement" (82 FR 2402) and the 2019 issuance of NUREG-0654/FEMA-REP-1, Revision 2, which encourages the involvement of Tribal governments in NRC activities, and to reflect that Tribes have the option to participate in emergency planning in the communities where they are located. A Tribal government that has its own radiological emergency response plan can participate in State or local emergency response planning as an independent entity. A Tribe also has the option of being part of a State or local emergency response plan without participating in exercises or other community emergency response planning. To the extent that the Tribe elects to be included in State and local plans or does not participate in community emergency planning, FEMA will evaluate the adequacy of the State or local emergency response plan to provide for adequate protection of the members of the Tribal nation.

The requirements in § 50.33(g)(2) also include submission of an analysis for determining the plume exposure pathway EPZ, which is discussed in the "Emergency Planning Zones" section of this document.

b. Performance Objectives

Applicants and licensees adopting the alternative performance-based regulations must describe how they intend to maintain the effectiveness of their emergency plans to meet the performance-based requirements, which includes the implementation of a performance objective scheme that reflects the emergency response functions under § 50.160(b)(1)(iii). The NRC anticipates that performance objectives needed to demonstrate compliance with performance-based requirements will vary by design. Therefore, the NRC or industry may develop additional guidance related to performance objectives for specific designs or classes of designs.

Section 50.160(b)(1)(ii) requires applicants and licensees using § 50.160 to describe in the emergency plan an approach to develop and maintain at the beginning of each calendar quarter a list of performance objectives for that calendar quarter. Each licensee also must maintain records showing the implemented performance objectives and associated metrics during each calendar quarter for the previous eight calendar quarters. The NRC monitors the performance objectives and metrics to ensure that licensees are maintaining adequate emergency planning and preparedness. During evaluated exercises, the NRC assesses the performance of the licensee and reviews the ability of the licensee to take corrective actions in a timely manner.

c. Drills and Exercises

A key feature of this final rule is the use of drills and exercises to demonstrate that the applicant or licensee can implement the emergency plan to carry out an effective response to emergency and accident conditions. Current regulations in appendix E to 10 CFR part 50, section IV.F include a requirement for periodic drills and exercises for nuclear power reactor licensees to be conducted during an eight-year drill and exercise cycle. The eight-year cycle requirement affords sufficient time for a licensee to vary exercise scenario content to provide ERO members the opportunity to demonstrate proficiency in the key skills necessary to respond to several specific scenario elements.

Similarly, § 50.160(b)(1)(iii) requires the use of drills and exercises to demonstrate the licensee's capabilities in the enumerated emergency response functions listed in § 50.160(b)(1)(iii)(A)-(H). Additionally, maintenance of these capabilities is demonstrated through continued drills and exercises. And, unlike the exercise cycle requirements in appendix E to 10 CFR part 50, this final rule's performance-based requirements do not define the required frequency of drills and exercises or their scenarios. However, the exercise cycle frequency adopted by applicants and licensees should afford sufficient time during which ERO members will be provided ample opportunities to demonstrate their emergency response function capabilities listed in § 50.160(b)(1)(iii)(A)-(H). Applicants and licensees are required to describe exercise scenario elements necessary to demonstrate the emergency response functions in their emergency plans.

For facilities with EPZs that do not extend beyond the site boundary, OROs are not required to participate in radiological drills and exercises. Participation is not required because State, local, and Tribal government organizations do not need to provide for predetermined, prompt protective measures or take specialized actions in response to an event, other than providing onsite firefighting, law enforcement, and ambulance/medical services. Applicants and licensees may consider allowing State, local, or Tribal government organizations to participate in drills when requested by the offsite authorities. The "Offsite Radiological Emergency Preparedness Planning Activities" section of this document addresses ORO participation for facilities with EPZs that extend beyond the site boundary.

Under § 50.160(b)(1)(iii), the applicant's or licensee's emergency response team needs to have sufficient capability to demonstrate the following emergency response functions:

- Event classification and mitigation. The applicant or licensee needs to establish an emergency classification and action level scheme with established criteria for determining the need for notification of State, local, and Tribal governments, and participation of those governments in emergency response such that demonstration of the scheme can be achieved through the performance of drills or exercises within a performance-based framework. Applicants and licensees need to demonstrate the ability to assess, classify, monitor, and repair facility malfunctions and return the facility to safe conditions. The term “safe conditions” means that the facility has been restored to a radiologically safe and stable condition.

- Protective actions. The drill and exercise program needs to demonstrate the capability to implement and maintain protective actions for onsite personnel, as warranted. Applicants and licensees need to demonstrate the ability to recommend protective actions to offsite authorities as conditions warrant.

- Communications. The drill and exercise program needs to demonstrate that control room staff are capable of making effective communications to the ERO, including personnel and organizations who may have responsibilities for responding during emergencies. Control room staff and the emergency response team must have a means for maintaining communication with the NRC as needed, and with OROs based on prior arrangements. For example, the applicant or licensee may need to notify and maintain communications with the onsite fire brigade; offsite fire departments, rescue squad, or medical dispatch; and local law enforcement according to established agreements. As EP programs are developed, applicants and licensees need to determine if notification to OROs is appropriate. If notification to OROs is necessary, then drills and exercises need to demonstrate notifying the appropriate Federal, State, local, and Tribal officials of an emergency.

- Command and control. The drill or exercise needs to demonstrate continuity of operations through one or more shift changes of emergency response personnel, including the augmentation of the ERO. The supporting organizational structure needs to have defined roles, responsibilities, and authorities, and the drill or exercise needs to show how key ERO functions (e.g., communications, command and control of operations, notification of OROs, accident/incident assessment, information dissemination to OROs and media, radiological monitoring, protective response, security) will be maintained around the clock throughout the emergency.

- Staffing and operations. The drills or exercises need to demonstrate effective emergency response with the level of staffing at the SMR or ONT as described in the emergency plan. There needs to be sufficient on-shift staff to perform all necessary tasks until augmenting staff arrive to provide assistance. This is of particular interest to the NRC because of the potential for reduced staffing levels at SMRs and ONTs, as compared to large LWRs. For example, some SMR and ONT designs may use multiple modules at one site with a single, centralized control room. Designers have indicated that they are considering designs that can operate with a staffing complement that is less than what is currently required of large LWRs by § 50.54(m), which sets forth the minimum licensed operator staffing requirements. Under this final rule, drills and exercises provide the NRC the opportunity to consider the sufficiency of emergency response staffing to implement the roles and responsibilities described in the emergency plan. The performance opportunities allow applicant and licensee staff to develop, maintain, or demonstrate key skills and provide applicants, licensees, and the NRC the opportunity to identify and correct any weaknesses or deficiencies.

- Radiological Assessment. During the drills or exercises, control room staff, on-shift personnel, and the emergency response team need to demonstrate the ability to assess radiological conditions, including the ability to: monitor and assess dose to

personnel resulting from radiological releases and inadvertent criticality accidents; conduct radiological surveys; assess and report information to the ERO such as early indications of loss of adequate core cooling and radiological releases, including the release of hazardous chemicals produced from licensed material; and use protective equipment to implement protective action strategies. The NRC received a public comment suggesting a revision to § 50.160(b)(1)(iii)(F)(*1*), "Radiological conditions," § 50.160(b)(1)(iii)(F)(*3*), "Core or vessel damage," and § 50.160(b)(1)(iii)(F)(*4*), "Releases." The commenter recommended the NRC change the phrase "and report radiological conditions to the response organization" to read "and report radiological conditions to the onsite and offsite response organizations." In the proposed rule, the NRC explained that the information to be reported under § 50.160(b)(1)(iii)(F)(*1*), (F)(*3*) and (F)(*4*) (i.e., radiological conditions; the extent and magnitude of damage to the core or other vessel containing irradiated special nuclear material; and the extent and magnitude of all radiological releases, including releases of hazardous chemicals produced from licensed material, respectively) would be reported to the ERO. However, considering the public comment, the NRC determined that that information would need to be reported to only certain personnel within the ERO. Therefore, the NRC changed these rule provisions, so the information is reported to the "applicable response personnel."

- Reentry. Reentry is the temporary movement of people into an area of actual or potential hazard. The applicant or licensee also needs to demonstrate general plans for reentry after an emergency through drills or exercises. The applicant or licensee needs to demonstrate reentry plans for the site boundary, including determining when facility conditions are acceptable to justify reentry (e.g., based on air and soil sampling and analysis to determine levels of radiological contamination and projected dose).

Certain individuals who have been evacuated or relocated from a restricted area may be allowed to reenter under controlled conditions to perform specified activities.

- Critique and corrective actions. The performance of emergency response functions in drills and exercises (or responses to actual emergencies) is evaluated to identify weaknesses or deficiencies in ERO performance and the EP program. The applicant or licensee needs to use a corrective action program to evaluate, track, and correct EP weaknesses and deficiencies identified in drills and exercises (or responses to actual emergencies). Weaknesses and deficiencies may include items such as errors in the emergency plan or implementing procedures, ERO performance weaknesses, or degraded conditions in emergency response facilities, systems, and equipment resulting in a performance objective not being met. Corrective actions include remedial exercises to demonstrate that the deficiencies have been fully addressed.

d. Planning Activities

In addition to an applicant's or licensee's performance demonstrations through drills and exercises, this final rule includes a set of required planning activities in § 50.160(b)(1)(iv) to account for certain EP-related activities that are not readily observable or effectively measured through drills and exercises. This final rule includes two sets of planning activities: § 50.160(b)(1)(iv)(A) establishes planning activities for all applicants and licensees complying with § 50.160; and § 50.160(b)(1)(iv)(B) establishes planning activities that apply to applicants and licensees with a plume exposure pathway EPZ that extends beyond the site boundary.

Currently, § 50.47(b) requires licensees to be capable of maintaining prompt communication among the response organizations and the public. In § 50.160(b)(1)(iv)(A)(*1*), SMR and ONT applicants and licensees are required to be capable of preparing and issuing information to the public during emergencies to protect public health and safety. The NRC is establishing in § 50.160(b)(1)(iv)(A)(*2*) that

applicants and licensees also must be capable of implementing the NRC-approved emergency response plan in conjunction with the Licensee Safeguards Contingency Plan. In implementing the emergency response plan, licensees should coordinate security-related and emergency response activities to ensure an adequate and efficient response to a radiological event. The regulations in § 50.160(b)(1)(iv)(A)(*3*) require the capability to establish voice and data communications with the NRC for use during emergencies. Voice communication through the Emergency Notification System (ENS) and data communication through an electronic data link provide timely updates to the NRC on the implementation of the emergency plan during and after an emergency. Section 50.160(b)(1)(iv)(A)(*4*) requires the capability to establish emergency response facilities to support the emergency response functions required in § 50.160(b). Applicants and licensees need to establish a facility from which effective direction can be given and effective control can be executed for the duration of an emergency. Depending on design- and site-specific considerations, applicants and licensees may need to establish multiple emergency response facilities to demonstrate the capability to support emergency response functions. Emergency plans need to include descriptions of the facilities' functional capabilities, activation times, staffing, and communication systems.

In this final rule, the NRC moved the proposed requirement in § 50.160(b)(1)(iv)(B)(*4*) to new § 50.160(b)(1)(iv)(A)(*5*). This provision requires applicants and licensees to provide site familiarization training to individuals whose assistance may be needed in the event of a radiological emergency, including personnel from offsite response organizations. The NRC moved this provision to ensure that all applicants and licensees complying with § 50.160 provide this offsite organization training, notwithstanding whether an applicant's or licensee's plume exposure pathway EPZ extends beyond the site boundary.

Finally, the NRC moved the proposed requirement in § 50.160(b)(1)(iv)(B)(*11*) to new § 50.160(b)(1)(iv)(A)(*6*). This provision requires applicants and licensees to maintain up to date the emergency plan, contacts and arrangements with OROs, procedures, and evacuation time estimates (ETEs). Emergency plans need to include a description of the periodic coordination with OROs. The NRC moved this provision to ensure that all applicants and licensees complying with § 50.160 maintain their emergency plans, notwithstanding whether the plume exposure pathway EPZ extends beyond the site boundary.

e. Offsite Radiological Emergency Preparedness Planning Activities

Current requirements for offsite radiological emergency response plans are included in § 50.47 and appendix E to 10 CFR part 50. In select cases, the NRC has granted exemptions from these requirements to licensees based partially on a demonstration that an offsite radiological release would not exceed the EPA PAGs at the site boundary. For SMR and ONT applicants and licensees complying with § 50.160 that have no plume exposure pathway EPZ or establish a plume exposure pathway EPZ at the site boundary, the NRC does not mandate offsite radiological emergency planning activities. Section 50.160(b)(1)(iv)(B) establishes offsite planning activities that must be described in the emergency plan for applicants and licensees with plume exposure pathway EPZs extending beyond the site boundary. These activities include:

- Contacts/arrangements with governmental agencies. Applicants and licensees need to describe in emergency plans their contacts and arrangements with OROs for offsite radiological emergency response. Applicants and licensees need to ensure regular coordination with these organizations, including review of emergency plan changes.

- Notification of OROs. Applicants and licensees need to establish primary and backup means of notifying OROs and a message authentication scheme. The

emergency plan needs to include the proposed time period within which notifications to OROs would be made.

- Protective measures. Applicants and licensees need to maintain the capability to issue offsite protective action recommendations to OROs (e.g., evacuation, sheltering). The emergency plan needs to describe the procedures by which protective measures are implemented, maintained, and discontinued in their emergency plans.

- Evacuation time estimate study. Applicants and licensees need to conduct an evacuation time estimate (ETE) study and maintain the ETE up to date. The ETE is primarily used in the development of protective action strategies and to inform offsite protective action decisionmaking. In the proposed rule, § 50.160(b)(1)(iv)(B)(*5*) would have required an ETE "of the areas beyond the site boundary and within the EPZ." The NRC received comments that the phrase, "areas beyond the site boundary" could be interpreted to exclude, rather than include, the area within the site boundary. As a result, in this final rule, the NRC removed the phrase "beyond the site boundary and" to clarify that an ETE is intended to estimate the time to evacuate various sectors and distances within a licensee's plume exposure pathway EPZ, which includes the area within the plant site boundary. However, for a site boundary EPZ, the NRC is not requiring an ETE because predetermined, prompt offsite protective actions are not required. In addition, in this final rule § 50.160(b)(1)(iv)(B)(*5*) is renumbered to § 50.160(b)(1)(iv)(B)(*4*)

- Emergency response facilities. Applicants and licensees need to describe in their emergency plans an offsite facility and any backup facilities for coordination of the response with OROs.

- Offsite dose projections. Applicants and licensees need to be capable of making offsite dose assessments and communicating their results to OROs. The

emergency plan needs to describe the methods and instruments available for conducting these assessments.

- Dissemination of public information. Applicants and licensees need to describe in their emergency plans the means of providing initial and updated information to the public during an emergency (e.g., communication with the news media, coordination with OROs). Applicants and licensees need to describe the public alert and notification system.

- Reentry. Applicants and licensees need to describe in their emergency plans coordination with OROs on offsite reentry plans including the conditions necessary to allow reentry into the EPZ during and after an emergency. Some conditions may include: 1) use of access control points to issue dosimetry and train reentering individuals on its use; 2) use of stay times (as used here, the amount of time a person can safely stay in a restricted zone without exceeding their exposure limit), depending on the location of the reentry destination; 3) use of a health physicist escort or other personnel escort trained in the use of dosimetry; and 4) provision of monitoring and decontamination for exiting individuals. Reentry plans cover private citizens. For example, reentry plans may cover scenarios such as farmers being permitted to reenter the affected area to provide essential care for livestock.

- Offsite drills and exercises. Applicants and licensees need to describe in their emergency plans how offsite radiological emergency response is incorporated into their drills and exercises without mandatory public participation. Drill and exercise programs need to incorporate offsite response, and applicants and licensees need to coordinate with offsite response organizations, including FEMA, for their participation in drills and exercises and implementation of corrective actions.

In carrying out its responsibility under the Atomic Energy Act of 1954, as amended (AEA), the NRC establishes regulatory standards for onsite and offsite

radiological emergency planning. If an applicant's or licensee's emergency plan meets the NRC's regulations, then the NRC has reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. In the case of existing EP regulations for NPUFs, fuel cycle facilities, and ISFSIs, there are no regulatory requirements for dedicated offsite radiological emergency plans as part of the NRC license. Accordingly, NRC guidance for such facilities states that FEMA findings and determinations are not needed to support NRC licensing decisions. Similarly, for SMRs and ONTs within the scope of this final rule, FEMA findings and determinations regarding reasonable assurance under § 50.54(s)(3) are only needed for a facility where a plume exposure pathway EPZ extends beyond the site boundary requiring dedicated offsite radiological EP plans for the facility.

This final rule, which does not require offsite planning activities for facilities without plume exposure pathway EPZs or with plume exposure pathway EPZs at the site boundary, does not affect the authority that FEMA has under its regulations in Chapter I, "Federal Emergency Management Agency, Department of Homeland Security," of 44 CFR, "Emergency Management and Assistance," for overall emergency management and assistance to State and local response organizations, nor does it affect the responsibilities of State and local governments to establish and maintain comprehensive emergency management plans. Under its role as described in the National Response Framework, the NRC remains ready to provide FEMA and State, local, and Tribal governments with technical advice related to the safety and security of any proposed SMR or ONT facility.

In cases where a plume exposure pathway EPZ does not extend beyond the site boundary, even in the absence of NRC requirements for offsite radiological emergency planning, the responsible OROs would continue to take actions to protect the health and

safety of the public. Each of the States has established an emergency management organization to facilitate the safeguarding of the life and property of its citizens.[5]

The NRC has confidence in the ability of OROs to implement appropriate response actions when necessary, using comprehensive "all-hazards" emergency planning. The OROs' general emergency response capabilities are not unique to radiological emergency response. The NRC's confidence is expressed in the NRC's regulations in § 50.47(c)(1)(iii) and further strengthened by the NRC's recognition of national-level efforts (e.g., National Incident Management System,[6] National Preparedness Goal,[7] Core Capabilities,[8] National Preparedness System,[9] National Planning Frameworks[10]), in which the NRC participates, to improve the state of emergency planning at all levels of government and within the whole community.[11] Consequently, for SMR and ONT facilities without plume exposure pathway EPZs or with plume exposure pathway EPZs at the site boundary, there is reasonable assurance that appropriate response actions can and will be taken in the event of a radiological emergency, without the need for regulatory standards for offsite radiological emergency response plans and the associated FEMA findings and determinations that offsite plans are adequate and can be implemented.

f. Changes to Emergency Plans

[5] See FEMA's Emergency Management Agencies website https://www.fema.gov/emergency-management-agencies.
[6] For further information on the National Incident Management System, see: https://www.fema.gov/pdf/emergency/nims/nimsfaqs.pdf.
[7] For further information on the National Preparedness Goal, see: https://www.fema.gov/national-preparedness-goal.
[8] For further information on Core Capabilities, see: https://www.fema.gov/core-capabilities.
[9] For further information on the National Preparedness System, see: https://www.fema.gov/national-preparedness-system.
[10] For further information on the National Planning Frameworks, see: https://www.fema.gov/national-planning-frameworks.
[11] For more information on the definition of "whole community," see: https://www.fema.gov/whole-community#.

Section 50.54(q) currently establishes the process for evaluation, submission, and review of changes to emergency plans. The NRC is establishing that SMRs and ONTs continue to follow the existing process for changes to emergency plans, whether the facilities are following the performance-based approach to EP under § 50.160 or the approach to EP under § 50.47(b) and appendix E to 10 CFR part 50. This final rule includes conforming changes to § 50.54(q).

Existing § 50.54(q)(2) requires licensees to follow and maintain the effectiveness of an emergency plan that meets the requirements in appendix E to 10 CFR part 50 and, for power reactor licensees, the planning standards in § 50.47(b), and existing § 50.54(q)(3) and (4) describe the process for analyzing, submitting, and making changes to emergency plans. The NRC is revising § 50.54(q)(2) through (4) to include cross-references to the requirements under § 50.160 for licensees choosing the performance-based approach and to clarify that licensees must follow and maintain an emergency plan that meets either the applicable requirements of § 50.160 or the requirements of appendix E to 10 CFR part 50 and, for nuclear power reactor licensees, the planning standards of § 50.47(b). The NRC is not making any changes to the emergency plan change process. Licensees choosing the performance-based approach to EP must evaluate changes to their emergency plans against the performance-based requirements under § 50.160 using the same reduction in effectiveness criteria as current licensees and submit changes that reduce the effectiveness of the plan to the NRC for approval prior to implementation. The NRC is revising the definition of "emergency planning function" under § 50.54(q)(1) to remove references to appendix E to 10 CFR part 50 and § 50.47(b) because emergency planning functions are addressed under both these sections and under § 50.160, and the NRC does not consider the references essential to the definition.

For any existing or future holder of an OL or COL for an SMR or non-LWR, or any future holder of an OL for an NPUF, § 50.54(q)(7) stipulates that a licensee desiring to change its emergency plan to comply with the performance-based approach to EP needs to submit a license amendment request with the proposed changes to its emergency plan. The request needs to include an explanation of the schedule and analyses supporting the implementation of a performance-based EP program.

g. Emergency Response Data System

Appendix E to 10 CFR part 50, section VI, "Emergency Response Data System," outlines a set of system, testing, and implementation requirements for the emergency response data system (ERDS) for operating nuclear power reactor licensees, and § 50.72, "Immediate notification requirements for operating nuclear power reactors," includes requirements for activation of ERDS. In contrast, the 10 CFR part 50, appendix E ERDS requirement and § 50.72 ERDS activation requirement are not applicable to applicants and licensees choosing to comply with § 50.160. Applicants and licensees choosing § 50.160 need to describe in their emergency plans the data links with the NRC for use in emergencies. Specific parameters to be reported are determined for the specific technology during the license application process under 10 CFR part 50 or part 52. The NRC must review each applicant's data transmission capabilities on a case-specific basis. The NRC is not making any changes to its ERDS regulations.

3. Hazard Analysis of Contiguous or Nearby Facilities

The NRC anticipates that SMRs and ONTs may be located on the same site or close to large LWRs or other types of reactors; industrial, military, or transportation facilities; or a combination of these or other facilities. The presence of such facilities requires additional EP considerations relative to an independently sited facility. For example, SMRs or ONTs may need to be prepared for events associated with contiguous or nearby facilities' hazards.

Although the NRC's regulations do not extend to the licensing, operations, or oversight of non-nuclear facilities, the NRC has authority over the activities of NRC applicants and licensees that are located on or close to an industrial site or other facility not licensed by the NRC. For example, a nuclear power facility could be sited contiguous to or near an industrial facility to supply process heat or electrical power, or an SMR could be used to power a desalination facility located on the same site. There are many potential examples of licensees that may be located contiguous to or near a facility not licensed by the NRC; under each scenario, the hazards of the facility not licensed by the NRC must be factored into the EP program of the nuclear facility to ensure the protection of public health and safety.

For SMR or ONT applicants and licensees located contiguous to or near another facility, § 50.160(b)(2) requires the applicant or licensee to perform a hazard analysis to assess any credible hazards that would adversely impact the implementation of emergency plans at the SMR or ONT facility. The analysis needs to identify site-specific, credible hazards from other, non-nuclear facilities that require the applicant's or licensee's emergency plan to include arrangements that would otherwise not be needed in the absence of the facility. For example, these arrangements might include notifying contiguous or nearby facilities regarding emergencies, classifying a hazard from another facility that may negatively impact the safe operation of the nuclear facility, and providing for protective actions for the other facility's personnel or other on-site individuals, such as visitors. A credible hazard could include any event at another facility's site that would lead to an emergency response at the SMR or ONT facility. It may be appropriate for SMRs or ONTs with contiguous or nearby facilities to consider a quantitative or qualitative assessment of all postulated accident scenarios at the other facilities. The applicant's or licensee's EP program must reflect these credible hazards and the planning activities needed to address the hazards. For example, the location of facilities

on the same site or close to an SMR or ONT may affect the applicant's or licensee's determinations about the EPZ size. Looking across all facilities, the applicant or licensee must assess the combined radiological and industrial hazards at the site.

The NRC is issuing RG 1.242 with this final rule, which includes guidance on hazard analyses for contiguous or nearby facilities.

4. Emergency Planning Zones

The NRC is establishing a consequence-oriented, technology-inclusive approach to EPZ size determinations for SMRs and ONTs. This approach is similar to the dose/distance rationale historically used by the NRC, in part, to determine EPZ size for production or utilization facilities. Under the existing regulations, SMRs or ONTs, depending on their capacity and technology, are either required to establish a 10-mile (16-km) plume exposure pathway EPZ and a 50-mile (80-km) IPZ or follow the case-by-case EPZ size determination process under §§ 50.33(g), 50.47(c)(2), and section I.3. of appendix E to 10 CFR part 50. Preapplication discussions and previous applications for EP exemption requests from SMRs and ONTs have indicated that these technologies could have reduced offsite dose consequences in the unlikely event of an accident, and the standard 10-mile (16-km) EPZ and 50-mile (80-km) IPZ may not be necessary to ensure public health and safety for these facilities. Because of the range of potential source terms and designs for SMRs or ONTs, the NRC is establishing an alternative scalable methodology for determining EPZ size on a case-specific basis. This methodology is established in guidance (RG 1.242) generically without design- or site-specific information regarding source term, fission products, or projected offsite dose. Applicants must provide the design- and site-specific information regarding source term, fission products, or projected offsite dose for NRC review in an application.

As mentioned in the "Technical Basis" section of this document, NUREG-0396 established the planning basis for EP and established EPZs for large LWRs based on

the conclusion that the objective of emergency response plans should be to provide dose savings for a spectrum of accidents that could produce offsite doses in excess of the EPA PAGs. This final rule is offering an EPZ size determination process that is consistent with this philosophy. Section 50.33(g)(2) establishes EPZ size determination requirements for SMR, non-LWR, and NPUF applicants complying with § 50.160. Small modular reactor and non-LWR applicants for an OL, COL, CP, or ESP and NPUF applicants for a CP or OL must submit the analysis used to establish their proposed plume exposure pathway EPZ size. Applicants need to establish their EPZ as the area within which public dose, as defined in § 20.1003, is projected to exceed 10 mSv (or 1 rem) TEDE over 96 hours from the release of radioactive materials from the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology. In addition, applicants need to show that the plume exposure pathway EPZ is the area in which predetermined, prompt protective measures are necessary. If the plume exposure pathway EPZ extends beyond the site boundary and if the application is for an SMR or non-LWR OL, COL, an ESP that contains plans for coping with emergencies under § 52.17(b)(2)(ii), or an ESP that proposes major features of the emergency plans and describes the EPZ, then § 50.33(g)(2) requires that the exact configuration of the plume exposure pathway EPZ be determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. Section 50.160(b)(3) requires applicants to describe in their emergency plans the boundary and physical characteristics of the EPZ.

Upon receiving an OL, COL, ESP, or CP applicant's technical basis for proposed site-specific plume exposure pathway EPZ size, the NRC must review the design and licensing information to ensure that the information that the applicant provides on the offsite dose consequences is commensurate with the requested EPZ size and that the

applicable performance-based requirements are met to ensure adequate protection of public health and safety. Some of this information may have already been provided as part of a certified design referenced in an application or in a topical report related to the design. The NRC also must assess the need to provide site-specific guidance concerning the accident scenarios being considered.

The plume exposure pathway EPZ determination requirements could result in an applicant having no plume exposure pathway EPZ. For this result to occur, the applicant's analysis required by § 50.33(g)(2) would need to show that one or both of the criteria in § 50.33(g)(2)(i) are not met. For purposes of complying with § 50.160, this applicant would be similar to an applicant with a site boundary plume exposure pathway EPZ. Both applicants would need to have an emergency plan that meets the requirements of § 50.160(a), (b)(1)(i)-(iv)(A), (b)(2), (b)(4) and (c). An applicant with a site boundary plume exposure pathway EPZ would also need to comply with § 50.160(b)(3), which requires the applicant to determine and describe in its emergency plan the boundary and physical characteristics of the EPZ.

In addition to the plume exposure pathway EPZ size determination process, the NRC is including ingestion response planning requirements under § 50.160(b)(4). Applicants and licensees complying with § 50.160 are required to describe in their emergency plans the capabilities to prevent contaminated food and water from entering the ingestion pathway. The proposed rule would have required applicants and licensees to describe in their emergency plans the capabilities to protect contaminated food and water from entering the ingestion pathway. Although the goal is to protect the public from contaminated food and water, this goal can be achieved by preventing contaminated food and water from entering the ingestion pathway. Therefore, in the final rule, the NRC revised § 50.160(b)(4) to require applicants and licensees to describe

in their emergency plans the capabilities to prevent contaminated food and water from entering the ingestion pathway.

The capabilities described in the emergency plan need to address major exposure pathways associated with the ingestion of contaminated food and water. The duration of any exposure to contaminated food or water could range from weeks to months and represents a long-term response need. Even in cases where the facility's plume exposure pathway EPZ is bounded by the site boundary, the applicant or licensee must reference capabilities of Federal, State, and local authorities.

Examples of demonstrated capabilities in response to ingestion of contaminated food or water include three notable large-scale quarantines documented by the Centers for Disease Control and Prevention: the multi-state outbreaks of E. Coli O157:H7 infections from spinach (September-October 2006); the multi-state outbreak of human *salmonella enteritis* infections associated with shell eggs (July-December 2010); and, the multi-state outbreak of fungal meningitis and other infections (October 2012). In each case, the successful quarantine and removal from public access of contaminated food and water products in response to biological contamination demonstrates that a response to prevent ingestion of contaminated foods and water could be performed in an expeditious manner without a predetermined ingestion planning zone.

5. Implementation

This final rule includes implementation schedules for existing and future applicants and licensees of facilities choosing to comply with § 50.160. The NRC received public comments on the proposed requirement for applicants to conduct an initial exercise to demonstrate effectiveness of the EP program no later than 18 months before the issuance of an OL or the scheduled date for initial loading of fuel for a part 52 COL holder. The comments suggested that an initial exercise "no later than 18 months before" the issuance of an OL for a part 50 applicant or the scheduled date for initial

loading of fuel for a part 52 COL holder is not the appropriate time frame. In reviewing these comments, the NRC determined that the wording in the proposed rule needed revision. Specifically, in § 50.160(c)(1), the NRC is revising the rule language to require an applicant for an OL issued under 10 CFR part 50 after the effective date of this final rule that desires to comply with the performance-based approach to EP to establish, implement, and maintain an EP program that meets the requirements of § 50.160(b), as described in the emergency plan and license, and conduct an initial exercise to demonstrate this compliance within 2 years before the issuance of an OL for the first unit described in the license application. Similarly, in § 50.160(c)(2), a holder of a COL issued under 10 CFR part 52 desiring to comply with the performance-based approach to EP before the Commission has made the finding under § 52.103(g) is required to establish, implement, and maintain an EP program that meets the requirements of § 50.160(b), as described in the emergency plan and license, and conduct an initial exercise to demonstrate this compliance within 2 years before the scheduled date for initial loading of fuel. These changes allow greater flexibility in demonstrating regulatory compliance and ensure consistency with appendix E to 10 CFR part 50, which requires an applicant to conduct a full-participation emergency planning exercise within 2 years before the issuance of an OL for a part 50 applicant or the scheduled date for initial loading of fuel for a part 52 COL holder.

As discussed in the “Changes to Emergency Plans” section of this document, for existing or future SMRs or ONTs that hold OLs or COLs, § 50.54(q)(7) stipulates that facilities desiring to change their emergency plans to comply with the performance-based approach to EP, shall submit a license amendment request with these ~~final~~ changes.

a. Reasonable Assurance

The NRC's authority to regulate the use of radioactive materials is set forth in the AEA. The AEA confers broad regulatory powers to the Commission and specifically authorizes it to issue regulations it deems necessary to fulfill its responsibilities under that statute. Section 161.b of the AEA authorizes the Commission to establish by rule, regulation, or order such standards and instructions to govern the possession and use of special nuclear material, source material, and byproduct material as the Commission may deem necessary or desirable to promote the common defense and security or to protect health or to minimize danger to life or property. Under Section 161.i of the AEA, the Commission may prescribe such regulations or orders, as it may deem necessary, to protect health and to minimize danger to life or property.

The NRC's regulations include standards for both onsite and offsite emergency response plans. The Commission, based on its authority under the AEA, determined that these standards are necessary for operating power reactors to provide for public health and safety. The regulations in §§ 50.47 and 50.54 prescribe how the NRC makes licensing decisions or takes appropriate enforcement action by using findings of reasonable assurance that adequate protective measures can and will be taken to protect public health and safety in the event of a radiological emergency. The NRC bases reasonable assurance findings on: 1) the NRC's assessment of the adequacy of the applicant's or licensee's onsite emergency plan and whether there is reasonable assurance the plan can be implemented, and 2) the NRC's review of FEMA findings and determinations as to whether State and local emergency plans are adequate and whether there is reasonable assurance that they can be implemented.

The performance-based approach to EP under § 50.160 provides an adequate basis for an acceptable state of EP and ensures that coordination and applicable arrangements with offsite agencies are maintained (e.g., notification and assistance resources). Reasonable assurance is maintained under the performance-based

approach through: 1) submission and case-specific review of design- and site-specific analyses to support the proposed plume exposure pathway EPZ size; 2) review of site-specific emergency plans to ensure compliance with the performance-based requirements; 3) demonstration of emergency response functions through drills and exercises; 4) regular tracking of performance objective information; 5) analysis of potential hazards associated with contiguous or nearby NRC-licensed facilities or facilities not licensed by the NRC; and 6) the NRC's inspection and enforcement program.

For applicants and licensees with plume exposure pathway EPZs beyond the site boundary, the NRC, in consultation with FEMA, continues to ensure that reasonable assurance is maintained based on the performance-based requirements, as demonstrated through drills and exercises. As described in the "Offsite Radiological Emergency Preparedness Planning Activities" section of this document, FEMA findings and determinations regarding reasonable assurance under § 50.54(s)(3) are not needed for SMRs or ONTs without plume exposure pathway EPZs or with plume exposure pathway EPZs that do not extend beyond the site boundary. The NRC makes reasonable assurance determinations regarding onsite EP requirements for these facilities, and every licensee must follow and maintain the effectiveness of its emergency plan if the NRC is to continue to find, under § 50.54(s)(2)(ii), that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at that site.

In this final rule, the NRC revised § 50.160(b) from the proposed rule to state that the reasonable assurance finding made under § 50.47(a)(1) necessary to issue an OL, COL, or ESP to an applicant complying with § 50.47 and appendix E to part 50 is also necessary to issue an OL, COL, or ESP to a power reactor applicant complying with § 50.160. The NRC also revised § 50.47(a)(1)(iv) to reflect that an applicant for an ESP

that proposes major features of the emergency plan under § 52.17(b)(2)(i) can choose to comply with § 50.160.

b. Administrative and Clarifying Changes to the Regulations

The NRC is making clarifying changes to the following paragraphs.

1. Section 50.54(q)(4), which required after February 21, 2012, any changes to a licensee's emergency plan that reduce the effectiveness of the plan as defined in paragraph (q)(1)(iv) to be submitted to the NRC for approval before implementation. As the date of the provision has expired, the NRC is deleting "after February 21, 2012" and retaining the remainder of the provision.

2. Section 50.54(q)(5), which required licensees to submit a report of each change made without prior NRC approval, as allowed under § 50.54(q)(3), after February 21, 2012, including a summary of its analysis, within 30 days after the change is put into effect. The NRC is deleting "after February 21, 2012" from this provision, as the date has expired, and retaining the remainder of the provision.

3. Section 50.54(s)(2)(ii), which allows the NRC to take enforcement action to shut down power reactors that do not provide reasonable assurance that adequate protective measures would be taken in the event of a radiological emergency after April 1, 1981. There is no longer a need for the date requirement of this provision because any future determinations made under § 50.54(s) will occur after April 1, 1981. The NRC is deleting "after April 1, 1981" and retaining the remainder of the provision.

The NRC is revising these requirements in the interest of regulatory clarity. Eliminating or revising these requirements does not relax currently effective regulatory requirements or cause any regulatory burden for existing or future licensees.

III. Opportunities for Public Participation

The NRC published the proposed rule on May 12, 2020 (85 FR 28436), and the comment period was open until July 27, 2020. On July 21, 2020 (85 FRN 44025), the NRC extended the public comment period by an additional 60 days to September 25, 2020, to allow more time for members of the public and other stakeholders to develop and submit their comments.

The NRC hosted one public meeting to engage with external stakeholders on the proposed rule and associated draft guidance document during the public comment period. This public meeting was held on June 24, 2020. A summary of the public meeting is available in ADAMS, as provided in the "Availability of Documents" section. The feedback from this public meeting informed the development of this final rule.

IV. Public Comment Analysis

The NRC prepared a summary and analysis of public comments received on the 2020 proposed rule and draft regulatory guide, as referenced in the "Availability of Documents" section. In response to the proposed rule and draft regulatory guide, the NRC received 2,212 comment submissions.

The public comment submittals are available from the Federal e-Rulemaking Web site at https://www.regulations.gov under Docket ID NRC-2015-0225. Responses to the public comments, including a summary of how this final rule or the guidance changed as a result of the public comments, can be found in the public comment analysis document as indicated in the "Availability of Documents" section of this document.

For more information about the associated guidance document, see the "Availability of Guidance" section of this document.

V. Section-by-Section Analysis

The following paragraphs describe the specific changes within this final rule.

Section 50.2 Definitions

In § 50.2, this final rule adds the definitions for *Non-light-water reactor*, *Non-power production or utilization facility,* and *Small modular reactor*.

Section 50.8 Information collection requirements; OMB approval

In § 50.8, this final rule adds new § 50.160 to the list of approved information collection requirements contained in 10 CFR part 50.

Section 50.10 License required; limited work authorization

In § 50.10, this final rule revises paragraph (a)(1)(vii) to include onsite emergency facilities necessary to comply with new § 50.160 requirements within the scope of items for which a CP or limited work authorization is necessary to commence construction.

Section 50.33 Contents of applications; general information

In § 50.33, this final rule revises paragraph (g) to create new subparagraphs (g)(1) and (2). Paragraph (g)(1) contains the original text of paragraph (g) and adds the qualifier “Except as provided in paragraph (g)(2) of this section.”

Paragraph (g)(2) establishes EPZ size determination requirements for SMR, non-LWR, and NPUF applicants complying with § 50.160.

Section 50.34 Contents of applications; technical information

In § 50.34, this final rule revises paragraph (a)(10) to require SMR, non-LWR, or NPUF CP applicants to describe in their PSARs the preliminary plans for coping with emergencies based on the requirements in either § 50.160 or appendix E to 10 CFR part 50.

This final rule also revises paragraph (b)(6)(v) to require SMR, non-LWR, and NPUF applicants for an OL to include in their FSARs their plans for coping with emergencies based on the requirements in either § 50.160 or appendix E to 10 CFR part 50.

Section 50.47 Emergency plans

In § 50.47, this final rule makes conforming changes to paragraphs (a)(1)(iv), (b) introductory text, (c)(1) introductory text, (c)(1)(i), and (e) and adds new paragraph (f) denoting when the offsite emergency response plan requirements in § 50.47(a)(2), (b), and (c)(2) do not apply.

Section 50.54 Conditions of licenses

In § 50.54, this final rule revises paragraph (q)(1)(iii) to remove the references to appendix E to 10 CFR part 50 and § 50.47(b).

This final rule revises paragraph (q)(2) to include new subparagraphs (q)(2)(i) and (ii). Paragraph (q)(2)(i) contains the original text of paragraph (q)(2) and adds the qualifier “except as provided in paragraph (q)(2)(ii) of this section,” and paragraph (q)(2)(ii) allows SMR, non-LWR, and NPUF licensees to follow and maintain the effectiveness of an emergency plan that meets the requirements of § 50.160 or appendix E to 10 CFR part 50 and, for nuclear power reactor licensees, § 50.47(b).

This final rule also revises paragraph (q)(3) to include new subparagraphs (q)(3)(i) and (ii). Paragraph (q)(3)(i) contains the original text of paragraph (q)(3) and

adds the qualifier “except as provided in paragraph (q)(3)(ii) of this section” and paragraph (q)(3)(ii) specifies when an SMR, non-LWR, or NPUF licensee choosing to comply with the performance-based EP regulations could make changes to its emergency plan without prior NRC approval.

Paragraphs (q)(4) and (5) are amended to remove the date February 21, 2012, and paragraph (q)(4) is further revised to specify that licensees that choose to comply with the new requirements of § 50.160, when making an emergency plan change that reduces plan effectiveness, need to specify the basis for concluding how their revised emergency plans continue to meet the requirements of that section.

This final rule adds new paragraph (q)(7) that contains the details for submitting license amendment requests for SMR, non-LWR, or NPUF licensees implementing EP programs with the associated plan modifications necessary to meet the requirements of new § 50.160.

Paragraph (s)(2)(ii) is amended to remove the date April 1, 1981, and to replace the word “reactor” with the word “facility.”

This final rule revises paragraph (s)(3) by adding clarification at the beginning of the sentence that if the standards apply to offsite emergency response plans, or if the planning activities in new § 50.160(b)(1)(iv)(B) apply, then the NRC bases its findings on a review of FEMA’s findings and determinations.

This final rule also revises paragraph (gg)(1) introductory text to include the option for SMR, non-LWR, or NPUF applicants to use new § 50.160, as applicable.

Section 50.160 Emergency preparedness for small modular reactors, non-light-water reactors, and non-power production or utilization facilities

This final rule adds a new subpart, “Small Modular Reactors, Non-Light-Water Reactors, and Non-power Production or Utilization Facilities,” after § 50.155 and new

§ 50.160, which contains alternative EP requirements for SMRs, non-LWRs, and NPUFs.

Appendix E to Part 50 – Emergency Planning and Preparedness for Production and Utilization Facilities

This final rule revises paragraph I.3 and footnote 2 to clarify that the potential radiological hazards to the public associated with the operation of NPUFs and fuel facilities involve considerations different than those associated with power reactors. This paragraph is also amended to replace “as necessary” with “is necessary,”.

Section 52.1 Definitions

This final rule revises the definition of *Major feature of the emergency plans* to include new § 50.160, as applicable.

Section 52.17 Contents of applications; technical information

This final rule revises paragraphs (b)(2)(i) and (ii) to include new § 50.160, as applicable.

Section 52.18 Standards for review of applications

This final rule revises § 52.18 to make editorial changes and to include references to new § 50.160, as applicable.

Section 52.79 Contents of applications; technical information in final safety analysis report

This final rule revises paragraph (a)(21) to require applicants for SMRs or non-LWRs to comply with either the requirements in § 50.160 or the requirements in appendix E to 10 CFR part 50 and § 50.47(b).

Section 72.32 Emergency plans

In § 72.32, this final rule revises paragraph (c)(2) to replace the words “required by” with “that meets either the requirements in” and to add a reference to new § 50.160.

VI. Regulatory Flexibility Certification

Under the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that this rule does not have a significant economic impact on a substantial number of small entities. This final rule affects only the licensing and operation of nuclear power facilities and NPUFs. The companies, universities, and government agencies that own these facilities do not fall within the scope of the definition of “small entities” set forth in the Regulatory Flexibility Act or the size standards established by the NRC (§ 2.810).

VII. Regulatory Analysis

The NRC has prepared a final regulatory analysis on this regulation. The analysis examines the costs and benefits of the alternatives considered by the NRC. The conclusion from the analysis is that this final rule and associated guidance results in net savings to the industry and the NRC of $7.98 million using a 7-percent discount rate and $14.9 million using a 3-percent discount rate. The final regulatory analysis is available as indicated in the “Availability of Documents” section of this document.

VIII. Backfitting and Issue Finality

This final rule contains new alternative requirements for SMR and ONT applicants and licensees. Because these alternative requirements are not imposed upon applicants and licensees and do not prohibit applicants and licensees from following existing requirements, the requirements do not constitute backfitting under 10 CFR part 50 or part 72 or affect the issue finality of any approval issued under 10 CFR part 52.

As described in Section XVI, “Availability of Guidance,” in this document, the NRC is issuing RG 1.242, which provides guidance on methods acceptable to the NRC for complying with this final rule. Issuance of the RG does not constitute backfitting under §§ 50.109 and 72.62 and does not affect the issue finality of any approval issued under 10 CFR part 52. As discussed in the “Implementation” section of the RG, the NRC has no current intention to impose the RG on holders of an OL, ESP, or COL. If, in the future, the NRC seeks to impose positions stated in the RG in a manner that would constitute backfitting or affect the issue finality of an approval under 10 CFR part 52, the NRC would need to make the showing as set forth in § 50.109 or address the regulatory criteria set forth in the applicable issue finality provision, as applicable, that would allow the NRC to impose the position.

IX. Cumulative Effects of Regulation

Cumulative Effects of Regulation (CER) consists of the challenges licensees may face in addressing the implementation of new regulatory positions, programs, and requirements (e.g., rulemaking, guidance, generic letters, backfits, inspections). The CER may manifest in several ways, including the total burden imposed on licensees by

the NRC from simultaneous or consecutive regulatory actions that can adversely affect the licensee's capability to implement those requirements, while continuing to operate or construct its facility in a safe and secure manner.

The goals of the NRC's CER effort were met throughout the development of this final rule. The NRC engaged external stakeholders at public meetings and by soliciting public comments on the proposed rule and associated draft guidance document. The NRC held a public meeting on June 24, 2020, to discuss the proposed rule. A summary of the public meeting is available in ADAMS, as provided in the "Availability of Documents" section of this document.

Although the new alternative EP requirements for SMRs and ONT are voluntary, the NRC included in the *Federal Register* notice for the proposed rule a request for feedback related to CER. Specifically, the NRC requested feedback on the implementation and potential unintended consequences of the proposed rule. The NRC received two comments in response to the CER questions in the proposed rule, but neither required a change to the rule.

X. Plain Writing

The Plain Writing Act of 2010 (Pub. L. 111-274) requires Federal agencies to write documents in a clear, concise, and well-organized manner. The NRC has written this document to be consistent with the Plain Writing Act as well as the Presidential Memorandum, "Plain Language in Government Writing," published June 10, 1998 (63 FR 31885).

XI. Environmental Assessment and Final Finding of No Significant Environmental Impact

The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission's regulations in subpart A of 10 CFR part 51, that this final rule is not a major Federal action significantly affecting the quality of the human environment and, therefore, an environmental impact statement is not required. The basis of this determination reads as follows: The majority of the provisions in this final rule are administrative or procedural in nature and either do not affect the physical environment or would have no noticeable effects. Further, the NRC has evaluated the final requirements of interest to stakeholders based on interactions described in section 6, "Environmental Impacts of the Proposed Action," of this environmental assessment that have the potential to affect the human environment, including the scalable approach for determining the size of the plume exposure pathway EPZ under § 50.33(g) and the ingestion response planning requirements under § 50.160(b)(4), and determined that this final rule does not have a significant environmental impact for the following reasons. Under the existing EP requirements and these final alternative EP requirements, the dose criteria under which predetermined protective measures would be taken (e.g., evacuation, sheltering) would be similar under both rules, and therefore, the dose consequence to the public is similar. The ingestion response planning requirements under § 50.160(b)(4), while not requiring SMR and ONT applicants and licensees to establish an IPZ, provide the same capabilities available to identify and interdict contaminated food and water in the event of a radiological emergency as required under existing EP regulations. The environmental effects of the final ingestion response planning requirements are similar to that of the existing EP requirements. For these reasons, the NRC concludes that the EPZ requirement under § 50.33(g) and ingestion response planning requirement under § 50.160(b)(4) do not have a significant impact on the physical environment. Therefore, this rulemaking does not warrant preparation of an

environmental impact statement. Accordingly, the NRC has determined that a Finding of No Significant Impact is appropriate.

The determination of this environmental assessment is that there is no significant offsite impact to the public from this action. The environmental assessment is available as indicated under the "Availability of Documents" section.

XII. Paperwork Reduction Act

This final rule contains new or amended collections of information subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). The collections of information were approved by the Office of Management and Budget (OMB), approval numbers 3150-0011 and 3150-0151.

The burden to the public for the information collections is estimated to average a reduction of 548 hours per response for 10 CFR part 50 and a reduction of 200 hours per response for 10 CFR part 52, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection.

The information collections create a transparent alternative EP regulatory framework that allows SMR and ONT applicants and licensees to submit for NRC approval a performance-based EP program, to include a scalable plume exposure pathway EPZ and licensee-defined performance objectives and metrics, while continuing to provide reasonable assurance that adequate protective measures can and will be implemented in a radiological emergency. Applicants or licensees requesting approval to construct or operate utilization or production facilities are required by the AEA to provide information and data that the NRC may determine necessary to ensure the adequate protection of health and safety of the public. The submission of emergency

plans to the NRC is required in order to allow the NRC to determine that the emergency plans and EP programs provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. Information is used by the NRC to evaluate the adequacy of the alternative EP program for approval, assess ongoing adequacy once implemented, determine whether to take actions, such as to conduct inspections or to alert other licensees to prevent similar events that may have generic implications, and to update information in the NRC Emergency Operation Center used in support of an NRC response to an actual emergency, drill, or exercise. Responses to these collections of information are required for applicants and licensees choosing to comply with 10 CFR 50.160. Confidential and proprietary information submitted to the NRC is protected in accordance with NRC regulations at 10 CFR 9.17(a) and 10 CFR 2.390(b).

You may submit comments on any aspect of the information collections, including suggestions for reducing the burden, by the following methods:

- **Federal Rulemaking Website:** Go to http://www.regulations.gov and search for Docket ID NRC-2015-0225.

- **Mail comments to:** FOIA, Library, and Information Collections Branch, Office of Information Services, Mail Stop: T6-A10M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001 or to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150-0011 and 3150-0151), Attn: Desk Officer for the Nuclear Regulatory Commissio[n,] 725 17th Street, NW Washington, DC 20503; email: oira_submission@omb.eop.gov.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

XIII. Congressional Review Act

This final rule is a rule as defined in the Congressional Review Act (CRA) (5 U.S.C. 801-808). However, OMB has not found it to be a major rule as defined in the CRA.

XIV. Criminal Penalties

For the purposes of Section 223 of the AEA, the NRC is issuing this final rule that will amend §§ 50.10, 50.34, 50.47, 50.54, 50.160, and appendix E to 10 CFR part 50 under one or more of Sections 161b, 161i, or 161o of the AEA. Willful violations of the rule would be subject to criminal enforcement. Criminal penalties as they apply to regulations in 10 CFR part 50 are discussed in § 50.111.

XV. Voluntary Consensus Standards

The National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113, requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless the use of such a standard is inconsistent with applicable law or otherwise impractical. In this final rule, the NRC revises regulations associated with EP in 10 CFR parts 50, 52, and 72. This action does not constitute the establishment of a standard that contains generally applicable requirements.

XVI. Availability of Guidance

The NRC is issuing new guidance, RG 1.242, "Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light-Water Reactors, and Non-Power Production or Utilization Facilities," that support implementation of the requirements in this final rule. The guidance is available in ADAMS, as provided in the "Availability of Documents" section of this document. You may access information and comment submissions related to the guidance by searching on https://www.regulations.gov under Docket ID NRC-2015-0225.

The guidance document is intended for use by applicants, licensees, and NRC staff, and describes an approach and method acceptable for implementing the requirements of this final rule. As a guidance document, RG 1.242 does not establish additional requirements, and applicants and licensees are able to propose alternative ways for demonstrating compliance with the requirements in § 50.160.

XVII. Availability of Documents

The documents identified in the following table are available to interested persons through one or more of the following methods, as indicated.

DOCUMENT	ADAMS ACCESSION NO. / WEB LINK / *FEDERAL REGISTER* CITATION
EPA 520/1-75-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," September 1975.	https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=9101AK8V.PDF
NUREG-75/014, "Reactor Safety Study – An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," (WASH-1400), October 1975 (Appendices III-IV, Appendix V, Appendix VI, Appendices VII-X).	ML070610293 ML070530533 ML070600389 ML070600376

NUREG-0396, “Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants,” December 1978.	ML051390356
RG 2.6, “Emergency Planning for Research Reactors,” January 1979.	ML12184A008
“10 CFR Parts 50 and 70, Emergency Planning,” Final Rule, August 19, 1980.	45 FR 55402
NUREG-0654/FEMA-REP-1, Revision 1, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” November 1980.	ML040420012
“Emergency Planning and Preparedness,” Final Rule, July 13, 1982.	47 FR 30232
NUREG-0849, “Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors,” October 1983.	ML062190191
“Specific Exemptions; Clarification of Standards,” Final Rule, December 12, 1985.	50 FR 50764
“Regulation of Advanced Nuclear Power Plants, Statement of Policy,” July 8, 1986.	51 FR 24643
NUREG-1226, “Development and Utilization of the NRC Policy Statement on the Regulation of Advanced Nuclear Power Plants,” June 1988.	ML13253A431
“Emergency Planning and Preparedness Requirements for Nuclear Power Plant Fuel Loading and Low-Power Testing,” Final Rule, September 23, 1988.	53 FR 36955
“Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants,” Final Rule, April 18, 1989.	54 FR 15372
EPA-400-R-92-001, “Manual of Protection Action Guides and Protective Actions for Nuclear Incidents,” May 1992.	https://www.epa.gov/sites/production/files/2016-03/documents/pags.pdf
SECY-93-092, “Issues Pertaining to the Advanced Reactor (RISM, MHTGR, and PIUS) and CANDU 3 Designs and Their Relationship to Current Regulatory Requirements,” April 8, 1993.	ML040210725
SRM-SECY-93-092, “Staff Requirements—SECY-93-092—Issues Pertaining to the Advanced Reactor (PRISM, MHTGR, and PIUS) and CANDU 3 Designs and Their Relationship to Current Regulatory Requirements,” July 30, 1993.	ML003760774

NUREG-1537, Part 1, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Format and Content,” February 1996.	ML042430055
NUREG-1537, Part 2, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Standard Review Plan and Acceptance Criteria,” February 1996.	ML042430048
SECY-97-020, “Results of Evaluation of Emergency Planning for Evolutionary and Advanced Reactors,” January 27, 1997.	ML992920024
Homeland Security Presidential Directive 5, “Management of Domestic Incidents,” February 28, 2003.	https://www.dhs.gov/publication/homeland-security-presidential-directive-5
SECY-04-0236, “Southern Nuclear Operation Company’s Proposal to Establish a Common Emergency Operating Facility at its Corporate Headquarters,” December 23, 2004.	ML042590576
SRM-SECY-04-0236, “Staff Requirements—SECY-04-0236—Southern Nuclear Operating Company’s Proposal to Establish a Common Emergency Operating Facility at its Corporate Headquarters,” February 23, 2005.	ML050550131
SECY-06-0200, “Results of the Review of Emergency Preparedness Regulations and Guidance,” September 20, 2006.	ML061910707
SRM-SECY-06-0200, “Staff Requirements—SECY-06-0200—Results of the Review of Emergency Preparedness Regulations and Guidance,” January 8, 2007.	ML070080411
NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” Section 13.3, “Emergency Planning,” March 2007.	ML063410307
NUREG-0800, Section 14.3.10, “Emergency Planning - Inspections, Tests, Analyses, and Acceptance Criteria,” March 2007.	ML070730206
“Policy Statement on Regulation of Advanced Reactors,” October 14, 2008.	73 FR 60612
“Summary of Workshop on Small and Medium-Sized Nuclear Reactors (SMRs),” October 22, 2009.	ML092940138
SECY-10-0034, “Potential Policy, Licensing, and Key Technical Issues for Small Modular Reactor Designs,” March 28, 2010.	ML093290268
NUREG-1520, “Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility,” Revision 1, May 1, 2010.	ML101390110

"Summary of July 28, 2010, Category 2 Meeting with Small Modular Reactor Design Representatives to Discuss Small Modular Reactor Key Licensing Issues (TAC NO. Q00269)," August 26, 2010.	ML102380209
Presidential Policy Directive/PPD-8, "National Preparedness," March 30, 2011.	https://www.dhs.gov/presidential-policy-directive-8-national-preparedness
SECY-11-0152, "Development of an Emergency Planning and Preparedness Framework for Small Module Reactors," October 28, 2011.	ML112570439
"Enhancements to Emergency Preparedness Regulations," Final Rule, November 23, 2011.	76 FR 72559
Interim Staff Guidance for NUREG-1537, "Final Interim Staff Guidance Augmenting NUREG-1537, Part 1, 'Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Format and Content' for Licensing Radioisotope Production Facilities and Aqueous Homogenous Reactors," October 12, 2012.	ML12156A069
Final Interim Guidance for NUREG-1537, "Final Interim Staff Guidance Augmenting NUREG-1537, Part 2, 'Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Standard Review Plan and Acceptance Criteria' for Licensing Radioisotope Production Facilities and Aqueous Homogenous Reactors," October 17, 2012.	ML12156A075
NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, August 13, 2013.	ML13261A116
NEI White Paper, "White Paper: Proposed Methodology and Criteria Establishing the Technical Basis for Small Modular Reactor Emergency Planning Zone," December 23, 2013.	ML13364A345
SECY-14-0038, "Performance-Based Framework for Nuclear Power Plant Emergency Preparedness Oversight," April 4, 2014.	ML13238A018
SECY-14-0066, "Request by Dominion Energy Kewaunee Inc., for Exemptions from Certain Emergency Planning Requirements," June 27, 2014.	ML14072A257

SRM-SECY-14-0038, “Staff Requirements—SECY-14-0038—Performance-Based Framework for Nuclear Power Plant Emergency Preparedness Oversight,” September 16, 2014.	ML14259A589
SECY-14-0118, “Request by Duke Energy Florida, Inc., for Exemptions from Certain Emergency Planning Requirements,” October 29, 2014.	ML14219A444
American National Standards Institute/American Society Standard (ANSI/ANS) 15.16 – 2015. “Emergency Planning for Research Reactors,” American Nuclear Society, La Grange Park, IL, February 2015.	https://webstore.ansi.org/standards/ansi/ansians15162015
SECY-15-0077, “Options for Emergency Preparedness for Small Module Reactors and Other New Technologies,” May 29, 2015.	ML15037A176
“Summary of June 7-8, 2015, Department of Energy and Nuclear Regulatory Commission Co-Hosted Workshop on Advanced Non-Light Water Reactors,” July 7, 2015.	ML16188A226
NEI White Paper, “Proposed Emergency Preparedness Regulations and Guidance for Small Modular Reactor Facilities,” July 2015.	ML15194A275
SRM-SECY-15-0077, “Staff Requirements—SECY-15-0077—Options for Emergency Preparedness for Small Module Reactors and Other New Technologies,” August 4, 2015.	ML15216A492
“Summary of September 1-2, 2015, Nuclear Regulatory Commission and Department of Energy Co-Hosted Workshop on Advanced Non-Light Water Reactors,” October 1, 2015.	ML15265A165
“Variable Annual Fee Structure for Small Modular Reactors,” Proposed Rule, November 4, 2015.	80 FR 68268
“Memorandum of Understanding Between the Department of Homeland Security/Federal Emergency Management Agency and Nuclear Regulatory Commission Regarding Radiological Emergency Response, Planning, and Preparedness,” December 7, 2015.	ML15344A371
“Variable Annual Fee Structure for Small Modular Reactors,” Final Rule, May 24, 2016.	81 FR 32617
SECY-16-0069, “Rulemaking Plan on Emergency Preparedness for Small Module Reactors and Other New Technologies,” May 31, 2016.	ML16020A388

Nuclear Innovation Alliance, “Enabling Nuclear Innovation: Strategies for Advanced Reactor Licensing,” June 7, 2016.	https://docs.wixstatic.com/ugd/5b05b3_71d4011545234838aa27005ab7d757f1.pdf
SRM-SECY-16-0069, “Staff Requirements—SECY-16-0069—Rulemaking Plan on Emergency Preparedness for Small Module Reactors and Other New Technologies,” June 22, 2016.	ML16174A166
RG 1.219, Revision 1, “Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors,” July 2016.	ML16061A104
“Summary of August 22, 2016, Public Meeting to Discuss a Performance-Based Approach to Emergency Preparedness for Small Modular Reactors and Other New Technologies,” September 15, 2016.	ML16257A510
“NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness,” December 2016.	ML16356A670
EPA-400/R-17/001, “PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents,” January 2017.	https://www.epa.gov/sites/production/files/2017-01/documents/epa_pag_manual_final_revisions_01-11-2017_cover_disclaimer_8.pdf
“Tribal Policy Statement,” January 9, 2017.	82 FR 2402
“Emergency Preparedness for Small Modular Reactors and Other New Technologies,” Draft Regulatory Basis, April 13, 2017.	82 FR 17768
“Summary of May 10, 2017, Public Meeting on the Draft Regulatory Basis for the Rulemaking for Emergency Preparedness for Small Modular Reactors and Other New Technologies,” May 24, 2017.	ML17139C860
RG 2.6, “Emergency Planning for Research and Test Reactors and Other Non-Power Production and Utilization Facilities,” September 2017.	ML17263A472
“Emergency Preparedness for Small Modular Reactors and Other New Technologies,” Regulatory Basis, November 15, 2017.	82 FR 52862
“Regulatory Improvements for Power Reactors Transitioning to Decommissioning Rulemaking,” Regulatory Basis, November 27, 2017.	82 FR 55954
SECY-18-0055, “Proposed Rule: Regulatory Improvements for Production and Utilization Facilities Transitioning to Decommissioning,” May 22, 2018.	ML18012A019

"Generalized Dose Assessment Methodology for Informing Emergency Planning Zone Size Determinations," June 2018.	ML18064A317
"Required Analyses for Informing Emergency Planning Zone Size Determinations," June 2018.	ML18114A176
SRM-SECY-18-0103, "Staff Requirements—SECY-18-0103—Proposed Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies (RIN 3150 AJ68; NRC-2015-0225)," December 17, 2019.	ML19351C729
NUREG-0654/FEMA-REP-1, Revision 2, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," December 2019.	ML19347D139
RG 1.233, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light Water Reactors," June 2020.	ML20091L698
Summary of June 24, 2020, Public Meeting to Discuss the Proposed Emergency Preparedness for Small Modular Reactors and Other New Technologies Rule, July 14, 2020	ML20196L775
"Regulatory Analysis for the Final Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies," December 2021.	ML21200A079
"Environmental Assessment for the Final Rule—Emergency Preparedness for Small Modular Reactors and Other New Technologies," December 2021.	ML21200A080
"Supporting Statement for Information Collections Contained in the Emergency Preparedness for Small Modular Reactors and Other New Technologies Final Rule; 10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities," December 2021.	ML21200A185
"Supporting Statement for Information Collections Contained in the Emergency Preparedness for Small Modular Reactors and Other New Technologies Final Rule; 10 CFR Part 52, Licensing, Certifications, and Approvals for Nuclear Power Plants," December 2021.	ML21200A190

RG 1.242, “Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light-Water Reactors, and Non-Power Production or Utilization Facilities,” December 2021.	ML20345A345
“NRC Response to Public Comments; Emergency Preparedness for Small Modular Reactors and Other New Technologies.”	ML21200A077
SECY-21-XXXX, “Final Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies,” December XX, 2021.	MLXXXXXXXXX
SRM-SECY-21-XXXX, “Final Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies,” MONTH XX, 202X.	MLXXXXXXXXX

List of Subjects

10 CFR Part 50

Administrative practice and procedure, Antitrust, Backfitting, Classified information, Criminal penalties, Education, Emergency planning, Fire prevention, Fire protection, Incorporation by reference, Intergovernmental relations, Nuclear power plants and reactors, Penalties, Radiation protection, Reactor siting criteria, Reporting and recordkeeping requirements, Whistleblowing.

10 CFR Part 52

Administrative practice and procedure, Antitrust, Combined license, Early site permit, Emergency planning, Fees, Incorporation by reference, Inspection, Issue finality, Limited work authorization, Nuclear power plants and reactors, Probabilistic risk assessment, Prototype, Reactor siting criteria, Redress of site, Penalties, Reporting and recordkeeping requirements, Standard design, Standard design certification.

10 CFR Part 72

Administrative practice and procedure, Hazardous waste, Indians, Intergovernmental relations, Nuclear energy, Penalties, Radiation protection, Reporting and recordkeeping requirements, Security measures, Spent fuel, Whistleblowing.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act, as amended; and 5 U.S.C. 552 and 553, the NRC is adopting the following amendments to 10 CFR parts 50, 52, and 72:

PART 50 – DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES

1. The authority citation for part 50 continues to read as follows:

Authority: Atomic Energy Act of 1954, secs. 11, 101, 102, 103, 104, 105, 108, 122, 147, 149, 161, 181, 182, 183, 184, 185, 186, 187, 189, 223, 234 (42 U.S.C. 2014, 2131, 2132, 2133, 2134, 2135, 2138, 2152, 2167, 2169, 2201, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2239, 2273, 2282); Energy Reorganization Act of 1974, secs. 201, 202, 206, 211 (42 U.S.C. 5841, 5842, 5846, 5851); Nuclear Waste Policy Act of 1982, sec. 306 (42 U.S.C. 10226); National Environmental Policy Act of 1969 (42 U.S.C. 4332); 44 U.S.C. 3504 note; Sec. 109, Pub. L. 96-295, 94 Stat. 783.

2. In § 50.2, add in alphabetical order the definitions for *Non-light-water reactor, Non-power production or utilization facility,* and *Small modular reactor* to read as follows:

§ 50.2 Definitions.

* * * * *

Non-light-water reactor means a nuclear power reactor using a coolant other than light water.

Non-power production or utilization facility means a production or utilization facility, licensed under § 50.21(a) or (c), or § 50.22, as applicable, that is not a nuclear

power reactor or a production facility as defined under paragraphs (1) and (2) of the definition of *Production facility* in this section.

* * * * *

Small modular reactor means a power reactor, which may be of modular design as defined in § 52.1 of this chapter, licensed under § 50.21 or § 50.22 to produce heat energy up to 1,000 megawatts thermal per module.

* * * * *

§ 50.8 [Amended]

3. In § 50.8(b), add the citation “50.160,” after the citation “50.155,”.

4. In § 50.10, revise paragraph (a)(1)(vii) to read as follows:

§ 50.10 License required; limited work authorization.

(a) * * *

(1) * * *

(vii) Onsite emergency facilities necessary to comply with either § 50.160 or § 50.47 and appendix E to this part, as applicable.

* * * * *

5. In § 50.33, revise paragraph (g) to read as follows:

§ 50.33 Contents of applications; general information.

* * * * *

(g)(1) Except as provided in paragraph (g)(2) of this section, if the application is for an operating license or combined license for a nuclear power reactor, or if the

application is for an early site permit and contains plans for coping with emergencies under § 52.17(b)(2)(ii) of this chapter, the applicant shall submit the radiological emergency response plans of State and local governmental entities in the United States that are wholly or partially within the plume exposure pathway emergency planning zone (EPZ),[4] as well as the plans of State governments wholly or partially within the ingestion pathway EPZ.[5] If the application is for an early site permit that, under 10 CFR 52.17(b)(2)(i), proposes major features of the emergency plans describing the EPZs, then the descriptions of the EPZs must meet the requirements of this paragraph. Generally, the plume exposure pathway EPZ for nuclear power reactors shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas-cooled reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.

* * * * *

[4] Emergency planning zones (EPZs) are discussed in NUREG-0396, EPA 520/1-78-016, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," December 1978.

[5] If the State and local emergency response plans have been previously provided to the NRC for inclusion in the facility docket, the applicant need only provide the appropriate reference to meet this requirement.

(2) Small modular reactor, non-light-water reactor, or non-power production or utilization facility applicants complying with § 50.160 who apply for a construction permit

or an operating license under this part, or small modular reactor or non-light-water reactor applicants complying with § 50.160 who apply for a combined license or an early site permit under part 52 of this chapter, must submit as part of the application the analysis used to determine whether the criteria in § 50.33(g)(2)(i)(A) and (B) are met and, if they are met, the size of the plume exposure pathway EPZ.

(i) The plume exposure pathway EPZ is the area within which:

(A) Public dose, as defined in § 20.1003 of this chapter, is projected to exceed 10 mSv (1 rem) total effective dose equivalent over 96 hours from the release of radioactive materials resulting from a spectrum of accidents for the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology; and

(B) Pre-determined, prompt protective measures are necessary.

(ii) If the application is for an operating license or combined license or if the application is for an early site permit and contains plans for coping with emergencies under § 52.17(b)(2)(ii) of this chapter, and if the plume exposure pathway EPZ extends beyond the site boundary:

(A) The applicant shall submit radiological emergency response plans of State, local, and participating Tribal governmental entities in the United States that are wholly or partially within the plume exposure pathway EPZ.

(B) The exact configuration of the plume exposure pathway EPZ surrounding the facility shall be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

(iii) If the application is for an early site permit that, under § 52.17(b)(2)(i) of this chapter, proposes major features of the emergency plans and describes the EPZ, and if the EPZ extends beyond the site boundary, then the exact configuration of the plume exposure pathway EPZ surrounding the facility shall be determined in relation to the

local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

* * * * *

6. In § 50.34, revise paragraphs (a)(10) and (b)(6)(v) to read as follows:

§ 50.34 Contents of applications; technical information.

(a) * * *

(10) A discussion of the applicant's preliminary plans for coping with emergencies based on:

(i) Except as provided in paragraph (a)(10)(ii) of this section, the requirements in appendix E to this part.

(ii) For a small modular reactor, a non-light-water reactor, or non-power production or utilization facility construction permit applicant, the requirements in either § 50.160 or appendix E to this part.

* * * * *

(b) * * *

(6) * * *

(v) Plans for coping with emergencies based on:

(A) Except as provided in paragraph (b)(6)(v)(B) of this section, the requirements in appendix E to this part.

(B) For a small modular reactor, a non-light-water reactor, or a non-power production or utilization facility operating license applicant, the requirements in either § 50.160 or appendix E to this part.

* * * * *

7. In § 50.47, revise paragraphs (a)(1)(iv), (b) introductory text, (c)(1) introductory text, (c)(1)(i), and (e) and add paragraph (f) to read as follows:

§ 50.47 Emergency plans.

* * * * *

(a) * * *

(1) * * *

(iv) If an application for an early site permit proposes major features of the emergency plans under 10 CFR 52.17(b)(2)(i), no early site permit will be issued unless a finding is made by the NRC that the major features are acceptable in accordance with the applicable standards of either § 50.47 and appendix E to this part, or the applicable requirements of § 50.160, within the scope of emergency preparedness matters addressed in the major features.

* * * * *

(b) The onsite and, except as provided in paragraphs (d) and (f) of this section, offsite emergency response plans for nuclear power reactors must meet the following standards:

* * * * *

(c)(1) Failure to meet the applicable standards set forth in either § 50.160 or § 50.47(b) may result in the Commission declining to issue an operating license; however, the applicant will have an opportunity to demonstrate to the satisfaction of the Commission that deficiencies in the plans are not significant for the plant in question, that adequate interim compensating actions have been or will be taken promptly, or that there are other compelling reasons to permit plant operations. Where an applicant for an operating license asserts that its inability to demonstrate compliance with the requirements in either § 50.160 or § 50.47(b) results wholly or substantially from the

decision of State and/or local governments not to participate further in emergency planning, an operating license may be issued if the applicant demonstrates to the Commission's satisfaction that:

(i) The applicant’s inability to comply with the requirements in either § 50.160 or § 50.47(b) is wholly or substantially the result of the non-participation of State and/or local governments.

* * * * *

(e) Notwithstanding the requirements of paragraph (b) of this section and the provisions of § 52.103 of this chapter, a holder of a combined license under part 52 of this chapter that is complying with the requirements of § 50.47(b) and appendix E to this part may not load fuel or operate except as provided in accordance with appendix E to this part and § 50.54(gg), and a holder of a combined license under part 52 of this chapter that is complying with the requirements of § 50.160 may not load fuel or operate except as provided in accordance with § 50.160(c)(2) and § 50.54(gg).

(f) Paragraphs (a)(2), (b), and (c)(2) of this section do not apply to offsite radiological emergency response plans if the onsite emergency plan is not required to meet § 50.47(b) or if the plume exposure pathway EPZ does not extend beyond the site boundary.

8. In § 50.54:

a. Revise paragraphs (q)(1)(iii) and (q)(2) through (4);

b. In paragraph (q)(5), remove the words “made after February 21, 2012”;

c. Add paragraph (q)(7);

d. In paragraph (s)(2)(ii), remove the words “after April 1, 1981,” remove the word “reactor” and add in its place the word “facility”, and add the words “or cease operation” after the words “shut down”;

e. In paragraph (s)(3), remove the words “The NRC” and add in their place the words “If the planning standards for radiological emergency preparedness apply to offsite emergency response plans, or if the planning activities in § 50.160(b)(1)(iv)(B) apply, then the NRC”; and

f. Revise paragraph (gg)(1) introductory text.

The addition and revisions read as follows:

§ 50.54 Conditions of licenses.

* * * * *

(q) * * *

(1) * * *

(iii) *Emergency planning function* means a capability or resource necessary to prepare for and respond to a radiological emergency.

* * * * *

(2)(i) Except as provided in paragraph (q)(2)(ii) of this section, a holder of a license under this part, or a combined license under part 52 of this chapter after the Commission makes the finding under § 52.103(g) of this chapter, shall follow and maintain the effectiveness of an emergency plan that meets the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).

(ii) A holder of a license under this part for a non-power production or utilization facility, a holder of a license under this part for a small modular reactor or a non-light water reactor, or a holder of a combined license under part 52 of this chapter after the Commission makes the finding under § 52.103(g) of this chapter for a small modular reactor or a non-light-water reactor, shall follow and maintain the effectiveness of either an emergency plan that meets the requirements in § 50.160 or an emergency plan that

meets the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).

(3)(i) Except as provided in paragraph (q)(3)(ii) of this section, the licensee may make changes to its emergency plan without NRC approval only if the licensee performs and retains an analysis demonstrating that the changes do not reduce the effectiveness of the plan and the plan, as changed, continues to meet the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).

(ii) A non-power production or utilization facility, small modular reactor, or non-light-water reactor licensee may make changes to its emergency plan without NRC approval only if the licensee performs and retains an analysis demonstrating that the changes do not reduce the effectiveness of the plan and the plan, as changed, continues to meet either the requirements in § 50.160 or the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).

(4) The changes to a licensee's emergency plan that reduce the effectiveness of the plan as defined in paragraph (q)(1)(iv) of this section may not be implemented without prior approval by the NRC. A licensee desiring to make such a change shall submit an application for an amendment to its license. In addition to the filing requirements of §§ 50.90 and 50.91, the request must include all emergency plan pages affected by that change and must be accompanied by a forwarding letter identifying the change, the reason for the change, and the basis for concluding that the licensee's emergency plan, as revised, will continue to meet either the requirements in § 50.160 or the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).

* * * * *

(q)(7) Each holder of an operating license under this part or a combined license

under part 52 of this chapter for a small modular reactor or non-light-water reactor or each holder of an operating license under this part issued after **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER]*** for a non-power production or utilization facility that wishes to transition to § 50.160 shall submit to the Commission, as specified in § 50.90, a license amendment request for implementing an emergency preparedness program with the associated plan modification necessary to meet the requirements of § 50.160(b). This submittal must include an explanation of the schedule and analyses supporting the implementation of the emergency preparedness program.

* * * * *

(gg)(1) Notwithstanding § 52.103 of this chapter, if, following the conduct of the exercise required by either paragraph IV.f.2.a of appendix E to this part or § 50.160(c)(2), as applicable, FEMA identifies one or more deficiencies in the state of offsite emergency preparedness, the holder of a combined license under part 52 of this chapter may operate at up to 5 percent of rated thermal power only if the Commission finds that the state of onsite emergency preparedness provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. The NRC will base this finding on its assessment of the applicant's onsite emergency plans against the pertinent standards in either § 50.47 and appendix E to this part, or § 50.160, as applicable. Review of the applicant's emergency plans will include the following standards with offsite aspects:

* * * * *

9. After § 50.155, add undesignated center heading **Small Modular Reactors, Non-Light-Water Reactors, and Non-power Production or Utilization Facilities** and § 50.160 to read as follows:

SMALL MODULAR REACTORS, NON-LIGHT-WATER REACTORS, AND NON-POWER PRODUCTION OR UTILIZATION FACILITIES

§ 50.160 Emergency preparedness for small modular reactors, non-light-water reactors, and non-power production or utilization facilities.

(a) *Definitions.* For the purpose of this section:

(1) *Site boundary* means site boundary as defined in § 20.1003 of this chapter.

(2) [Reserved]

(b) *Requirements*. The emergency plan shall contain information needed to demonstrate compliance with the elements set forth in this paragraph. The applicable requirements of § 50.47(a)(1) apply to applications submitted under this section.

(1) *Performance-based framework*. Demonstrate effective response in drills and exercises for emergency and accident conditions.

(i) *Maintenance of performance*. Maintain in effect preparedness to respond to emergency and accident conditions and describe in an emergency plan the provisions to be employed to maintain preparedness.

(ii) *Performance objectives*.

(A) By the beginning of each calendar quarter, develop and maintain a complete list of performance objectives for that calendar quarter; and

(B) Maintain records showing the implemented performance objectives and associated metrics during each calendar quarter for the previous eight calendar quarters.

(iii) *Emergency response performance*. The emergency response team must have sufficient capability to demonstrate the following emergency response functions using drills or exercises:

(A) *Event classification and mitigation*. Assess, classify, monitor, and repair

facility malfunctions in accordance with the emergency plan to return the facility to safe conditions.

(B) *Protective actions*. Implement and maintain protective actions for onsite personnel for emergency conditions, and recommend protective actions to offsite authorities as conditions warrant.

(C) *Communications*. Establish and maintain effective communications with the emergency response organization, and make notifications to response personnel and organizations who may have responsibilities for responding during emergencies.

(D) *Command and control*. Establish and maintain effective command and control for emergencies by using a supporting organizational structure with defined roles, responsibilities, and authorities for directing and performing emergency response functions as described in paragraph (b) of this section.

(E) *Staffing and operations*. Establish staffing for the facility necessary to implement the roles and responsibilities in paragraph (b)(1)(iii) of this section.

(F) *Radiological assessment*. Assess radiological conditions in and around the facility during emergencies, including:

(*1*) *Radiological conditions*. Assess, monitor, and report radiological conditions to the applicable response personnel using installed or portable equipment.

(*2*) *Protective equipment*. Issue and use protective equipment necessary to continue and expand mitigation and protective action strategies.

(*3*) *Core or vessel damage*. Assess, monitor, and report to the applicable response personnel the extent and magnitude of damage to the core or other vessel containing irradiated special nuclear material, such as fuel or targets, as applicable.

(*4*) *Releases*. Assess, monitor, and report to the applicable response personnel the extent and magnitude of all radiological releases, including releases of hazardous chemicals produced from licensed material.

(G) *Reentry*. Develop and implement reentry plans for accessing the facility after emergencies.

(H) *Critique and corrective actions*. Critique emergency response functions and implement corrective actions after drills and exercises, and after emergencies, if they occur.

(iv) *Planning activities*.

(A) Maintain the capability to:

(*1*) Prepare and issue public information during emergencies.

(*2*) Implement the NRC-approved emergency response plan in conjunction with the licensee's Safeguards Contingency Plan.

(*3*) Establish voice and data communications with the NRC for emergencies.

(*4*) Establish an emergency facility or facilities from which effective direction can be given and effective control can be exercised during an emergency, with capabilities to support the emergency response functions as described in paragraph (b)(1)(iii) of this section.

(*5*) Provide site familiarization training for any offsite organization that may respond to the site in the event of an emergency.

(*6*) Establish methods for maintaining the emergency plan, contacts and arrangements, procedures, and evacuation time estimate up to date, including periodic reviews by the onsite and offsite organizations.

(B) For a plume exposure pathway EPZ that extends beyond the site boundary, the emergency plan must describe:

(*1*) The contacts and arrangements made and documented with Federal, State, local, and Tribal governmental agencies, as applicable, with responsibilities for coping with emergencies, including the identification of the principal coordinating agencies, and the coordinated reviews of changes in offsite and onsite planning and preparation;

(*2*) Offsite organizations responsible for coping with emergencies and the means of notifying, in the event of an emergency, persons assigned to the emergency organizations, including the means of validating notifications, the time period by which notifications must be completed, and primary and secondary methods to complete notification;

(*3*) The protective measures to be taken within the EPZ to protect the health and safety of the public in the event of an emergency, including the procedures by which the protective measures are implemented, maintained, and discontinued;

(*4*) An evacuation time estimate of the areas within the EPZ;

(*5*) The offsite facility and any backup facilities to coordinate the onsite response with the offsite response;

(*6*) The means of making offsite dose projections and the means of communicating the offsite dose projections to the offsite response coordinating agencies;

(*7*) The means by which public information is provided to the members of the public concerning emergency planning information, public alert notification system, and any prompt actions that need to be taken by the public;

(*8*) The general plans and methods to allow reentry into the EPZ during and after an emergency; and

(*9*) The drill and exercise program that tests and implements major portions of planning, preparations, and the coordinated response by the onsite response organization with the offsite response organizations within the EPZ without mandatory public participation.

(2) *Hazard analysis*. Conduct a hazard analysis of any contiguous or nearby facility, such as industrial, military, and transportation facilities, and include any credible

hazard into the licensee's emergency preparedness program that would adversely impact the implementation of emergency plans.

(3) *Emergency planning zone*. For an applicant whose analysis required by § 50.33(g)(2) meets the criteria in § 50.33(g)(2)(i), determine and describe the boundary and physical characteristics of the EPZ in the emergency plan.

(4) *Ingestion response planning*. Describe or reference in the emergency plan the capabilities that provide actions to prevent contaminated food and water from entering into the ingestion pathway.

(c) *Implementation*. (1) An applicant for an operating license issued under this part after **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]** must establish, implement, and maintain an emergency preparedness program that meets the requirements of paragraph (b) of this section, as described in the emergency plan and license, and conduct an initial exercise to demonstrate this compliance within 2 years before the issuance of an operating license for the facility described in the license application.

(2) A holder of a combined license issued under part 52 of this chapter before the Commission has made the finding under § 52.103(g) of this chapter, must establish, implement, and maintain an emergency preparedness program that meets the requirements of paragraph (b) of this section, as described in the approved emergency plan and license, and conduct an initial exercise to demonstrate this compliance within 2 years before the scheduled date for initial loading of fuel.

10. In appendix E to part 50, revise paragraph I.3. and footnote 2 to I.3 to read as follows:

APPENDIX E TO PART 50—EMERGENCY PLANNING AND PREPAREDNESS FOR

PRODUCTION AND UTILIZATION FACILITIES

I. * * *

3. The potential radiological hazards to the public associated with the operation of non-power production or utilization facilities licensed under 10 CFR part 50 and fuel facilities licensed under 10 CFR part 70 involve considerations different than those associated with nuclear power reactors. Consequently, the size of Emergency Planning Zones[1] (EPZs) for facilities other than power reactors and the degree to which compliance with the requirements of this section and sections II, III, IV, and V of this appendix is necessary, will be determined on a case-by-case basis.[2]

[1] EPZs for power reactors are discussed in NUREG-0396; EPA 520/1-78-016, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," December 1978. The size of the EPZs for a nuclear power plant shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas-cooled nuclear reactors and for reactors with an authorized power level less than 250 MW thermal. Generally, the plume exposure pathway EPZ for nuclear power plants with an authorized power level greater than 250 MW thermal shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius.

[2] Regulatory Guide 2.6, "Emergency Planning for Research and Test Reactors and Other Non-power Production and Utilization Facilities," may be used as guidance for the acceptability of non-power production or utilization facility emergency response plans.

* * * * *

PART 52 – LICENSES, CERTIFICATIONS, AND APPROVALS FOR NUCLEAR POWER PLANTS

11. The authority citation for part 52 continues to read as follows:

Authority: Atomic Energy Act of 1954, secs. 11, 101, 102, 103, 104, 105, 108, 122, 147, 149, 161, 181, 182, 183, 184, 185, 186, 187, 189, 223, 234 (42 U.S.C. 2014, 2131, 2132, 2133, 2134, 2135, 2138, 2152, 2167, 2169, 2201, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2239, 2273, 2282); Energy Reorganization Act of 1974, secs. 201, 202, 206, 211 (42 U.S.C. 5841, 5842, 5846, 5851); Nuclear Waste Policy Act of 1982, sec. 306 (42 U.S.C. 10226); National Environmental Policy Act of 1969 (42 U.S.C. 4332); 44 U.S.C. 3504 note; Sec. 109, Pub. L. 96-295, 94 Stat. 783.

12. In § 52.1, revise the definition of *Major feature of the emergency plans* to read as follows:

§ 52.1 Definitions.

(a) * * *

Major feature of the emergency plans means an aspect of those plans necessary to:

(i) Address in whole or part either one or more of the 16 standards in 10 CFR 50.47(b) or the requirements of 10 CFR 50.160(b), as applicable; or

(ii) Describe the emergency planning zones as required in 10 CFR 50.33(g).

* * * * *

13. In § 52.17, revise paragraphs (b)(2)(i) and (ii) to read as follows:

§ 52.17 Contents of applications; technical information.

* * * * *

(b) * * *

(2) * * *

(i) Propose major features of the emergency plans, in accordance with either the requirements in § 50.160 of this chapter, or the requirements in appendix E to part 50 of this chapter and § 50.47(b) of this chapter, as applicable, such as the exact size and

configuration of the emergency planning zones, for review and approval by the NRC, in consultation with the Federal Emergency Management Agency (FEMA), as applicable, in the absence of complete and integrated emergency plans; or

(ii) Propose complete and integrated emergency plans for review and approval by the NRC, in consultation with FEMA, as applicable in accordance with either the requirements in § 50.160 of this chapter, or the requirements in appendix E to part 50 of this chapter and § 50.47(b) of this chapter. To the extent approval of emergency plans is sought, the application must contain the information required by § 50.33(g) and (j) of this chapter.

* * * * *

14. Revise § 52.18 to read as follows:

§ 52.18 Standards for review of applications.

Applications filed under this subpart will be reviewed according to the applicable standards set out in 10 CFR part 50 and its appendices and 10 CFR part 100. In addition, the Commission shall prepare an environmental impact statement during review of the application, in accordance with the applicable provisions of 10 CFR part 51. The Commission shall determine, after consultation with Federal Emergency Management Agency, as applicable, whether the information required of the applicant by § 52.17(b)(1) shows that there is not a significant impediment to the development of emergency plans that cannot be mitigated or eliminated by measures proposed by the applicant, whether any major features of emergency plans submitted by the applicant under § 52.17(b)(2)(i) are acceptable in accordance with either the requirements in § 50.160 of this chapter, or the requirements in appendix E to part 50 of this chapter and § 50.47(b) of this chapter, and whether any emergency plans submitted by the applicant

under § 52.17(b)(2)(ii) provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

15. In § 52.79, revise paragraph (a)(21) to read as follows:

§ 52.79 Contents of applications; technical information in final safety analysis report.

(a) * * *

(21) Emergency plans complying with the requirements of § 50.47 of this chapter, and appendix E to part 50 of this chapter, or for a small modular reactor or a non-light-water reactor license applicant, emergency plans complying with either the requirements in § 50.160 of this chapter, or the requirements in appendix E to part 50 of this chapter and § 50.47(b) of this chapter;

* * * * *

PART 72 – LICENSING REQUIREMENTS FOR THE INDEPENDENT STORAGE OF SPENT NUCLEAR FUEL, HIGH-LEVEL RADIOACTIVE WASTE, AND REACTORRELATED GREATER THAN CLASS C WASTE

16. The authority citation for 10 CFR part 72 continues to read as follows:

Authority: Atomic Energy Act of 1954, secs. 51, 53, 57, 62, 63, 65, 69, 81, 161, 182, 183, 184, 186, 187, 189, 223, 234, 274 (42 U.S.C. 2071, 2073, 2077, 2092, 2093, 2095, 2099, 2111, 2201, 2210e, 2232, 2233, 2234, 2236, 2237, 2238, 2273, 2282, 2021); Energy Reorganization Act of 1974, secs. 201, 202, 206, 211 (42 U.S.C. 5841, 5842, 5846, 5851); National Environmental Policy Act of 1969 (42 U.S.C. 4332); Nuclear Waste Policy Act of 1982, secs. 117(a), 132, 133, 134, 135, 137, 141, 145(g), 148, 218(a) (42 U.S.C. 10137(a), 10152, 10153, 10154, 10155, 10157, 10161, 10165(g), 10168, 10198(a)); 44 U.S.C. 3504 note.

17. In § 72.32, revise paragraph (c)(2) to read as follows:

§ 72.32 Emergency plan.

* * * * *

(c) * * *

(2) Located within the exclusion area as defined in 10 CFR part 100, of a nuclear power reactor licensed for operation by the Commission, the emergency plan that meets either the requirements in § 50.160 of this chapter, or the requirements in appendix E to part 50 of this chapter and § 50.47(b) of this chapter shall be deemed to satisfy the requirements of this section.

* * * * *

Dated: Month XX, 2021

For the Nuclear Regulatory Commission.

Annette L. Vietti-Cook,
Secretary of the Commission.

CTH edits

NRC Response to Public Comments

Emergency Preparedness for Small Modular Reactors and Other New Technologies

NRC-2015-0225; 3150-AJ68

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Office of Nuclear Safety and Incident Response
Office of Nuclear Material Safety and Safeguards

[Insert Date]

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Abbreviations and Acronyms

ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act of 1954, as amended
APA	Administrative Procedure Act
BDBA	beyond-design-basis accident
BEIR	Biological Effects of Ionizing Radiation (report)
BWR	boiling-water reactor
CFR	*Code of Federal Regulations*
COL	combined license (combined construction and operating license)
CPG	Comprehensive Preparedness Guide
DBA	design-basis accident
DG	draft regulatory guide
DOE	U.S. Department of Energy
EAL	emergency action level
EP	emergency preparedness
EPA	U.S. Environmental Protection Agency
EPZ	emergency planning zone
ERO	emergency response organization
ESP	early site permit
ETE	evacuation time estimate
FDA	U.S. Food and Drug Administration
FEMA	Federal Emergency Management Agency
FIOP	Federal Interagency Operational Plan
FR	*Federal Register*
FRMAC	Federal Radiological Monitoring and Assessment Center
FRN	*Federal Register* notice
GSR	general safety requirements
IAEA	International Atomic Energy Agency
IPZ	ingestion pathway emergency planning zone
ISFSI	independent spent fuel storage installation
KI	potassium iodide
LLWR	large light-water reactor
LNT	linear no-threshold
LOCA	loss-of-coolant accident
LWR	light-water reactor
MACCS	MELCOR Accident Consequence Code System
mSv	millisievert
MW	megawatt(s)
MW(e)	megawatt(s) electric
MW(t)	megawatt(s) thermal
NARAC	National Atmospheric Release Advisory Center
NEI	Nuclear Energy Institute

NEIMA	Nuclear Energy Innovation and Modernization Act
NEPA	National Environmental Policy Act
non-LWR	non-light-water reactor
NNSA	National Nuclear Security Administration
NPUF	non-power production or utilization facility
NRC	U.S. Nuclear Regulatory Commission
NRF	National Response Framework
NRIA	Nuclear/Radiological Incident Annex
NUREG	U.S. Nuclear Regulatory Commission technical report designation
OL	operating license
ONT	other new technology
ORO	offsite response organization
PAA	Price-Anderson Act
PAG	protective action guide
PRA	probabilistic risk assessment
RA	regulatory analysis
RG	regulatory guide
ROP	Reactor Oversight Process
RTR	research and test reactor
SAR	safety analysis report
SFR	sodium-cooled fast reactor
SMR	small modular reactor
SOC	statement of considerations
SPR	Stakeholder Preparedness Review
SRM	staff requirements memorandum
TEDE	total effective dose equivalent
THIRA	Threat and Hazard Identification and Risk Assessment

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U.S. NUCLEAR REGULATORY COMMISSION
RESPONSE TO PUBLIC COMMENTS RECEIVED ON THE PROPOSED RULE EMERGENCY PREPAREDNESS FOR SMALL MODULAR REACTORS AND OTHER NEW TECHNOLOGIES

Introduction

This document presents the U.S. Nuclear Regulatory Commission's (NRC's) responses to written public comments received on the proposed rule, "Emergency Preparedness for Small Modular Reactors and Other New Technologies," and draft Regulatory Guide (DG)-1350, "Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light-Water Reactors, and Non-Power Production or Utilization Facilities." The NRC published the proposed rule and notice of DG-1350 in the *Federal Register* on May 12, 2020 (85 FR 28436), for public comment with a 75-day public comment period. On July 21, 2020 (85 FR 44025), the NRC extended the public comment period by an additional 60 days to allow more time for members of the public and other stakeholders to develop and submit their comments.

The NRC's proposed rule would adopt new alternative emergency preparedness (EP) requirements for small modular reactors (SMRs) and other new technologies (ONTs) such as non-light-water reactors (non-LWRs) and certain non-power production or utilization facilities (NPUFs). These alternative requirements would introduce a performance-based, technology-inclusive, risk-informed, and consequence-oriented approach to EP for SMRs and ONTs. The new alternative EP requirements would: (1) continue to provide reasonable assurance that adequate protective measures can and will be implemented by an SMR or ONT licensee, (2) promote regulatory stability, predictability, and clarity, (3) reduce requests for exemptions from EP requirements, (4) recognize advances in design and technological advancements embedded in design features, (5) credit safety enhancements in evolutionary and passive systems, and (6) credit the potential benefits of smaller sized reactors and non-LWRs associated with postulated accidents, including slower transient response times, and relatively small and slow release of fission products.

The proposed rule on EP for SMRs and ONTs and DG-1350 are available from the Federal e-Rulemaking Web site at https://www.regulations.gov/ (Docket ID No. NRC-2015-0225) and through the NRC's Agencywide Documents Access and Management System (ADAMS) (Accession Nos. ML20133J896 and ML18082A044, respectively).

In developing the final rule and supporting guidance,[1] the NRC considered all the comments provided in response to the proposed rule. If, as a result of its review of a public comment, the NRC changed the rule, the supporting statement of considerations (SOC), or the supporting guidance, the NRC's response to the comment indicates where the change occurred.

Comment Overview

The NRC received comments from 2,212 individuals and organizations, including 121 unique submissions, 2,087 form letters and form letters with non-substantive additional text, and 4 form letters with additional substantive text. Table 1 identifies all unique submissions, Table 2

[1] DG-1350 has been redesignated as Regulatory Guide (RG) 1.242, "Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light-Water Reactors, and Non-Power Production or Utilization Facilities," issued [month year] (ADAMS Accession No. ML20345A345).

identifies form letter submissions, Table 3 identifies form letter submissions with non-substantive additional text, and Table 4 identifies form letter submissions with additional substantive text.[2] The NRC reviewed and annotated the comment submissions to identify separate comments within each submission.[3] Accordingly, a single submission may have several individual comments associated with it. The NRC gave each individual comment within a submission a unique identifier. The NRC's summaries include this unique identifier to identify which individual comments are addressed by each response.

Table 1. Unique Comment Submissions on EP for SMRs and ONTs Proposed Rule

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
1	Adrian Egholm	Private Citizen	AE	ML20135H055
2	Gary Hoe	Private Citizen	GHX	ML20139A171
3	Chandra Perkins	Private Citizen	CPX	ML20139A172
4	Tracy McLellan	Private Citizen	TMX	ML20139A174
5	Alan Medsker	Private Citizen	AMX	ML20139A175
6	Dr. Rita Baranwal	U.S. Department of Energy (DOE)	DOE1	ML20147A194
7	Jill ZamEk	San Luis Obispo Mothers for Peace	SL1	ML20177A318
8	Paul Laudeman	Private Citizen	PL	ML20177A319
9	Sarah Fields	Uranium Watch	UW1	ML20199M274
10	Charity Colleen Crouse	Private Citizen	CCR	ML20177A385
11	Randolph Sullivan	Private Citizen	RS	ML20177A386
12	James Hopf	Private Citizen	JH	ML20177A387
13	Anthony Devoe	Private Citizen	AD	ML20177A388
14	Traber Schroeder	Private Citizen	TS	ML20177A389
15	Billy Gogesch	Private Citizen	BGX	ML20177A390
16	Robert Steinhaus	Private Citizen	RT	ML20177A391
17	Nancy Bearg	Private Citizen	NB	ML20177A396
18	Kevin and Pam Ward	Private Citizen	KPW	ML20177A392
19	Mark Giese	Private Citizen	MG	ML20177A393
20	Mark Weadick	Private Citizen	MW	ML20177A394
21	Kimberly Mazik	Private Citizen	KM	ML20177A395
22	Anonymous	Private Citizen	AN1	ML20177A426
23	Denisse B	Private Citizen	DBX	ML20177A427
24	Tim Queeney	Private Citizen	TQ	ML20177A428
25	Anonymous	Private Citizen	AN2	ML20178A154
26	Thomas McKenna	Private Citizen	TMY	ML20191A271
30	Mitch McFarland	Private Citizen	MMX	ML20192A283
77	Sherrill Futrell	Private Citizen	SF	ML20192A279
80	Jill ZamEk	San Luis Obispo Mothers for Peace	SL2	ML20196L638

[2] Appendix A contains a table showing the individual submissions that were bundled together as form letter submissions.

[3] The NRC compiled the annotated comment submissions into a single document which may be accessed within ADAMS using accession number ML21209A043.

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
81	Bruce Musico	Private Citizen	BM	ML20196L769
82	Dan Barss	Private Citizen	DBY	ML20196L770
85	Herschel Specter	Micro-Utilities, Inc.	MU	ML20202A532
92	Eleanor Dwight	Private Citizen	ED	ML20204A854
97	Harry Kershner	Private Citizen	HK	ML20204A859
105	Jay Tilden	U.S. DOE National Nuclear Security Administration	NNSA1	ML20209A069
111	Bobbie Flowers	Private Citizen	BF	ML20204B021
116	Rebecca Ramsay	Private Citizen	RR	ML20204B013
129	Kevin Callahan	The Shoshone-Bannock Tribes	SBT	ML20209A425
130	Eric Crews	Private Citizen	EC	ML20209A426
131	Anonymous	Private Citizen	AN3	ML20209A427
132	Chanceton Ippolito	Private Citizen	CI	ML20209A428
133	Suzanne Sorkin	Private Citizen	SSX	ML20209A429
134	Anonymous	Private Citizen	AN4	ML20209A430
135	Karla Kelley	Private Citizen	KK	ML20209A431
136	Georgia Morgan	Private Citizen	GM	ML20209A432
137	Lisa Chapnick	Private Citizen	LC	ML20209A420
138	Nora Moosnick	Private Citizen	NMY	ML20209A421
139	Anonymous	Private Citizen	AN5	ML20209A422
140	Paul Gunter	Beyond Nuclear	BN	ML20209A537
141	Naomi	Private Citizen	NA	ML20211L783
142	Laurie Macintosh	Private Citizen	LMY	ML20211L781
143	Adam Stein	Private Citizen	AS	ML20211L782
144	Pete Gaynor	FEMA	FEMA	ML20213C415
145	Joan Whittemore	Private Citizen	JW	ML20216A404
146	Thomas Arruda	Private Citizen	TA	ML20216A405
147	Thomas Deuring	Private Citizen	TD	ML20216A406
148	Deborah Euerle	Private Citizen	DE	ML20216A407
149	Philip Jensen	Private Citizen	PJ	ML20216A408
150	Anonymous	Private Citizen	AN6	ML20216A409
151	Raymond Underberg	Private Citizen	RU	ML20216A410
152	Bruce Hlodnicki	Private Citizen	BH2	ML20216A411
153	Lars Engstrom	Private Citizen	LEY	ML20216A413
154	Geneva Lee	Private Citizen	GL	ML20216A414
155	Mark Duane	Private Citizen	MDX	ML20216A415
156	Barbara & Rob Matthews	Private Citizen	BRM	ML20216A416
157	Anonymous	Private Citizen	AN7	ML20216A417
158	Bradley Green	Private Citizen	BG	ML20216A418
159	Dan Schmid	Private Citizen	DS	ML20216A419
160	Taylor White	Private Citizen	TW	ML20216A420
161	Charles Moldenhauer	Private Citizen	CMZ	ML20216A421
162	David Johnson	Private Citizen	DJ	ML20216A422

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
163	Michael Lyons	Private Citizen	ML	ML20216A423
164	S. Spilman	Private Citizen	SSY	ML20216A425
165	August Bramoff	Private Citizen	AB	ML20216A426
166	William Seldon	Private Citizen	WSY	ML20216A427
167	Lynn & Roger Stapes	Private Citizen	LRS	ML20216A428
168	George Wolfe	Private Citizen	GW	ML20216A429
169	Scott Bean	Private Citizen	SB	ML20216A430
170	Francesca Moldenhauer	Private Citizen	FM	ML20216A432
171	Marla Dygert	Private Citizen	MDY	ML20216A433
172	Austin Ouellette	Private Citizen	AO	ML20216A434
173	Sean Holland	Private Citizen	SHY	ML20216A435
174	John M Rathbun	Private Citizen	JR	ML20216A424
175	Cory Casanave	Private Citizen	CCY	ML20218A699
176	Von Froehlich	Private Citizen	VF	ML20219A613
177	David Gluck	Private Citizen	DGY	ML20220A523
178	28 nongovernmental organizations	Group Comment	NGO	ML20198M501
181	Nathan Roser	Private Citizen	NR	ML20232D065
182	Charles Myers	Private Citizen	CMXA	ML20233A681
183	David Lafleur	Pennsylvania Bureau of Radiation Protection	PBRP	ML20238B975
184	Anonymous	Private Citizen	AN8	ML20239B007
186	Herschel Specter	Micro-Utilities, Inc.	MU2	ML20247J576
187	Matthew Rail	Private Citizen	MRY	ML20252A210
188	Lee St. John	Private Citizen	LSY	ML20253A136
189	Ren Dolnick	Private Citizen	RD	ML20258A100
190	Daniel Farr	Private Citizen	DF	ML20258A140
191	Karl Rabenhorst	Private Citizen	KR	ML20266G313
192	Patrick Mulligan	NJDEP	NJDEP	ML20267A328
193	Anonymous	Private Citizen	AN9	ML20267A325
194	Marcus Nichol	Nuclear Energy Institute	NEICL, NELA	ML20267A326
195	A. Gilbert	Nuclear Innovation Alliance	NIA	ML20267A327
196	Cyrus Afshar	NuScale	NSCL, NSA	ML20268B269
197	Richard Schumacher	Private Citizen	RS	ML20268B270
198	Katie Tubb	The Heritage Foundation	HF	ML20269A250
199	Kenneth Schrader	Private Citizen	KS	ML20269A251
200	Nicholas McMurray	ClearPath	CPCL, CLA	ML20269A252
201	Peter Lyons	Nuclear Matters	NM1, NM2	ML20269A253
202	Christopher Chwasz	Private Citizen	CC	ML20269A254

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
203	Kimberly Steves	Conference of Radiation Control Program Directors, Inc.	CRCPD	ML20269A423
204	Dr. Rita Baranwal and Jay Tilden	U.S. DOE National Nuclear Security Administration	NNSA2	ML20269A441
205	Heywood Williams	Private Citizen	HW	ML20272A200
206	Leigh Ford	Snake River Alliance, et al.	SRA	ML20272A201
207	Margo & Dennis Proksa	Private Citizen	MDP	ML20272A202
208	Ted Stout	Private Citizen	TSX	ML20272A203
209	Angela Leek	Iowa Department of Public Health	IDPH	ML20272A204
210	Craig Piercy	American Nuclear Society	ANS	ML20272A205
211	Edwin Lyman	Union of Concerned Scientists	UCS, UCSJT	ML20272A206
212	Tansey Moore	Nuclear Energy Tribal Working Group	NETWG	ML20272A207
213	Theresa Kaufmann	Private Citizen	TKX	ML20272A208
214	Sarah Fields	Uranium Watch	UW2, UWJB, UWF1, UWF2	ML20272A270
215	Ryan Bodolay	Private Citizen	RB	ML20307A004

Table 2. Form Letter Comment Submissions on EP for SMRs and ONTs Proposed Rule

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
NA	Form Comments 1 (1–500)	NA	FL1	ML20192A067
NA	Form Comments 1 (501–1,000)	NA	FL1	ML20192A079
NA	Form Comments 1 (1,001–1,500)	NA	FL1	ML20205L565
NA	Form Comments 1 (1,501–1,950)	NA	FL1	ML20211L855
NA	Form Comments 1 (1,951–1,959)	NA	FL1	ML20225A219
NA	Form Comments 1 (1,960–1,964)	NA	FL1	ML20240A274
NA	Form Comments 1 (1,965–1,971)	NA	FL1	ML20272A243
NA	Form Comments 1 (1,972)	NA	FL1	ML20290A748
NA	Form Comments 1 (1,973)	NA	FL1	ML20337A375

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
NA	Form Comments 2 (1–23)	NA	FL2	ML20272A286
61	Dr. F. Taylor	Private Citizen	FT	ML20192A263
114	Mindy Maxwell	Private Citizen	MMY	ML20204B011
NA	Form Comments 1 (1,974)	NA	FL1	ML21131A175

Table 3. Form Letter Comment Submissions with Nonsubstantive Additional Text on EP for SMRs and ONTs Proposed Rule

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
27	Glen Anderson	Private Citizen	GA	ML20192A280
28	Jeannette Bartelt	Private Citizen	JBX	ML20192A281
29	Matthew Sheinin	Private Citizen	MS	ML20192A282
31	Beth Jane Freeman	Private Citizen	BJF	ML20192A284
32	Joseph Magid	Private Citizen	JM	ML20192A285
33	Davis and Rhonda Costas-Mirza	Private Citizen	CMX	ML20192A286
34	Janice Hallman	Private Citizen	JHX	ML20192A287
35	James Hadcroft	Private Citizen	JHY	ML20192A288
36	Charlie Weaver	Private Citizen	CW	ML20192A289
37	Jill McManus	Private Citizen	JMX	ML20192A290
38	Jennifer Merritt	Private Citizen	JMY	ML20192A291
39	Maxina Ventura	Private Citizen	MVX	ML20192A292
40	Sara Hale	Private Citizen	SHX	ML20192A293
41	Marjorie Oakes	Private Citizen	MO	ML20192A294
42	Bron Lucas	Private Citizen	BL	ML20192A295
43	Mary Ryan-Hotchkiss	Private Citizen	MR	ML20192A296
44	Mark Meeks	Private Citizen	MMZ	ML20192A297
45	Winthrop Southworth	Private Citizen	WSX	ML20192A298
46	Sr. Linda M. Bessom	Private Citizen	LBX	ML20192A299
47	Jef Schultz	Private Citizen	JSX	ML20192A300
48	Felice Nord	Private Citizen	FN	ML20192A301
49	Nancy Hiestand	Private Citizen	NH	ML20192A302
50	Ned Flaherty	Private Citizen	NF	ML20192A303
51	Linda Silversmith	Private Citizen	LS	ML20192A304
52	Sandra Morey	Private Citizen	SM	ML20192A305
55	Neal Steward	Private Citizen	NSY	ML20192A308
56	Michael Marquardt	Private Citizen	MMA	ML20192A258
57	Fred Oswald	Private Citizen	FO	ML20192A259
58	Karen Bonime	Private Citizen	KB	ML20192A260
59	Carol Creech	Private Citizen	CCX	ML20192A261
60	L. Bagley	Private Citizen	LBY	ML20192A262
62	Beverley Birks	Private Citizen	BB	ML20192A264

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
63	Michael House	Private Citizen	MH	ML20192A265
64	Bruce Hlodnicki	Private Citizen	BH1	ML20192A266
65	Gabrielle Hecht	Private Citizen	GHY	ML20192A267
66	L. Watchempino	Private Citizen	LW	ML20192A268
67	Patricia Reynolds	Private Citizen	PRY	ML20192A269
68	Bobby Greg	Private Citizen	BGY	ML20192A270
69	Carol Taccetta	Private Citizen	CT	ML20192A271
70	Patty McGrath	Private Citizen	PMX	ML20192A272
71	Steve Dickman	Private Citizen	SD	ML20192A273
72	Virginia Smedberg	Private Citizen	VS	ML20192A274
73	Chris Moore	Private Citizen	CMY	ML20192A275
74	Rick Harlan	Private Citizen	RH	ML20192A276
75	Erlynn Wallace	Private Citizen	EW	ML20192A277
76	Carol Jagiello	Private Citizen	CJX	ML20192A278
78	Jacquelyn Drechsler	Private Citizen	JD	ML20195B143
79	Carol Jagiello	Private Citizen	CJY	ML20195B144
83	Helen Dickey	Private Citizen	HD	ML20197A196
84	Edith Griffin	Private Citizen	EG	ML20199M273
86	Jean Blackwood	Private Citizen	JBY	ML20204A848
87	Jeri Fergus	Private Citizen	JF	ML20204A849
89	Dennis Vieira	Private Citizen	DV	ML20204A851
90	Margaret Johnson	Private Citizen	MJ	ML20204A852
91	Shannin Zevian	Private Citizen	SZ	ML20204A853
93	Ann Ruthsdottir	Private Citizen	AR	ML20204A855
94	Jean Farris	Private Citizen	JFX	ML20204A856
95	T. Cassidy	Private Citizen	TC	ML20204A857
96	Barbara Antonoplos	Private Citizen	BA	ML20204A858
98	Naomi Zuckerman	Private Citizen	NZ	ML20204A860
99	Leslie Potter	Private Citizen	LP	ML20204A861
100	James Fuller	Private Citizen	JFY	ML20204A862
101	Katie Harris	Private Citizen	KHX	ML20204A863
102	Barrie Stebbings	Private Citizen	BS	ML20204A864
103	Don McKelvey	Private Citizen	DM	ML20204A865
104	Phyllis Miller	Private Citizen	PMY	ML20204A846
106	Gail Payne	Private Citizen	GP	ML20204B016
107	Deborah Reade	Private Citizen	DR	ML20204B017
108	Ann Morgan	Private Citizen	AMY	ML20204B018
109	Janice Gintzler	Private Citizen	JG	ML20204B019
110	Jill Simon	Private Citizen	JSY	ML20204B020
112	Donald Goldhamer	Private Citizen	DGX	ML20204B022
113	Gina Zirtzman	Private Citizen	GZ	ML20204B023
115	Tom Kennedy	Private Citizen	TK	ML20204B012
117	Kay Cumbow	Private Citizen	KC	ML20204B014
119	Randall Wayne	Private Citizen	RW	ML20204B031
120	Fay Payton	Private Citizen	FP	ML20205L569

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
121	Melvin Mackey	Private Citizen	MMB	ML20205L570
122	Linda Marshall	Private Citizen	LMX	ML20205L571
123	Leonard Eiger	Private Citizen	LEX	ML20205L572
124	Wesley Banks	Private Citizen	WB	ML20205L566
125	Dee Halzack	Private Citizen	DH	ML20205L567
126	Kirsten Hopkins	Private Citizen	KHY	ML20205L568
127	Marie Valleroy	Private Citizen	MVY	ML20209A423
128	Karen Froiland	Private Citizen	KF	ML20209A424
179	Harry Bryant	Private Citizen	HB	ML20230A213
180	Cathy Lester	Private Citizen	CL	ML20231A367
185	Shannin Zevian	Private Citizen	SZX	ML20246G623

Table 4. Form Letter Comment Submissions with Substantive Additional Text on EP for SMRs and ONTs Proposed Rule

Submission No.	Commenter	Affiliation	Submission Abbreviation	ADAMS Accession No.
53	Paul Roden	Private Citizen	PRX	ML20192A306
54	Jerell Lambert	Private Citizen	JL	ML20192A307
88	Patrick Conley	Private Citizen	PC	ML20204A850
118	Fred Bergmann	Private Citizen	FB	ML20204B015

Public Meeting

On June 24, 2020, the NRC held a Category 3 public meeting virtually via WebEx to discuss the proposed rule with external stakeholders (see meeting summary at ADAMS Accession No. ML20196L775). The NRC's goal for conducting this meeting was to explain the proposed rule and supporting guidance and answer questions to enable stakeholders to provide informed comments on the proposed rule.

Comment Categorization

This comment response document separates the comments into the 17 categories identified below. Within each category, the NRC summarizes comments and responds to the comments. In general, the NRC addresses each individual comment. However, when similar comments can be readily grouped together, the NRC has binned those comments and treated them as a single comment. The NRC's response addresses the binned comments. The annotated comment number or numbers appear in a parenthetical list at the end of each comment summary to provide a cross-reference aid to the reader.

The comment summaries are grouped in the following categories:

General Comments on the Proposed Rulemaking

New Performance-Based Emergency Preparedness Framework—10 CFR 50.160(b)(1)

Hazard Analysis of Contiguous or Nearby Facilities—10 CFR 50.160(b)(2)

Scalable Approach for Determining the Plume Exposure Pathway Emergency Planning Zone Size—10 CFR 50.160(b)(3)

Requirement to Describe Ingestion Response Planning—10 CFR 50.160(b)(4)

Implementation Schedule

Administrative and Clarifying Changes to the Regulations

Scope of the Proposed Rule

Draft Regulatory Analysis

Information Collection

Draft Environmental Assessment

Draft Regulatory Guide

Requests for Extension of the Comment Period

Additional Comments on the Proposed Rule

Outside the Scope of the Rulemaking

A. General Comments on the Proposed Rulemaking

General Comments in Support of the Proposed Rulemaking

Comment A-1.1: Several commenters expressed support for the proposed rule, stating that the existing EP regulations for SMRs and ONTs are unnecessary, outdated, and do not account for advances in nuclear reactor technology. Several commenters stated that the proposed performance-based approach is necessary for the effective evaluation of new technological and safety advancements in SMR and ONT designs. Two commenters stated that current EP requirements are based on existing large light-water reactors (LLWRs) and are overly prescriptive for modern advanced reactor designs. One commenter wrote that the proposed rule exemplifies the NRC's ability to modernize regulations to account for innovative nuclear technologies. One commenter stated that the NRC should proceed with updating regulations for older reactors, which are safer than current rules would suggest. One commenter wrote that the rationale for existing EP regulations, and the decision to require a 10-mile plume exposure pathway emergency planning zone (EPZ) were guided by the spectrum of possible accidents from existing LLWR technology in 1978. According to the commenter, these regulations have remained unchanged, so the NRC should update EP regulations to meet the risk profile of advanced reactor technologies. (GHX-1, GHX-6, CI-1, TD-1, PJ-1, MDX-1, HF-2, CPCL-1, CLA-1, NM2-1, CRCPD-1, ANS-1)

NRC Response*:* The NRC agrees with the comments. The comments support the proposed rule and suggest no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-1.2: Several commenters, including a form letter campaign, expressed general support for the proposed rulemaking. The form letter campaign and one commenter expressed support for a performance-based, risk-informed, and consequence-oriented approach to emergency planning. (DS-1, CMZ-1, ML-1, WSY-1, NR-1, RSY-1, CLA-4, FL2-1)

NRC Response*:* The NRC agrees with the comments. The comments support the proposed rule and suggest no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-1.3: Several commenters wrote that modern SMRs are important to mitigating climate change, reducing greenhouse gas emissions, and lowering usage of carbon-intensive fuel. One commenter stated that after weighing the risks of modern nuclear technologies against global warming and fossil fuels, modern nuclear technologies are well worth the minimal risk they pose. One commenter wrote that the proposed rule would make construction of small reactors more financially feasible and, as a result, help reduce greenhouse gases. One commenter wrote that nuclear power is an important transition technology to cope with carbon emissions. One commenter wrote that nuclear power is critical to combatting climate change and ensuring that the United States is competitive in the nuclear industry. (TS-1, JR-1, KS-2, SHY-1, BG2-1, CCY-1, NM2-3)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that it should proceed with the rulemaking. However, the promotion of nuclear power, for any reason, is not one of the purposes of this rulemaking nor is it permissible under the NRC's statutory authority.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-1.4: Several commenters stated that nuclear technology is safe and risks are overstated. Two commenters referenced the Three Mile Island or Fukushima incidents, writing that they were not representative of newer technology. Several commenters noted that the perception of nuclear technology is based on fear and that the public must be educated on the safety of nuclear reactors. One commenter wrote that modern small reactor designs feature state-of-the-art digital systems, passive safety features, and other modern characteristics that largely eliminate dangerous events. One commenter wrote that the likelihood that SMR facilities and other smaller reactors would require a massive evacuation is extremely small. (DJ-1, FM-1, CCY-2, NSCL-1, KS-1)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that one goal of this rulemaking is to credit safety enhancements and the potential benefits of smaller sized reactors and non-LWRs associated with postulated accidents. However, notwithstanding whether the risks of nuclear technology are overstated, the NRC's mission is to license and regulate the Nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety, promote the common defense and security, and protect the environment. To fulfill this mission, the NRC evaluates the risks associated with commercial nuclear power technologies on a case-by-case basis. This rulemaking provides an EP framework built on that foundational principle.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-1.5: One commenter supported the performance-based, risk-informed framework and urged the NRC staff to apply this approach to other topics such as security or accident analysis. (ANS-9)

NRC Response*:* The NRC agrees, in part, with the comment. The agency is considering performance-based, risk-informed frameworks for some other domains, such as licensing advanced reactors. On a case-by-case basis, and as needed, the NRC will determine the value of adopting additional performance-based, risk-informed frameworks.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment A-1.6: A form letter campaign stated that the proposed requirements do not fully recognize microreactor safety. The commenters suggested that the NRC further refine its EP regulations and guidance to account for the inherent safety of advanced microreactors. (FL2-2, NR-2)

NRC Response*:* The NRC agrees, in part, with the comments. Microreactors may present accident consequences comparable to existing non-power reactors, which are already not subject to offsite emergency planning requirements. However, this rulemaking addresses EP for all advanced reactors, including microreactors. Both the rule and accompanying guidance are technology inclusive, which provides for the scope of EP to be scaled commensurate to the dose consequence risk for a facility on a case-specific basis and using design-specific and site-specific information. The NRC will consider addressing other microreactor regulations in other advanced reactor rulemaking efforts.

Accordingly, the NRC did not change the rule language in response to these comments.

General Comments in Opposition to the Proposed Rulemaking

Comment A-2.1: Several commenters stated that easing EP requirements will compromise public health and safety and proposed to maintain the existing EP protections. One commenter stated that the nuclear industry has a reckless disregard for public health and safety. One commenter urged the NRC not to put the safety of citizens in jeopardy. (NB-1, MG-1, AN2-1, LC-1, NMY-1, AN5-1, NA-1)

NRC Response*:* The NRC disagrees with the comments. The NRC's mission is to license and regulate the civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety, promote the common defense and security, and protect the environment. This rulemaking is consistent with the agency's mission. As explained in the NRC Response to Comment A-2.3, the NRC is not reducing EP requirements through this rulemaking. As explained in the NRC Response to Comment A-2.4, the final rule's performance-based framework, the NRC's inspection and enforcement program, and the design-specific review process described in the rule provide reasonable assurance that protective actions can and will be taken in the event of a radiological emergency at a facility complying with the final rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.2: Several commenters suggested that the NRC evaluate new SMRs under the existing regulations to prove their safety. The commenters stated that once there is tangible evidence that SMRs are safe, then the NRC can move ahead with the proposed regulation. One commenter stated that implementing SMRs without evaluating their deficiencies would be sacrificing the safety of the community for the sake of an experiment. Another commenter wrote that the nuclear industry has a poor reputation with the public, and evaluating new SMRs under the existing regulations first would reassure the public of SMR safety. One commenter said that new SMRs need to be tested under a variety of weather, geological, and social conditions before implementation. One commenter said that SMR facilities could potentially be safer, but none have been approved by the NRC, and there is no justification for reducing emergency planning requirements as a result. (AN6-1, JW-1, TA-1, RU-1, SSY-1, LRS-1, MDY-1, MRY-1, UWJB-1)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that designers of new nuclear power reactors must prove the safety of their designs but disagrees that this is a reason to revise or postpone this rulemaking. Any reactor design is evaluated under the NRC's current regulations to determine the safety of the design. Under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.43(e), the NRC will not approve a reactor design for nuclear power plants that differ significantly from evolutionary light-water reactors (LWRs) or that use simplified, inherent, passive, or other innovative means to accomplish their safety functions (i.e., advanced reactors), without the demonstration of the performance of their safety features through either analysis, appropriate test programs, experience, or a combination thereof. This requirement and others implement the Commission's policy on proof-of-performance testing for all advanced reactors ("Regulation of Advanced Nuclear Power Plants; Statement of Policy" (51 FR 24643, 24648; July 8, 1986)) and its goal of resolving all safety issues before authorizing construction ("Licenses, Certificates, and Approvals for Nuclear Power Plants; Final Rule" (72 FR 49351, 49566; August 28, 2007)).

This rulemaking acknowledges technological advancements and other differences from LLWRs that are inherent in SMRs and ONTs by, for example, crediting the potential benefits of smaller

sized reactors and non-LWRs associated with postulated accidents, including slower transient response times and relatively small and slow release of fission products.

Furthermore, not all current EP requirements apply to SMRs or ONTs. One of the purposes of this rulemaking is to establish an alternative EP framework that reduces the need for future applicants to seek exemptions from NRC regulations while providing the same level of EP as the current EP framework.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.3: Several commenters expressed opposition to the proposed rule, arguing that nuclear energy is dangerous, and the NRC should not ease associated safety regulations. Two commenters wrote that nuclear power is still too dangerous, and the country should investigate other sources of energy such as wind, solar, or hydroelectric power. Some commenters further stated that nuclear energy is a dirty energy and will harm the environment. One commenter wrote that small reactors are still dangerous and have no safe storage or decommissioning plan. One commenter wrote with concern over the disposal of nuclear waste. One commenter stated that to promote the use of nuclear power is to vote in favor of the inevitable destruction of the environment. One commenter wrote that the proposed rule is designed to bolster "theoretical certainty" of SMR designs by claiming "inherent safety" and "passive safety" of designs and reinstate what the commenter describes as a false perception that the potential for a severe incident with significant offsite consequences is not "mathematically credible." One commenter cited incidents such as Three Mile Island, Chernobyl, and Fukushima as evidence for the impact of accidents and wrote that the use of nuclear energy should be permanently ended. (TMX-1, PRX-1, JL-1, BN-1, BH2-1, LEY-1, AB-1, LSY-1, RD-1, RD-2, HW-1)

NRC Response*:* The NRC disagrees with the comments. Congress authorized the NRC to license and regulate the civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety. Whether the Nation should pursue other sources of energy is beyond the NRC's authority. Further, the NRC is not reducing safety regulations through this rulemaking. The dose criteria under which predetermined, prompt protective actions (e.g., evacuation, sheltering in place) would be taken are the same under the EP requirements in 10 CFR 50.47(b) and Appendix E, "Emergency planning and preparedness for production and utilization facilities," to 10 CFR Part 50, "Domestic licensing of production and utilization facilities," and the alternative EP requirements of 10 CFR 50.160, "Emergency preparedness for small modular reactors, non-light water reactors, and non-power production or utilization facilities." Therefore, the level of EP is the same under both EP frameworks. Also, the reactor core sizes in SMRs and ONTs are expected to be smaller than those in currently operating LLWRs and are associated with lower power densities, lower probabilities of severe accidents, slower accident progression, and smaller offsite accident consequences per module.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.4: Several commenters, including a form letter campaign, expressed general opposition to reducing EP requirements. One commenter stated that it is irresponsible to shrink the "containment area" around nuclear facilities, arguing that the current pandemic is a perfect example of the Government facing significant consequences for disregarding safety standards. One commenter criticized reduction in EP planning standards, arguing that this is an unnecessary change and that EP needs to be at its most stringent after the past failures of nuclear facilities. The commenter also emphasized the importance of the Federal Emergency Management Agency (FEMA) in EP planning. (AN1-1, MMX-1, ED-1, TSX-1, FL1-1)

***NRC Response**:* The NRC disagrees with the comments. The NRC is not reducing its emergency planning standards. The dose criteria under which predetermined, prompt protective actions (e.g., evacuation, sheltering in place) would be taken is the same under the EP requirements in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 and the alternative EP requirements of 10 CFR 50.160. Therefore, the level of EP is the same under both EP frameworks.

The final rule's performance-based approach to EP provides reasonable assurance of adequate protection of the public health and safety through NRC review of design-specific and site-specific analyses to support a proposed plume exposure pathway EPZ size, review of site-specific emergency plans to ensure compliance, demonstration of emergency response capabilities through drills and exercises by applicants and licensees, analysis of potential hazards, and the NRC's inspection and enforcement program. Additionally, reasonable assurance is also based on the NRC's review of FEMA findings and determination as to whether State, local, and participating Tribal governmental entities' emergency plans are adequate, except in cases where plume exposure pathway EPZs do not extend beyond the site boundary. However, not requiring offsite planning activities for facilities with plume exposure pathway EPZs at the site boundary in no way affects the authority that FEMA has for overall emergency management and assistance to Tribal, State, and local response organizations.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.5: Several commenters expressed concern that the NRC is not fulfilling its duty of protecting the public. One commenter wrote that, instead, the NRC is looking out for the financial interests of the nuclear industry and criticized what the commenter described as a reduction in EP requirements after the Fukushima and Chernobyl accidents. One commenter said that independent safety reviews are a key feature of the NRC, and the proposed rule just falls back on "industry knows best"—a denial of the NRC's core purpose. One commenter called reduced EP regulations for smaller reactors irresponsible and dangerous. Another commenter criticized the proposed rule as "fundamentally flawed and technically unsound," writing that it would be inappropriate to allow any facility within the scope of the rule to utilize reduced EP standards. The commenter also wrote that the rule would undermine the NRC's credibility as an independent regulator looking out for the public interest. (PC-1, FB-1, AN7-1, UCS-1)

***NRC Response**:* The NRC agrees, in part, with the comments. As explained in the NRC Response to Comment A-2.3, the NRC is not reducing EP regulations through this rulemaking. Further, the NRC has a history of successfully implementing performance-based EP standards. For example, the NRC applies a graded approach to EP for research and test reactors (RTRs). The NRC agrees that independent safety reviews are fundamental to how the agency regulates. As explained in the NRC Responses to Comments D-1.3 and D-2.1, the NRC will perform independent safety reviews under the final rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.6: Several commenters and a form letter campaign expressed concern about the environmental dangers of nuclear energy. One commenter urged the NRC not to reduce EP regulations and stated that the nuclear industry is disregarding safety of the environment and water supply under the proposed regulation. Several commenters expressed concern that the proposed rule does not adequately consider climate change. Three commenters stated that a

higher frequency of extreme weather events or natural disasters induced by climate change could potentially result in nuclear disasters. One commenter and a form letter campaign stated that EP requirements are more essential than ever for nuclear facilities due to climate change and the natural disasters that could impact them and asserted that it is arbitrary and capricious for the NRC to promulgate an EP rule without taking into account climate change. One commenter echoed these concerns and stated that climate hazards would intersect with the COVID-19 response, and the NRC must consider how a nuclear facility could become understaffed due to a pandemic. (KPW-1, MW-1, JL-2, SL2-3, JW-2, RB-4, FL1-4)

***NRC Response**:* The NRC disagrees with the comments. As explained in the NRC Response to Comment A-2.3, the NRC is not reducing the level of EP for SMRs and ONTs through this rulemaking as compared to current EP requirements for LLWRs. Further, as explained in the NRC's environmental assessment for this rulemaking, the rule's provisions either will not affect the physical environment or will not have any noticeable effects. Regarding climate change, NRC regulations require applicants to design and site their facilities to address design basis accidents and external events such as severe weather.

The NRC and licensees have addressed staffing concerns during a pandemic. In 2010, the NRC issued Regulatory Issue Summary 2010-04, "Monitoring the Status of Regulated Activities During a Pandemic" (ADAMS Accession No. ML100539611), to enhance the NRC's situational awareness of the status of activities under its regulatory authority before and during a pandemic. The NRC has taken many steps to address various challenges associated with the COVID-19 public health emergency, including staffing levels at nuclear power plants, as described on the NRC's public Web site at https://www.nrc.gov/about-nrc/covid-19/index.html.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.7: Several commenters wrote that the nuclear industry cannot be trusted to regulate itself. One of the commenters said that nuclear companies will choose to make a profit over keeping Americans safe, thus leading to disaster and potential fatalities. The commenter further noted examples in the oil and chemical industry to assert that business executives value profit over the welfare of Americans. One commenter expressed concerns about the nuclear industry's accident record and said that the industry needs to address the failings of its past. (AO-1, DF-1)

***NRC Response**:* The NRC disagrees with the comments. The nuclear industry does not regulate itself. In 1954, Congress established the Atomic Energy Commission to regulate the civilian use of radioactive materials under the Atomic Energy Act of 1954, as amended (AEA). In 1974, through the Energy Reorganization Act, Congress abolished the Atomic Energy Commission and established the NRC as an independent agency to regulate civilian use of radioactive materials. All promotional activities were transferred to the Energy Research and Development Administration, which later became the Department of Energy. Notwithstanding the development of the nuclear power industry and changes to that industry over the decades, the NRC's mission to license and regulate the Nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety, promote the common defense and security, and protect the environment is unchanged. This rule helps accomplish the agency's mission. The performance-based regimen provides the NRC with enhanced oversight of the competencies important to the protection of public health and safety. The performance-based framework, inspection and enforcement program, and design-specific review process provide reasonable assurance that protective actions can and will be taken in the event of an emergency.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.8: Several commenters expressed general opposition to reducing plume exposure pathway EPZ requirements. One commenter asserted that the NRC should retain the current 10-mile plume exposure pathway EPZ requirements and that the proposed rule is a radical departure from historical nuclear EP. Another commenter asserted that no matter the size or generating capacity of a reactor, extensive and adequate emergency planning is required. (LMY-1, UW2-1)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that adequate emergency planning is required for every SMR and ONT. However, not every SMR and ONT needs the same emergency plan. The performance-based approach to EP provided by this rulemaking provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at an SMR or ONT that complies with this final rule, as explained in the NRC Response to Comment A-2.4. Further, the NRC has historically used a graded approach to EP for other applicants and licensees, such as RTRs.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.9: One commenter expressed concern that the NRC is prioritizing nuclear industry financial interests and subjugating its responsibility of protecting public health and safety. (SF-1)

NRC Response*:* The NRC disagrees with the comment. The use and regulation of small reactors and other advanced reactor designs and technology have been active topics of discussion between the NRC and a variety of stakeholders for more than 30 years. The NRC developed the framework for the implementation of performance-based EP regulations with input from all stakeholders and is not prioritizing the financial interests of the nuclear industry. As explained in the NRC Response to Comment A-2.3, the NRC is not reducing EP regulations through this rulemaking. This rule continues to require that the NRC make a finding of reasonable assurance that adequate protective measures can and will be taken in an emergency.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment A-2.10: Two commenters stated that the public is being used as test subjects for the proposed regulation. One commenter stated that the nuclear industry should abide by the existing regulations first and that it cannot be trusted with public safety. (DE-1, VF-1)

NRC Response*:* The NRC disagrees with the comments. The NRC's mission is to license and regulate the civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety, promote the common defense and security, and protect the environment. This rulemaking is consistent with the agency's mission. As explained in the NRC Response to Comment A-2.3, the NRC is not reducing EP requirements through this rulemaking. The NRC expects that SMRs and ONTs will be designed with advanced safety features to protect the public. Any SMR or ONT complying with the final rule is required to develop, maintain, and, as necessary, implement emergency plans and coordinate with the Federal, Tribal, State and local governments, as applicable. As explained in the NRC Response to Comment A-2.4, this final rule provides reasonable assurance that adequate

protective measures can and will be taken in the event of a radiological emergency at an SMR or ONT that complies with this final rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.11: Two commenters indicated that the proposed rule is not supported with any technical or scientific evidence. One commenter stated that there is no science that recommends expansion of SMRs. The other commenter wrote that the lack of technical evidence used to curtail EP in the proposed rule directly contradicts how the NRC has historically prioritized public safety planning. (AN8-1, UW2-2)

NRC Response: The NRC disagrees with the comments. The proposed rule included a detailed technical basis for the proposed EP requirements. The NRC developed this technical basis using historical experience, knowledge of technological advancements, and new research. Emergency preparedness continues to be a fundamental part of the NRC's regulatory structure. Further, as described in the NRC Response to Comment A-2.3, the NRC is not reducing EP through this rulemaking.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment A-2.12: One commenter said that if the nuclear industry can survive only via the elimination of safety regulations, then the industry is not viable. The commenter further stated that regulations should not be eliminated just because they are too expensive or onerous for the industry. Regulations can and should be evaluated and changed over time as the world and technologies change. (RU-2)

NRC Response*:* The NRC agrees, in part, with the comment. The NRC agrees that regulations should be assessed for updates as technology changes. This is precisely what the NRC has done in this rulemaking. The current EP regulations in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 were initially written more than 40 years ago for the currently operating LLWRs. The expectation of new reactor designs compelled the NRC to reevaluate the EP requirements in light of these technological changes. The resultant performance-based requirements do not eliminate safety regulations. They provide the same level of EP for SMRs and ONTs as the current EP preparedness requirements for LLWRs.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment A-2.13: One commenter stated that there is an internal disagreement between the Department of Energy (DOE) Office of Nuclear Energy and some National Nuclear Security Administration (NNSA) staff regarding the national security risks of the proposed rule. The commenter said that the NRC should give the NNSA's initial arguments more weight than those of the DOE Office of Nuclear Energy as DOE is tainted by its "promotional mission." (UCS-4)

NRC Response*:* The NRC disagrees with the comment. As required by the Administrative Procedure Act (APA), the NRC offers all interested persons an opportunity to participate in rulemakings through public comment. The NRC considers all public comments equally.

Accordingly, the NRC did not change the rule language in response to this comment.

Mixed or Other General Comments on the Proposed Rulemaking

Comment A-3.1: A comment urged the NRC to "do the right thing". (HK-1)

NRC Response: The comment suggests no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment A-3.2: One commenter expressed support for aspects of the proposed rule but requested further consideration of offsite response requirements. (IDPH-1)

NRC Response: The NRC agrees, in part, with the comment. The NRC has considered all aspects of offsite emergency response. A risk-informed and consequence-oriented approach to EP considers the potential consequences from a spectrum of accidents, including those that can result in an offsite radiological release. The result is a graded approach to EP based on site-specific analyses.

Accordingly, the NRC did not change the rule language in response to this comment.

B. New Performance-Based Emergency Preparedness Framework— 10 CFR 50.160(b)(1)

General Comments on New Performance-Based Emergency Preparedness Framework

Comment B-1.1: Several commenters expressed general support for the performance-based EP framework. Three commenters wrote that the framework is a positive step toward developing performance-based, technology-inclusive, risk-informed, and consequence-oriented regulations. Two commenters wrote that current regulations targeted at LLWRs are outdated, and it is only appropriate to develop a performance-based framework for new technologies. Two commenters wrote that the proposed EP framework will allow for increased innovation in the nuclear industry. Finally, two commenters wrote that the proposed EP framework would ensure that the NRC evaluates EP on a case-by-case basis, while another commenter praised the approach of the proposed rule in establishing "site-specific emergency plans" that would allow facilities to allocate resources to any high-consequence areas. (CI-2, CI-3, CI-5, CI-6, SB-1, NIA-5, HF-10, CRCPD-7, RB-2, RB-3)

NRC Response: The NRC agrees, in part, with the comments. The NRC agrees that the proposed rule would offer a performance-based, technology-inclusive, risk-informed, and consequence-oriented EP framework. However, the NRC disagrees with the comment that current EP regulations are outdated. The existing EP regulatory framework is an effective approach that provides reasonable assurance that protective measures can and will be taken in the unlikely event of an accidental radiological release.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-1.2: Several commenters opposed the proposed performance-based EP framework. One commenter wrote that the NRC was abandoning defense-in-depth principles for EP in favor of "passive" or "inherent" safety. Similarly, one commenter wrote that defense-in-depth approaches, including "specified emergency planning zones, established joint planning standards and evaluation criteria," are critical to EP. One commenter wrote that performance-based regulations are inappropriate for unproven technologies. Similarly, one commenter wrote that previous EP regulations assumed technology was "failsafe" but incidents such as Three Mile Island proved this is not true. The commenter wrote that "infallibly

engineered safety" is a myth. One commenter wrote that the proposed rule assumes current EP regulations emphasize processes and procedures over performance, but performance is always a key component to assuring readiness and competence. The commenter added that a performance-based framework that does not require plans and procedures would be deficient, and reasonable assurance should not be solely based on drills, exercises, and performance objectives. One commenter expressed concern that the proposed rule does not define the required frequency of drills and exercises, and as a result, SMRs and non-LWR licensees would not be required to conduct a full offsite EP drill every 2 years. Finally, one commenter suggested terms such as "performance-based," "technology-inclusive," "risk-informed," and "consequence-oriented" are vague, undefined, and intended to confuse the public. (BN-3, FEMA-6, DGY-1, KR-4, NJDEP-7, UW2-13, UWJB-9)

***NRC Response**:* The NRC agrees, in part, with the comments. The NRC is not abandoning defense-in-depth. The Commission's Safety Goal Policy Statement (51 FR 30028, 30033; August 21, 1986) includes the following:

> A defense-in-depth approach has been mandated in order to prevent accidents from happening and to mitigate their consequences. Siting in less populated areas is emphasized. *Furthermore, emergency response capabilities are mandated to provide additional defense-in-depth protection to the surrounding population*" [emphasis added].

The level and extent of required EP in this rule is based on a graded approach to EP, commensurate with the relative radiological risk, source term, and potential hazards, among other considerations. This approach is consistent with the NRC's approach to EP for other licensees, such as RTRs.

The NRC disagrees that performance-based regulations are inappropriate for unproven technologies. As explained in the NRC Response to Comment A-2.2, under 10 CFR 50.43(e), the NRC requires the demonstration of the performance of safety features of new reactor designs before approving the designs.

The NRC agrees with the comment that a performance-based approach that does not include plans and procedures would be deficient, and reasonable assurance should not be solely based on drills, exercises, and performance objectives. The NRC Response to Comment A-2.4 describes how the performance-based approach to EP provided by this final rule affords reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at an SMR or ONT that complies with this final rule.

The NRC disagrees with the comment that terms such as "performance-based," "technology-inclusive," "risk-informed," and "consequence-oriented" are vague, undefined, and intended to confuse the public. NUREG-2122, "Glossary of Risk-Related Terms in Support of Risk-Informed Decisionmaking," issued November 2013 (ADAMS Accession No. ML13311A353), defines "performance-based" as focusing on measurable outcomes, rather than prescriptive processes, techniques, or procedures, and "risk-informed" as a characteristic of decisionmaking in which risk results or insights are used together with other factors to support a decision. However, in the final rule's SOC, the NRC clarified "technology-inclusive" in this rule to mean the principle of establishing performance requirements, for any SMR or ONT applicant or licensee to use in its emergency plan, developed using methods of evaluation that are flexible and practicable for application to a variety of reactor technologies. The NRC also clarified the meaning of "consequence-oriented" as the principle of basing decisions on the scope of EP

required on the potential consequences from a spectrum of accidents, including those that could result in an offsite radiological release.

The NRC agrees that the proposed rule does not define a required frequency for drills and exercises and that SMR and ONT licensees would not be required to conduct a full offsite EP drill every 2 years. However, the exercise cycle frequency adopted by applicants and licensees should afford sufficient time during which ERO members will be provided ample opportunities to demonstrate their emergency response function capabilities listed in 10 CFR 50.160(b)(1)(iii)(A)–(H). Licensees are also required to maintain these capabilities, and maintenance of the capabilities will be demonstrated through drills and exercises. The NRC stated the following in the proposed rule's SOC (85 FR 28436, 28466; May 12, 2020):

> [The NRC] anticipates that applicants and licensees would adopt an exercise cycle of eight years during which licensees would vary the content of exercise scenarios to provide [emergency response organization (ERO)] members the opportunity to demonstrate proficiency in the key skills necessary to respond to several specific scenario elements. Applicants and licensees would be required to describe exercise scenario elements necessary to demonstrate the emergency response functions in their emergency plans.

In DG-1350, the NRC stated the following:

> The staff will evaluate applications using a graded approach based on site-specific consequence analyses. Program elements that may be implemented and evaluated according to a graded approach include periodicity between inspections, drills, exercises, number of performance objectives, and staffing.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-1.3: One commenter wrote that current EP requirements are inadequate, and further reducing requirements would be a "relinquishment of regulatory responsibility." The commenter added that the SMRs can still have significant consequences, and nearby communities deserve adequate protection. (SL2-4, SL2-5)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that communities around nuclear power plants must have adequate protection. The AEA requires the NRC to provide this level of protection through its regulation of commercial nuclear power plants. However, the NRC disagrees that the proposed rule would reduce EP requirements. In the 1980 Emergency Planning Final Rule (45 FR 55402, 55413; August 19, 1980), the NRC stated that the size of the plume exposure pathway EPZ could be determined on a case-by-case basis for gas-cooled nuclear reactors and for reactors with an authorized power level less than 250 megawatts thermal (MW(t)). The NRC explained that this requirement was based on the lower potential hazard from these facilities (i.e., lower radionuclide inventory and longer times to release significant amounts of activity in many scenarios) (45 FR 55402, 55406). Since 1980, the NRC has used a similar graded approach to EP commensurate with the relative radiological risk, source term, and potential hazards, among other considerations, as demonstrated in the existing regulations in 10 CFR 50.47(b), 10 CFR 50.47(c)(2), 10 CFR 70.22(i), and 10 CFR 72.32, "Emergency plan." The SMR and ONT final rule continues this approach.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-1.4: One commenter wrote that the proposed EP framework should include a continuous improvement mechanism that would ensure that licensees revise EP planning as new information and techniques become available. The commenter offered the Fukushima accident as an example, in which the facility was originally built to withstand a 10-to-12-meter tsunami, when later research suggested a more severe incident at the site was possible. The commenter cited techniques such as chaos engineering and testing, improved automation, and required retrospective sessions as options to include, and suggested that facilities include budgets for updated analyses and incorporation of the latest research related to EP. (RB-6, RB-7, RB-8)

NRC Response*:* The NRC agrees, in part, with the comments. The final rule requires, in 10 CFR 50.54(q), that licensees complying with 10 CFR 50.160 maintain the effectiveness of their emergency plans. This requirement, together with the performance-based approach of 10 CFR 50.160, allows licensees to change their plans as technologies and EP change if the plans continue to maintain their effectiveness and meet the requirements of 10 CFR 50.160. However, the NRC does not require nuclear power plant licensees to continually assess the possibilities for improvements in EP. Under the NRC's regulatory authority, if new information were to indicate the need for improvements, then the NRC can impose requirements that are necessary to provide reasonable assurance of adequate protection. Further, the NRC could impose enhancements beyond what is necessary for adequate protection, if there is a substantial safety benefit that is cost-justified.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-1.5: Two commenters wrote that the requirement for applicants to conduct an initial exercise to demonstrate effectiveness of the EP program no later than 18 months before the issuance of an operating license (OL) is unreasonable. One commenter wrote that current experience with the Vogtle Electric Generating Plant, Unit 3, facility suggests the timeframe is unworkable. The commenter added that there is no radiological risk until fuel load, and the timeline should be closer to authorization for fuel load. The other commenter wrote that it is difficult to see how applicants will have "established, implemented, and maintained the emergency planning requirements plus the staffing needed" 18 months before issuance of an OL as it may not be logistically or financially feasible. (DBY-2, HF-9)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that the proposed rule's "no later than 18 months before" the issuance of an OL for a 10 CFR Part 50 applicant or the scheduled date for initial loading of fuel for a 10 CFR Part 52 combined license (COL) holder is not the appropriate timeframe. The 1980 EP Final Rule required an applicant to hold a full-participation emergency planning exercise within 1 year before receiving the OL of a power plant. That 1-year deadline was based on a scheduling decision to balance the desirability for a timely assessment of the adequacy of the emergency plan and the countervailing need to avoid the scheduling and resource burdens created by the opportunity in an OL proceeding for a hearing on the results of a full-participation exercise. This requirement created some difficulty in scheduling the exercise so that it would allow time for a hearing while still being conducted within 1 year of plant readiness to be licensed.

The Commission changed this requirement in 1987 to require a full-participation emergency planning exercise within 2 years before licensing a power plant ("Production and Utilization Facilities; Timing Requirements for Full Participation Emergency Preparedness Exercises for

Power Reactors Prior to Receipt of an Operating License; Final Rule" (52 FR 16823, 16829; May 6, 1987)). The Commission determined that, based on applicants' experience implementing the 1-year requirement and a 2-year post-licensing exercise frequency requirement, 2 years provided an appropriate balance.

In the final rule, the NRC changed the "no later than 18 months before" requirement to "within 2 years before" to be consistent with the current requirement in Appendix E to 10 CFR Part 50 for LLWRs and provide flexibility to 10 CFR Part 50 OL applicants and 10 CFR Part 52 COL holders.

Accordingly, the NRC revised the rule language in 10 CFR 50.160(c)(1) and 10 CFR 50.160(c)(2) to allow licensees greater flexibility in demonstrating regulatory compliance.

Comment B-1.6: One commenter wrote that the rule should stipulate the involvement of Tribes in EP drills and exercises, stating that these activities would be "vastly strengthened with the inclusion of Tribal EMPs [emergency management programs] who have an interest and responsibility for activities within or near EPZs and IPZs [ingestion exposure pathway emergency planning zones]." The commenter stated that Tribes have limited capacity and capabilities, and the NRC should require provisions in the rule that make Federal resources available to Tribes to assist with "sampling, assessing, and implementing precautionary actions prior to incidents and before exceeding dose thresholds." Similarly, the commenter wrote that Tribes have limited capacity to assess and implement quarantine and embargo actions, and proactive integration of Tribes to emergency response functions would bolster Tribal response and mitigation strategies. The commenter also suggested changing dissemination of public information requirements in the rule from "the public alert and notification system" to "the public and Tribal alert and notification systems" arguing offsite response organizations (OROs) must include coordination with Tribes. (SBT-3, SBT-4, SBT-12, SBT-13, SBT-21)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that activities such as drills and trainings are strengthened with the inclusion of Tribal emergency management programs that have an interest in and identified responsibility in the emergency plan. In the final rule, 10 CFR 50.160(b)(1)(iv)(B)(*9*) requires an emergency plan to describe the drill and exercise program that tests and implements major portions of planning, preparations, and the coordinated response by the onsite response organizations with the ORO within the plume exposure pathway EPZ. If a Tribe is located within the plume exposure pathway EPZ and is part of the planned offsite response to an emergency at the facility, then the applicant or licensee must include that Tribe in its emergency plan's description of its drill and exercise program.

Ingestion pathway response activities are implemented in the intermediate and late phases of response to an accident involving the release of radioactive material. Support for intermediate and late phases of radiological emergency response activities is described in the Nuclear/Radiological Incident Annex (NRIA). The NRIA is part of the National Response Framework (NRF) and describes the policies, situations, concepts of operations, and responsibilities of key Federal radiological resources and assets governing the short-term, immediate, and late phases of response activities for incidents involving the release of radioactive materials. It applies when the nature and scope of the incident require a Federal response to supplement the State, Tribal, or local incident response. The Federal Radiological Monitoring and Assessment Center (FRMAC) is one of the key Federal agencies and is responsible for coordinating environmental radiological monitoring, sampling, and assessment

response activities. The FRMAC is available to State, Tribal, and local authorities upon request to respond to nuclear or radiological incidents.

If a Tribe seeks Federal help with EP, such as assistance and coordination with sampling, assessing, and implementing precautionary actions before accidents, then it should contact FEMA. FEMA provides Federal assistance, services, and access to Federal funds to States, territories, and Tribes to train staff and purchase equipment for offsite EP. FEMA provides training on EP on all hazards, including radiological EP, to interested States and Tribes. Additionally, FEMA provides hands-on expertise to assist with comprehensive all-hazard plan development, training, and exercises. For more information, refer to FEMA's Tribal Policy found at https://www.fema.gov/about/organization/tribes and to FEMA's National Preparedness Web site, https://www.fema.gov/emergency-managers/national-preparedness.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-1.7: One commenter suggested improving the emergency plan change process with a performance-based change process. The commenter noted that the proposed rule uses the emergency change plan process under 10 CFR 50.54(q) which is "difficult" despite recent attempts to improve it. The commenter suggested that any non-administrative change be demonstrated in a drill or exercise as opposed to a "paper analysis" as required by the process under 10 CFR 50.54(q). Additionally, the commenter stated that the proposed EP framework is not actually performance-based, as the emergency plan must be submitted for review and approval, similar to current requirements. The commenter suggested an approach in which emergency planning is "developed, reviewed, questions asked for clarification and then approved when it is demonstrated in an inspected exercise." (RSX-1, RSX-2)

NRC Response*:* The NRC disagrees with the comments. The suggested approach for approving an emergency plan is not significantly different from the current licensing approach. An emergency plan is part of the required content of applications under 10 CFR Part 50 and 10 CFR Part 52. The NRC reviews the emergency plan and may ask questions for clarification. The licensee demonstrates implementation of the emergency plan as part of the required EP inspections, tests, analyses, and acceptance criteria in an inspected exercise for a 10 CFR Part 52 COL holder or in an evaluated exercise within 2 years before the NRC issues a full power Part 50 OL.

As stated in 10 CFR 50.54(q), licensees may make emergency plan changes without NRC approval only if the licensee performs and retains an analysis that the changes do not reduce the effectiveness of the plan. Additionally, 10 CFR 50.54(q) does not prescribe how the licensee performs the analysis. Such analyses could be performed in a variety of ways, such as through research, pilot programs, or during a drill or exercise. Evaluation of the successful demonstration of the changes to the emergency plan would be documented in the analysis.

The NRC cannot rely solely on a demonstration of the plan change, as suggested by the comments. Demonstration of a plan change in an evaluated drill or exercise would show the plan's adequacy only under the specific drill or exercise conditions and not the rest of the spectrum of accidents for which the licensee is required to respond. Analysis in addition to the demonstration would be required.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-1.8: One commenter asked if an existing LLWR could use the license amendment request process under proposed 10 CFR 50.54(q)(7) to transition to the plume exposure pathway EPZ and IPZ requirements under 10 CFR 50.160 if they can prove the risk for the LLWR is the same as for an SMR with a 10-mile plume exposure pathway EPZ. (BM-14)

NRC Response*:* An existing LLWR could not use the license amendment request process under 10 CFR 50.54(q)(7) to transition to the EP requirements under 10 CFR 50.160. In the final rule, 10 CFR 50.54(q)(7) is applicable only to SMRs, non-LWRs, and NPUFs licensed after the effective date of the final rule. LLWRs were not included in the scope of this rule, not because of the potential radiological consequence posed by an LLWR, but because an EP licensing framework already exists for LLWRs, and current LLWR licensees have not expressed an interest in changing the current framework. Comments concerning a performance-based, consequence-oriented approach to EP for entities besides SMRs and ONTs are addressed in the NRC responses to comments in Section H.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-1.9: One commenter recommended that the NRC should remove "as applicable" from the proposed rule in 10 CFR 52.17(b)(2)(i) and (ii) and 10 CFR 52.18, "Standards for review of applications," as it is an undefined term, inconsistent with comparable FEMA consultation language in those sections, and inconsistent with the memorandum of understanding between FEMA and the NRC, dated December 7, 2015 (ADAMS Accession No. ML15344A371). The commenter also suggested changing "that there is not significant impediment" to "that there is not a significant impediment" in 10 CFR 52.18. (BM-21)

NRC Response*:* The NRC agrees, in part, with the comment. The NRC proposed using the words "as applicable" in 10 CFR 52.17(b)(2)(i) and (ii) and 10 CFR 52.18 regarding the NRC's consultation with FEMA because, under 10 CFR 50.160, the NRC's consultation with FEMA would not always be necessary. For some applicants and licensees, the rule would allow for a site boundary plume exposure pathway EPZ, which would not require a formal offsite radiological EP program. In that case, NRC consultation with FEMA would not be required.

Accordingly, the NRC did not change the rule language in response to this part of the comment. However, the NRC agrees that the word "a" was missing from proposed 10 CFR 52.18 and revised the text to read, "there is not a significant impediment…" in the final rule.

Comment B-1.10: One commenter noted that the proposed rule requires applicants to describe the data link that will provide information to the NRC, but does not provide any guidance on safety parameters, type of information that should be provided, or timeframe for activation of the Emergency Response Data System following an event. (DBY-3)

NRC Response*:* The NRC disagrees with the comment. As described in the proposed rule SOC (85 FR 28436, 28450), applicants and licensees choosing to follow 10 CFR 50.160 will be required to describe in their emergency plans the data links with the NRC for use in emergencies. Specific parameters to be reported will be determined for the specific technology during the license application process under 10 CFR Part 50 or 10 CFR Part 52. The NRC will review each applicant's data transmission capabilities on a case-specific basis.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-1.11: One commenter asked if the proposed rule should define "safe condition," including it in 10 CFR 50.2, "Definitions." (DBY-4)

NRC Response*:* In the proposed rule SOC (85 FR 28436, 28447), the NRC defined "safe conditions" to mean "the facility has been restored to a radiologically safe and stable condition." The NRC kept the definition in the final rule SOC and added it to DG-1350.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-1.12: One commenter recommended that emergency plans should avoid calling on local elected officials to be the principal decisionmaker regarding sheltering and evacuation as this may lead to over-evacuation. In addition, the commenter noted that local elected officials frequently change. (MU-13)

NRC Response*:* The NRC disagrees with the comment. Nuclear power plant licensees are required to have in place emergency plans that specify the OROs responsible for coping with emergencies. State, local, and Tribal officials designate OROs and decisionmakers. Nuclear power plant licensees recommend protective actions to the OROs and decisionmakers. Only State, local, and Tribal officials have the authority to make decisions concerning public health and safety for their jurisdictions. The NRC does not have the authority to determine who makes these decisions.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-1.13: One commenter stated that performance objectives under 10 CFR 50.160(b)(1)(iii) may become confused with existing EP Reactor Oversight Process (ROP) indicators. The commenter suggested clarifying in the proposed rule and guidance that the requirements in 10 CFR 50.160(b)(1)(iii) are not part of the ROP, but instead are maintained for review as part of routine inspections. (NEIA-27)

NRC Response*:* The NRC agrees, in part, with the comment. The performance objectives under 10 CFR 50.160(b)(1)(iii) could be confused with EP ROP performance indicators. However, the NRC currently does not know what the ROP will be for SMRs and ONTs. This means that, at this time, the NRC does not know what the relationship will be between 10 CFR 50.160 and the ROP.

Accordingly, the NRC revised the SOC to state that the agency will monitor the licensee's performance objectives and metrics, without referencing the ROP.

NRC Question: Would an 8-year exercise cycle (as is currently required for LLWRs) be appropriate for SMRs or ONTs choosing to comply with the performance-based approach? If not, would an alternative cycle length be appropriate?

Comment B-2.1: Several commenters noted that the current 8-year exercise cycle is effective, with some commenters stating that it would provide the same level of reasonable assurance. (NJDEP-18, NEIA-8, CRCPD-17, CRCPD-18, IDPH-9)

NRC Response*:* The NRC agrees, in part, with the comments. The 8-year requirement in Appendix E to 10 CFR Part 50 for LLWRs has proven to be appropriate and effective for those reactors. However, the NRC is not requiring licensees to adopt an 8-year cycle or any exercise frequency. As a performance-based approach to EP, the rule provides performance objectives

without prescribing deterministic methods to meet those objectives. Drills and exercises are one example of this approach. Licensees must have performance objectives under 10 CFR 50.160(b)(1)(ii). Performance objectives measure emergency response performance (i.e., compliance with requirements). Those requirements include, at a minimum, the capability to demonstrate the emergency response functions listed in 10 CFR 50.160(b)(1)(iii)(A)–(H). Licensees demonstrate those capabilities through drills and exercises required under 10 CFR 50.160(b)(1). So, even without required exercise cycles or frequencies, licensees will have to perform drills and exercises to meet these requirements. The NRC will monitor the performance objectives and metrics to ensure that licensees maintain adequate emergency planning and preparedness.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-2.2: One commenter suggested that the length of the exercise cycle should be reduced given that "design elements associated with SMRs and ONTs are still being refined." (SBT-20)

NRC Response*:* The NRC agrees, in part, with the comment. The length of the exercise cycle in 10 CFR 50.160 could be less than the 8-year requirement in Appendix E to 10 CFR Part 50 for LLWRs. However, the NRC is not requiring licensees to adopt any exercise frequency. As a performance-based approach to EP, the rule provides performance objectives without prescribing deterministic methods to meet those objectives. As explained in the NRC Response to Comment B-2.1, drills and exercises are one example of this approach. The NRC will monitor the performance objectives and metrics to ensure that licensees maintain adequate emergency planning and preparedness.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-2.3: One commenter expressed support for conducting an offsite EP drill every 2 years with completion of the full suite of EP exercises over an 8-year cycle. The commenter asserted that the drill and exercise cycle should compensate for the turnover of key personnel at the facility and with State, Tribal, and local authorities. The commenter also noted that as SMR and ONT operational history is established, lessons learned may be incorporated. The commenter also wrote that drills and exercises should include interfacing between onsite staff and offsite authorities. (UCSJT-8)

NRC Response*:* The NRC agrees, in part, with the comment. The NRC agrees that licensees using the performance-based EP approach in 10 CFR 50.160 will need to demonstrate through drills and exercises capabilities such as communications with OROs and making protective action recommendations to OROs as conditions warrant. These requirements are found under 10 CFR 50.160(b)(1)(iii). However, the NRC disagrees that it needs to require an offsite drill every 2 years and a full exercise cycle every 8 years. As a performance-based approach to EP, the rule provides performance objectives without prescribing deterministic methods to meet those objectives. As explained in the NRC Response to Comment B-2.1, drills and exercises are one example of this approach. The NRC will monitor the performance objectives and metrics to ensure that licensees maintain adequate emergency planning and preparedness.

The NRC disagrees with the comment stating that the drill and exercise cycle should compensate for the turnover of key personnel at the facility and with State, Tribal and local authorities. In 10 CFR 50.160(b)(1)(iii)(E), the NRC requires applicants and licensees to establish staffing for the facility necessary to implement the roles and responsibilities in

10 CFR 50.160(b)(1)(iii). Regulatory Guide (RG) 1.242 states in part that the emergency plan should describe the process used to train, before assigning roles and responsibilities, as well as retrain, the emergency response team members.

Accordingly, the NRC did not change the rule language in response to this comment.

NRC Question: The NRC is therefore considering aligning the discussion of the EP framework in this rule with its other risk-informed, performance-based regulations and considering eliminating the use of the descriptors "dose-based" and "consequence-oriented," but intends no change to the meaning of the proposed regulations. Would such a change impact the clarity and predictability of the regulations?

Comment B-3.1: Several commenters supported the use of risk-informed regulations, and two commenters supported the elimination of the descriptors "dose-based" and "consequence-oriented." Several commenters added that the risk-informed framework is not as clear as the regulations under 10 CFR 50.47(b), which could lead to inconsistencies in implementation. One commenter said that use of the term "risk-informed" would more clearly allow for consideration of the public, environmental, and economic risks of an offsite radiological release. One commenter wrote that alignment would not impact the clarity and predictability of the proposed regulations if the final rule acknowledges the alignment and makes clear that terms have been subsumed by new terminology. Finally, one commenter wrote that risks should be inclusive of stakeholder interests and not limited to certain dose values or measures. (NJDEP-11, NEIA-1, CRCPD-10, IDPH-5)

NRC Response*:* The NRC agrees, in part, with the comments. Risk-informed regulation is an approach to regulatory decisionmaking that considers a combination of risk insights such as engineering analysis, defense-in-depth, safety margins, and performance history to establish requirements. A performance-based regulatory framework focuses on measurable outcomes, specifies requirements to be met, and provides flexibility to an applicant or licensee regarding the information or approach needed to satisfy those requirements. A risk-informed, performance-based EP framework, by design, will be less defined than the current EP regulations in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. How a licensee implements the risk-informed, performance-based EP requirements will depend on the design of the licensee's facility, so one licensee may implement the requirements differently than another licensee. That is not inconsistent implementation or regulation because every licensee will be required to satisfy the same requirements. Different does not mean inconsistent.

The NRC did not remove "dose-based" and "consequence-oriented" from the rule because those terms are appropriate and beneficial descriptors that define the risk insights used to develop the final rule. These risk insights include the risks of an offsite radiological release because a risk-informed and consequence-oriented approach considers the potential consequences from a spectrum of accidents, including those that could result in an offsite radiological release. The result is a graded approach to EP based on site-specific analyses.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-3.2: One commenter wrote that it would be misleading to remove "dose-based" from the regulations as the proposed rule would still fundamentally base EP requirements on dose. (UCS-17)

***NRC Response**:* The NRC agrees, in part, with the comment. The NRC did not remove the term "dose-based" from the SOC for the final rule. The term is used in the SOC to describe, in part, the EP framework suggested in SECY-11-0152, "Development of an Emergency Planning and Preparedness Framework for Small Modular Reactors," dated October 28, 2011 (ADAMS Accession No. ML112570439). As stated in the NRC Response to Comment B-3.1, "dose-based" describes one of the specific risk insights used to develop the final rule. However, the NRC disagrees that the final rule is fundamentally based on dose. The level and extent of required EP in this rule are based on a graded approach to EP, commensurate with the relative radiological risk, source term, and potential hazards, among other considerations. This approach is consistent with the NRC's approach to EP for other licensees, such as RTRs.

Accordingly, the NRC did not change the rule language in response to this comment.

Offsite and Onsite Emergency Preparedness Planning

Comment B-4.1: Several commenters criticized the proposed rule's offsite emergency planning requirements and the impact they would have on public health and safety. One commenter wrote that without appropriate offsite planning, there will be no mechanism for radiological assessment and formulation of protective action recommendations. As a result, decisionmakers will not be able to evaluate offsite radiological consequences and make decisions to reduce public exposure to radiation. One commenter stated that SMR facilities would be sited close to residential areas, and as a result, it would be unwise to allow for reduced offsite planning requirements. The commenter also recommended that the NRC should prioritize public health and safety instead of relief from the regulatory burden and increased regulatory stability and predictability. The commenter wrote that, instead, regulatory stability and predictability are maintained by ensuring that communities have offsite emergency planning. One commenter wrote that some basic offsite planning should occur regardless of plume exposure pathway EPZ size, and the rule should include additional requirements related to ingestion planning. One commenter wrote that SMRs may have higher electricity production costs per unit than LLWRs, and this drives cost cutting, which may come at the expense of safety. The commenter wrote that, as a result, the NRC should not "shrink and eliminate" offsite emergency planning, especially considering that multiunit SMR facilities could have the same combined radiological source term as other larger reactors. Finally, one commenter wrote that because of the unique nature of nuclear power, public health and safety concerns warrant more robust offsite EP requirements than the proposed rule provides. (BF-1, GM-1, BN-2, FEMA-1, NJDEP-4, IDPH-10, UW2-24, UW2-25, UW2-30, UW2-61, UW2-62, UW2-63)

***NRC Response**:* The NRC disagrees with the comments. The NRC is not eliminating offsite EP with this rulemaking. State and local comprehensive all-hazards emergency response plans are tested by real events almost daily across the United States. The hazards that prompt the implementation of these response actions are sometimes immediately dangerous to life and health. These responses are frequently ad hoc responses and save lives. As described in the NRC Response to Comment B-7.2, communities can still develop and maintain radiological response capabilities without an NRC requirement for an offsite plume exposure pathway EPZ.

This rulemaking allows for a site boundary plume exposure pathway EPZ, but the applicant or licensee must justify such a plume exposure pathway EPZ. This rulemaking does not guarantee that a licensee will have a site boundary plume exposure pathway EPZ. Licensees and applicants that successfully justify a site boundary plume exposure pathway EPZ would not include a General Emergency declaration in their emergency plans. Therefore, no prompt

protective offsite radiological response measures or training would be required by the NRC for Tribal, State, and local government organizations.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-4.2: One commenter wrote that the rule should ensure that Tribes are consulted on a government-to-government basis and fully integrated into EP requirements. The commenter wrote that the rule could potentially exclude Tribes that fall outside plume exposure pathway EPZs but have "cultural, historic, or administrative ties to the area of potential effect." The commenter requested that the NRC address this by requiring consultation and coordination with Tribal governments throughout the development of emergency planning and integrating the NRC's Tribal Protocol Manual into requirements. The commenter offered an example of the IPZ requirements in the rule, stating that the approach requires government-to-government consultation with Tribal authorities. The commenter also wrote that any provision of the rule stipulating involvement of Tribal authorities must be negotiated with the Tribe directly and not through a "non-governmental applicant." The commenter recommended that the NRC include provisions in the rule for the inclusion of Tribal government health and safety responsibilities that fall outside of State jurisdictions to clarify lines of authority and responsibility. The commenter also suggested that the NRC modify the event classification and mitigation portion of the proposed rule, arguing that applicants and licensees will be able to establish their own emergency classification scheme for determining whether to notify Tribes. Additionally, the commenter wrote that any modifications to plume exposure pathway EPZ sizes, including expansion beyond the administrative site boundary, must be shared with Tribes in face-to-face consultations on a government-to-government basis. (SBT-1, SBT-2, SBT-11, SBT-15, SBT-17, SBT-18, SBT-25, SBT-26, SBT-27, SBT-28)

NRC Response*:* The NRC agrees, in part, with the comments. Regarding government-to-government consultation, the NRC consults in good faith with Tribes on agency actions that have substantial direct effects on Tribes, as well as those regulatory actions for which Tribal consultation is required under Federal statute. Under the NRC's Tribal Policy Statement (82 FR 2404, 2416; January 9, 2017), "The NRC will provide timely notice and consult in good faith with Tribal governments on NRC's regulatory actions that have substantial direct effects on one or more Indian Tribes as well as those regulatory actions for which Tribal consultation is required under Federal statute." The NRC also follows NUREG-2173, Revision 1, "Tribal Protocol Manual," issued July 2018 (ADAMS Accession No. ML18214A663) on all communication with Tribes.

The NRC disagrees with the commenter's assertion that the rule could potentially exclude Tribes that fall outside plume exposure pathway EPZs but have "cultural, historic, or administrative ties to the area of potential effect." The NRC will offer consultation to Tribes that have cultural, historic, or administrative ties to the area of potential effect through the licensing proceeding consistent with Federal statutes and the NRC's Tribal Policy Statement.

The NRC disagrees with the commenter's suggestion that the NRC serve as a neutral entity for licensee event classification and mitigation communications with Tribes during an emergency. Because of the potential need to take immediate action offsite in the event of a significant radiological accident, notifications to appropriate OROs must go directly from the facility licensee to affected OROs. Adding the NRC to licensee communications with Tribes would degrade the timeliness of this required capability to promptly declare and classify emergency conditions and notify OROs of recommended protective actions such as evacuation or

sheltering. As a result, potential delays in implementing offsite protective actions could negatively affect public health and safety.

The NRC agrees that in licensing actions in which the applicant proposes to comply with 10 CFR 50.160 and which have a substantial direct effect on one or more Tribes, the Tribe(s) need to be consulted in those licensing actions. The NRC's guidance for reviewing applications that would comply with 10 CFR 50.160 will direct the NRC staff to consider, consistent with the Tribal Policy Statement, whether the action may have a substantial direct effect on one or more Tribes. The NRC also revised DG-1350 to include a statement to inform potential applicants that they may need to reach out to States or the NRC or another Federal agency, as applicable, to coordinate with Tribes to obtain information to meet the NRC's application requirements for emergency planning. Part of this coordination could be determining whether, and if so, how, the Tribes would be notified during an emergency under the applicant's emergency classification scheme.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-4.3: One commenter wrote that the proposed rule does not include mitigation capability demonstration, which is a critical regulatory requirement. Additionally, the commenter said that consideration of integrating safeguards incidents into emergency response seems to be missing and suggested that the rule require demonstration of response capabilities that address hostile action and integrated emergency response. (RSX-3, RSX-8)

NRC Response*:* The NRC disagrees with the comments. The proposed rule did include a mitigation capability demonstration requirement. Proposed 10 CFR 50.160(b)(1)(iii) describes the emergency response functions that licensee emergency response teams must have the capability to successfully demonstrate in drills or exercises. The first required response function is event classification and mitigation, which is the ability to assess, classify, monitor, and repair facility malfunctions in accordance with the emergency plan to return the facility to safe conditions.

The NRC also disagrees with the comment that integrating safeguards incidents into emergency response is missing. In the proposed rule, 10 CFR 50.160(b)(1)(iv)(A)(2) requires applicants and licensees to be capable of implementing their approved emergency response plan in conjunction with their safeguards contingency plan. As explained in the proposed rule SOC, "[L]icensees should coordinate security-related and emergency response activities to ensure an adequate and efficient response to a radiological event."

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-4.4: One commenter suggested that core damage assessment should be considered a recovery or planning effort rather than a response capability because regulatory oversight of exercises has shown that core damage assessment is of little value during response. Radiological assessment is sufficient to determine the impact on the facility and public during response. Additionally, the commenter wrote that reentry has little value in ensuring reasonable assurance that the emergency plan can and will be implemented and suggested it be required for mitigation efforts only. (RSX-5, RSX-6)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC disagrees that core damage assessment as a response capability is of little value during response and that radiological assessment is sufficient to determine the impact on a facility and the public during

response. Core damage assessment is a key input to radiological dose assessment and projection. The amount of core damage relates directly to the amount of source term for release: the greater the source term, the greater the magnitude of the release and the greater potential impact to the public. Therefore, the NRC requires licensees to have the capability to assess core damage.

The NRC agrees that reentry can be a mitigative action. However, the NRC disagrees with the suggestion that reentry be required for mitigation efforts only and that it has little value in ensuring reasonable assurance that the emergency plan can and will be implemented. Reentry can occur as a response action, such as augmenting the on-shift ERO during a hostile-action-based emergency or implementing diverse and flexible mitigation capabilities. To support these efforts, licensees need to demonstrate the required coordination with OROs on offsite reentry points, including the conditions necessary to allow reentry. These conditions include establishing access control points to issue dosimetry and train reentering individuals on its use, developing stay times for restricted areas to prevent exceeding exposure limits, providing escorts trained in the use of dosimetry, and providing monitoring and decontamination for exiting individuals.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-4.5: One commenter wrote that past evacuation time estimates (ETEs) for new reactor license applications have included consideration of the evacuation of people within the site boundary, while the proposed rule seems to require consideration only of those outside the site boundary. In addition, the commenter wrote that ETE requirements should include special events that occur within the plume exposure pathway EPZ that warrant special consideration to maintain consistency with NUREG/CR-7002, Revision 1, "Criteria for Development of Evacuation Time Estimate Studies," issued February 2021 (ADAMS Accession No. ML21013A504). (BN-19, BM-20)

NRC Response*:* The NRC agrees with the comments. ETEs are a calculation of the time to evacuate various sectors and distances within the facility's plume exposure pathway EPZ. This includes the nuclear power plant site location, as described in NUREG/CR-7002, Revision 1. While the proposed rule language provides for development of an ETE "of the areas beyond the site boundary and within the EPZ," the phrase "areas beyond the site boundary" could be interpreted to exclude the area within the site boundary. For this reason, the NRC revised the rule language by removing the phrase, "beyond the site boundary and" to clarify that the ETE study area encompasses the entire area within the plume exposure pathway EPZ, including the area within the plant site boundary. In addition, the NRC revised DG-1350, Section C.7(e), to refer to NUREG/CR-7002, Revision 1, which provides guidance for considering special events, such as the construction of new reactors, and other activities within the plume exposure pathway EPZ in the development of an ETE study.

Accordingly, the NRC removed "beyond the site boundary and" from 10 CFR 50.160(b)(1)(iv)(B)(*4*).

Comment B-4.6: One commenter wrote that current ETE guidance in NUREG/CR-7002 is based on an evacuation of a 10-mile plume exposure pathway EPZ, and the proposed rule and guidance should be updated to limit the scope of the ETE study in line with site-specific ETE requirements to reduce unnecessary burden. (NEIA-28)

***NRC Response**:* The NRC agrees with the comment. In February 2021, the NRC published NUREG/CR-7002, Revision 1, which contains new guidance for preparing ETEs for scalable plume exposure pathway EPZ sizes. This revised guidance will assist applicants and licensees in developing ETEs that are commensurate with site-specific plume exposure pathway EPZs. The NRC staff revised DG-1350, Section C.7(e), to refer to NUREG/CR-7002, Revision 1.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-4.7: One commenter suggested improvements to the proposed rule to ensure that EP planning standards are performance-based. The commenter noted that the proposed rule focuses on drills as the primary method to demonstrate maintenance of effective response capabilities and that drills should be one means of achieving compliance with the rule's performance-based requirements. The commenter recommended that the NRC adopt language from DG-1350 specifying that the NRC staff will evaluate applications using a graded approach based on site-specific consequences including periodicity between inspections, drills, exercises, number of performance objectives, and staffing. The commenter wrote that this would allow the performance-based framework to adapt to new technologies and new methods for demonstrating response capabilities. (NEIA-7)

***NRC Response**:* The NRC agrees, in part, with the comment. The proposed rule SOC included language that described how the NRC will evaluate applications using a graded approach to EP based on site-specific characteristics and consequences. The NRC disagrees that the proposed rule's performance-based regulatory approach does not have clear measurable outcomes. The desired measurable outcomes for this rule are the successful demonstration of the emergency response functions listed in 10 CFR 50.160(b)(1)(iii) during drills or exercises. In addition, the proposed set of required planning activities in 10 CFR 50.160(b)(1)(iv) accounts for those EP-related activities not readily observable or effectively measured through drills and exercises. The NRC will determine licensee compliance with these requirements through the NRC's inspection program.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-4.8: One commenter wrote that 10 CFR 50.33(g)(2)(i)(A) in the proposed rule requires applicants and licensees to submit emergency plans for governmental entities within the plume exposure pathway EPZ, which seems to be arbitrary and insufficient. The commenter wrote that FEMA and other Federal entities with an interest in the plume exposure pathway EPZ, such as land administered by other Federal agencies (including the Bureau of Land Management, Forest Service, and National Parks Service), navigable waterways, and Federal highways, should be included in these requirements. (UW2-55, UW2-56)

***NRC Response**:* The NRC disagrees with the comments. The Federal Government's responses to various emergencies, including radiological emergencies, are described in the NRF, one of the five National Planning Frameworks constituting the National Preparedness System required by Presidential Policy Directive 8, "National Preparedness," dated March 30, 2011. The Federal Interagency Operational Plans (FIOPs) describe how the Federal Government aligns resources and delivers core capabilities to implement the National Planning Frameworks. Incident annexes to the FIOPs, such as the NRIA to the Response and Recovery FIOP, address concepts of operations, roles, responsibilities, critical tasks, or resources for a unique threat or hazard that requires additional information not addressed by the FIOPs. The NRIA describes the policies, situations, concepts of operations, and responsibilities of key Federal radiological resources and assets governing the early, immediate, and late phases of

response for incidents involving a release of radioactive materials. It applies to incidents of a nature and scope that require a Federal response to supplement the State, Tribal, or local incident response. FEMA's Web site, at https://www.fema.gov/emergency-managers/national-preparedness, contains more information on these topics.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-4.9: One commenter provided general support for the proposed rule's requirements, writing that it would reflect safety enhancements and current methodologies for plume exposure pathway EPZ size, onsite and offsite emergency planning, and the number of emergency response staff needed. (DOE1-6)

NRC Response*:* The NRC agrees with the comment. The rulemaking appropriately reflects safety enhancements and current methodologies for plume exposure pathway EPZ size and onsite and offsite emergency planning, including emergency response staffing.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-4.10: One commenter suggested that the proposed rule should treat public information capabilities as a component of the response rather than a planning requirement. (RSX-4)

NRC Response*:* The NRC disagrees with the comment. Although 10 CFR 50.160(b)(1)(iv) is titled, "Planning activities," the public information capabilities required in that section are also components of the licensee's response. Having the capability to prepare and issue public information during emergencies is part of the licensee's planning for emergencies, and issuing that information during an emergency is part of the licensee's response. Under 10 CFR 50.160(b)(1)(iv)(A)(*1*), licensees must maintain the capability to prepare and issue public information during emergencies. The issuance of public information during emergencies involves, for example, developing press releases and addressing the media, including social media. Under 10 CFR 50.160(b)(1)(iv)(B)(*7*), which applies when the licensee has a plume exposure pathway EPZ beyond the site boundary, the emergency plan must contain a description of the "means by which public information is provided to the members of the public concerning emergency planning information, public alert notification system, and any prompt actions that need to be taken by the public." This provision requires the licensee to distribute to the public information concerning offsite emergency planning information, such as the actions to take if someone hears a siren or evacuation routes. During an emergency, the licensee would need to keep the media and OROs apprised of the emergency by providing initial and updated information.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-4.11: One commenter stated that the proposed rule would replace 15 of the 16 planning standards under 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 with 11 new planning requirements under 10 CFR 50.160(b)(1)(iv)(B) for applicants with a plume exposure pathway EPZ beyond the site boundary. As a result, the commenter asked why an applicant with a 10-mile plume exposure pathway EPZ would be eligible for reduced planning requirements under the proposed rule despite requiring the same 10-mile plume exposure pathway EPZ as those facilities with more extensive planning requirements under current rules. The commenter requested clarification of the situation, including whether an offsite IPZ would also be required. (BM-12)

***NRC Response**:* The NRC disagrees with the comment. In the proposed rule, the NRC did not attempt to match each regulatory requirement contained in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. The current EP planning standards in 10 CFR 50.47(b) were developed for LLWRs, and the requirements in Appendix E to 10 CFR Part 50 were developed for LLWRs and non-power reactors. With its risk-informed, performance-based approach, this final rule recognizes advances in design and technological advancements embedded in design features of SMRs and ONTs; credits safety enhancements in evolutionary and passive systems; and credits the potential benefits of smaller sized reactors and non-LWRs associated with postulated accidents, including slower transient response times and relatively small and slow release of fission products. Although the two sets of EP requirements are different, the level of EP is the same under 10 CFR 50.160 and the current EP requirements.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-4.12: One commenter wrote that the proposed rule should allow facilities to scale offsite EP considerations when a facility is sited within a large land area owned by a Federal or State entity, which the public cannot access. (NEIA-15)

***NRC Response**:* The NRC agrees, in part, with the comment. The NRC's case-by-case and design-specific review process plus the performance-based EP framework of 10 CFR 50.160 allow applicants and licensees to propose site-specific methods of meeting the applicable requirements of 10 CFR 50.160. Given the particular facts and circumstances of the application, an applicant or licensee also can request exemptions from requirements. So, the NRC allows applicants and licensees to propose scaled offsite emergency plans and does not need to explicitly address the situation described in the comment.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-4.13: One commenter supported the proposed rule's approach to drills and exercises, writing that it allows the "appropriate flexibility" for applicants to determine drill and exercise requirements, with NRC approval, in a performance-based and technology-neutral manner. The commenter noted that not explicitly prescribing drills or exercises in the rule language or RG is consistent with the NRC's performance-based, technology-neutral approach. (NNSA2-14)

***NRC Response**:* The NRC agrees with the comment. The rule's approach to drills and exercises allows applicants and licensees appropriate flexibility to meet the rule requirements in a performance-based and technology-neutral (i.e., technology-inclusive) manner.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-4.14: One commenter stated that the proposed rule's emergency planning requirements do not consider the possibility of multiple emergency scenarios that could impact an SMR or ONT and the surrounding area. The commenter offered examples of unforeseen events such as a fire, flood, hurricane, explosion, seismic event, terrorist attack, national conflict, or cyber threats. (UW2-45)

***NRC Response**:* The NRC ~~dis~~agrees, in part, with the comment. Although not called out specifically, the example emergency scenarios in the comment would be addressed both in existing regulations under 10 CFR 100.20, "Factors to be considered when evaluating sites,"

and in this rule. Under 10 CFR 100.20, nuclear power plant applicants must evaluate various hazards at a site, including human-related hazards (e.g., airports, dams, transportation routes, military and chemical facilities) and physical characteristics of the site, including seismology, meteorology, geology, and hydrology. ~~Terrorist attacks and cybersecurity threats are outside the scope of this rulemaking because they would be addressed by an applicant's physical security and cybersecurity plans, respectively.~~ For the purposes of this final rule, the spectrum of accidents used to develop the basis for emergency planning includes the entire collection of event sequences considered in the design and licensing basis of the facility, including those related to security.

Under 10 CFR 50.160(b)(1)(iii)(A), applicants and licensees must be capable of assessing and classifying facility malfunctions that could occur from a range of initiating conditions. As described in RG 1.242, the emergency plan should describe how the licensee will classify the events that would warrant an emergency declaration and the associated emergency action levels (EALs) and immediate actions to provide an appropriate graded response. RG 1.242 provides sample EALs, such as "External Hazards or Natural Phenomena," which includes initiating conditions like natural phenomena (e.g., high windspeeds, high/low ultimate heat sink, seismic), technical hazards (e.g., hazardous gases, hostile-action-based event, fire), and hazardous chemical releases incident to the processing of licensed material. Also, 10 CFR 50.160(b)(2) requires applicants and licensees to submit a hazard analysis of contiguous or nearby facilities, such as industrial, military, and transportation facilities, along with any credible hazards that could adversely impact the implementation of emergency plans.

Accordingly, the NRC provided additional clarification in the SOC ~~did not change the rule language in response to this comment~~.

Comment B-4.15: One commenter expressed support for the proposed revisions to 10 CFR 50.10(a)(1)(vii), which would include onsite emergency facilities necessary to comply with 10 CFR 50.160 requirements within the scope of items for which a construction permit or limited work authorization is necessary to commence construction. (UW2-50)

NRC Response*:* The comment supports the proposed rule and suggests no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to this comment.

NRC Question: Are there additional emergency response functions that the NRC should consider for incorporation in this proposed rulemaking?

Comment B-5.1: Two commenters noted that the proposed rule "does not appear to contain adequate performance objectives to implement a true performance-based approach," and as a result, it is difficult to comment on any additional emergency response functions. (NJDEP-17, CRCPD-16)

NRC Response*:* The NRC disagrees with the comments. The rule contains performance-based provisions that require the applicant or licensee to establish performance objectives based on the applicant's or licensee's facility's design. Based on the performance objectives, the applicant or licensee develops performance metrics to measure performance (i.e., determining when or how successful performance is achieved), and the NRC evaluates the metrics to ensure they are acceptable. The NRC or the industry may develop future additional guidance related to performance objectives for specific designs or classes of designs.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-5.2: Two commenters indicated that the proposed rule contains the appropriate emergency response functions. One commenter stated that the proposed rule does not require any additional emergency response functions. The other commenter noted that the emergency response functions listed in the proposed rule cover the important components of offsite response coordination. (NEIA-6, IDPH-7a)

NRC Response*:* The NRC agrees with the comments. The emergency response functions in the rule are appropriate for the performance-based approach to EP for SMRs and ONTs.

Accordingly, the NRC did not change the rule language in response to these comments.

NRC Question: Are there any planning activities that should be added to or removed from the NRC's proposed list?

Comment B-6.1: Two commenters stated that the proposed rule has the potential to cause confusion with existing planning standards, and the proposed performance-based approach is not a true performance-based approach but rather a hybrid approach. One commenter wrote that it is unclear what measurable outcomes under 10 CFR 50.160 replace the old deterministic planning standards under 10 CFR 50.47(b). As a result, planning standards may need to be removed or added to make the methodology a strictly performance-based approach. (NJDEP-19, CRCPD-8, CRCPD-19)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that the rule is not entirely performance-based. As explained in the proposed rule SOC, some EP-related activities, called "planning activities" in the rule, are not readily observable or effectively measured through drills and exercises. Some of these planning activities may not be performance based, but the rule is, on the whole and in comparison to the current EP requirements in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 performance-based.

The NRC disagrees that the rule has the potential to cause confusion with the planning standards in 10 CFR 50.47(b). The rule clearly states that applicants and licensees must use either the EP framework of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 or the requirements in 10 CFR 50.160.

Accordingly, the NRC did not change the rule language in response to these comments.

Offsite Response Organization Participation

Comment B-7.1: Several commenters suggested that the proposed rule require that OROs be included in emergency planning activities, regardless of a facility's plume exposure pathway EPZ size. One commenter noted that under the proposed rule a site boundary plume exposure pathway EPZ "effectively eliminates the need for full participation exercises to test the capacity of state and local governments." The commenter explained that these exercises allow for evaluation of response capabilities and help refine and train response personnel. The commenter added that a site boundary plume exposure pathway EPZ results in the degradation of operational readiness and hampers refinement and continuous improvement of emergency plans, and that they do not believe a site boundary plume exposure pathway EPZ provides for defense in depth for the full spectrum of accident scenarios and unforeseen issues. Another

commenter agreed with this commenter's argument. Another commenter stated that given that SMRs and ONTs are new technologies with a limited operational history, OROs should continue to be involved in emergency planning for these facilities. According to the commenter, the consequences of a site boundary plume exposure pathway EPZ include "no established relationships with local and state responders; no trained and practiced means to reduce dose that is projected to be below the 1 rem total effective dose equivalent (TEDE) threshold." The commenter asserted that without appropriate drills and exercises "the risk of delays, errors and inefficiencies in response activities increases." One commenter stated that the NRC does not seem to understand that it is not just the applicant and licensee that are the foundation of emergency planning, but also State and local governments and surrounding community organizations that must be trained and prepared for emergencies. (AS-3, FEMA-4, FEMA-13, FEMA-14, NJDEP-5, NJDEP-6, UW2-8, UW2-9, UW2-10, UW2-43, UW2-44)

***NRC Response**:* The NRC disagrees with the comments. This rule is a risk-informed, consequence-oriented EP framework. A "risk-informed" and "consequence-oriented" approach considers the potential consequences from a spectrum of accidents, including those that could result in an offsite radiological release. The outcome is a graded approach to EP based on site-specific analyses. Part of this graded approach is a scalable plume exposure pathway EPZ size that is based on the NRC's review of an applicant's or licensee's site-specific analysis of the accident likelihood and source term, timing of the accident sequence, and meteorology. One potential result of this EP framework is a site boundary plume exposure pathway EPZ if the applicant's or licensee's analysis can support one. Even in this scenario, the applicant or licensee would be required to establish an emergency classification scheme with criteria to determine the need for notification of Tribal, State, and local agencies in emergencies. If the classification scheme does not reach a severity level that would require notification of Tribal, State, and local agencies of the need to take a protective action, such as with a site boundary plume exposure pathway EPZ, then Tribal, State, and local government organizations would not need training on specialized actions in response to an event, other than providing onsite firefighting, law enforcement, and ambulance response. This is risk-informed decisionmaking. The NRC is not saying that radiological support and training of OROs is abandoned. As described in the NRC Response to Comment B-7.2, communities can still develop and maintain radiological response capabilities without an NRC requirement for an offsite plume exposure pathway EPZ.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-7.2: Several commenters stated that, under the proposed rule, the NRC approval of a facility with a site boundary plume exposure pathway EPZ would leave Tribal, State, local, and Federal agencies with an "all-hazards" approach to EP, which would not be sufficient preparation to respond to an emergency event. Several commenters wrote that it would be unrealistic to expect that an all-hazards approach would be coordinated or effective in responding to a radiological emergency. One commenter suggested that the proposed rule merely assumes that State and local governments will respond to an accident because they are required to by State law. The commenter asserted that this is an ad hoc approach that does not ensure that the full range of necessary actions will be taken and makes it likely any response will be uncoordinated. Another commenter specifically agreed with this argument. Additionally, two commenters suggested that radiological incidents pose unique circumstances that OROs may not be prepared to confront with an all-hazards approach. One commenter agreed that while the probability of a significant radiological release from an SMR or ONT facility is low, an all-hazards approach would not sufficiently address the unique nature of a radiological incident. One commenter said that the NRC is assuming a large, coordinated Federal response will be

available to respond to an offsite emergency, but this could be problematic if multiple disasters or a broader national emergency occurs. Two commenters wrote that they support a risk-informed approach to emergency planning, and a minimum level of training and support for OROs should remain regardless of the plume exposure pathway EPZ size. Additionally, one commenter suggested this coordination could be conducted through ingestion pathway requirements as detailed in the proposed rule "but more detail is required to ensure clearer understanding of the expected level of licensee coordination with the offsite organizations and the requirements for demonstration of the adequacy of these required coordination efforts."

One commenter stated that the NRC has previously misrepresented FEMA's views on an all-hazards approach to emergency planning. The commenter asserted that the NRC has cited FEMA's Comprehensive Preparedness Guide (CPG)-101, "Developing and Maintaining Emergency Operations Plans," issued November 2010, as evidence that all-hazards planning is just as effective as dedicated radiological emergency planning. The commenter stated that CPG-101 actually recommends hazard-specific procedures and planning. The commenter noted that this is also reflected in CPG-201, "Threat and Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) Guide," issued May 2018, which recommends preparing for specific threats. (BN-4, FEMA-12, NJDEP-2, NJDEP-10, CRCPD-2, IDPH-2, IDPH-3, UW2-47, UW2-48, UWF1-2, UWF1-4, UWF2-3, UWF2-4, UWF2-5, UWJB-5)

***NRC Response**:* The NRC disagrees with the comments. The NRC is not required to assume an offsite radiological release will happen but also does not assume that the probability of an offsite release is zero. EP is risk informed rather than risk based. The risk-informed and consequence-oriented framework of 10 CFR 50.160 considers the potential consequences from a spectrum of accidents, including those that could result in an offsite radiological release and those that could not. The outcome is a graded approach to EP based on site-specific analyses. Part of this graded approach is a scalable plume exposure pathway EPZ size that is based on the NRC's review of an applicant's or licensee's site-specific analysis of the accident likelihood and source term, timing of the accident sequence, and meteorology. One potential result of this EP framework is a site boundary plume exposure pathway EPZ if the applicant's or licensee's analysis can support one.

Whether the NRC requires offsite radiological EP depends on the size of the plume exposure pathway EPZ. If the NRC finds acceptable a site-specific analysis supporting a site boundary plume exposure pathway EPZ, then the NRC will not require a formal offsite radiological emergency plan. This approach is risk-informed decisionmaking. This approach does not abandon radiological support and training of OROs. Communities can still develop and maintain radiological response capabilities without an NRC requirement for an offsite plume exposure pathway EPZ. FEMA's CPG-101 provides guidance for developing offsite emergency plans and understanding risk-informed planning and preparedness. FEMA's CPG-201 provides communities with additional guidance for conducting a risk assessment and presents the basic steps of the process. Together, these two CPGs provide a risk-informed basis for the offsite planning effort, as well as encourage the engagement of the whole community to address risks that might impact a jurisdiction.

As described in the NRC Response to Comment B-4.8, the NRIA to the Response and Recovery FIOP in the NRF provides the Federal Government's response activities for incidents involving a release of radioactive materials. The NRIA also identifies the Federal response capability inventory, which includes radiological assets, resources, and teams available for

OROs. The OROs are encouraged to incorporate Federal assets that may be used in State, local, and Tribal government emergency plans.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment B-7.3: One commenter recommended that emergency plans should clearly document the contacts and arrangements made with outside organizations, State and local governments, and other organizations. (DBY-5)

NRC Response*:* The NRC agrees, in part, with the comment. Under 10 CFR 50.160(b)(1)(iv)(B)(*1*), the emergency plan must describe the following:

> …contacts and arrangements made and documented with local, State, Tribal and Federal governmental agencies, as applicable, with responsibilities for coping with emergencies, including the identification of the principal coordinating agencies, and the coordinated reviews of changes in offsite and onsite planning and preparation.

As explained in RG 1.242, this requirement means that the emergency plan should describe the contacts and arrangements made for various OROs. This description should document the relevant emergency planning and preparations, roles, and responsibilities, including references to or attachments of agreements with the OROs. Together, the rule language and guidance address this comment. However, consistent with the performance-based nature of this rule, the NRC did not place in the rule text the prescriptive requirement suggested by the comment.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-7.4: Regarding drills and exercises, one commenter asked what standards would apply to offsite organizations. (DBY-6)

NRC Response*:* The comment assumes that the NRC would establish standards for the performance of drills and exercises by OROs. The proposed rule did not intend to define drill and exercise standards for OROs. The current Memorandum of Understanding between FEMA and the NRC describes FEMA's responsibilities as having the lead role in offsite emergency planning and preparedness activities, including assessing offsite emergency plans and preparedness and making findings and determinations as to the adequacy of the plans and whether they can be implemented (e.g., adequacy and maintenance of procedures, training, resources, staffing levels and qualifications, and equipment). FEMA's findings and determinations will be based on the review of plans and exercise results.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-7.5: One commenter wrote that the 1-rem TEDE over 96 hours criterion leaves uncertainty as to the level of offsite engagement required by licensees to demonstrate drill and exercise functions. (IDPH-7b)

NRC Response*:* The NRC disagrees with the comment. The need for and level of offsite engagement required by licensees to demonstrate drill and exercise functions will be determined by the size of the plume exposure pathway EPZ. The applicant or licensee will document the details of ORO engagement needs in the emergency plan. Thus, the level of engagement by OROs will be established when the NRC approves the emergency plan and

issues a license. If the plume exposure pathway EPZ is at the site boundary, such that the NRC will not require offsite radiological response plans, certain capabilities that the NRC requires the licensee to demonstrate in drills or exercises will require ORO engagement to enable the licensee to demonstrate the capability. For example, 10 CFR 50.160(b)(1)(iii)(B) requires the capability to recommend protective actions to offsite authorities as conditions warrant. Additionally, 10 CFR 50.160(b)(1)(iii)(C) requires the capability to make notifications to organizations who may have responsibilities for responding during emergencies. The specifics of OROs' participation will be captured in the emergency plan.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment B-7.6: One commenter wrote that the proposed rule does not include requirements involving doctors and hospitals outside the plume exposure pathway EPZ as was the case for the development of the Blue Castle Holdings facility plume exposure pathway EPZ. (UW2-57)

NRC Response*:* The NRC disagrees with the comment. Under 10 CFR 50.160(b)(1)(iv)(B)(*1*), emergency plans must describe contacts and arrangements made and documented with local, State, Tribal, and Federal governmental agencies, as applicable, with responsibilities for coping with emergencies. As explained in RG 1.242, these agencies include medical and other response organizations. The regulations do not place a limit on the distance from the licensee's site for providers of resources identified as being needed in an applicant's or licensee's emergency plan. The applicant or licensee must justify the travel time to or by the resource provider or provide the resource themselves. The latter situation occurs when a facility does not have an offsite fire department in close proximity, and the licensee provides an onsite fire department.

Accordingly, the NRC did not change the rule language in response to this comment.

C. Hazard Analysis of Contiguous or Nearby Facilities—10 CFR 50.160(b)(2)

General Comments on the Hazard Analysis of Contiguous or Nearby Facilities

Comment C-1.1: Several commenters suggested defining some key terms more clearly in the proposed rule to improve regulatory certainty and consistency for applicants. Specifically, one commenter wrote that it is unclear what could be considered a "credible hazard." One commenter suggested defining the terms "nearby" and "adversely impact" with respect to the hazard analysis to reduce uncertainty for applicants, while other commenters wrote that the NRC should better define terms such as "facility," "nearby," "less severe," "more severe," "more probable," and "less probable." Specifically, one commenter proposed that the NRC define the difference between more and less severe accidents, as well as the term "less probable but more severe." The commenter explained that it is often the case that "an accident with low probability due to multiple system failures nevertheless has very benign consequences." (DBY-7, NSA-3, NSA-4, ANS-6)

NRC Response*:* The NRC disagrees with the comments. Because this rule is performance based, the NRC is allowing applicants and licensees to determine which facilities are "nearby" and which hazards may "adversely impact" the implementation of the emergency plan, as those terms are used in 10 CFR 50.160(b)(2). Some of the comments concern terms used in the proposed rule *Federal Register* notice (FRN) to describe the plume exposure pathway EPZ size determination analysis. In response to other comments on the proposed rule (see the NRC Response to Comment D-2.1), the NRC removed the ~~phrase~~ word "~~spectrum of~~ credible

~~accidents~~" from the plume exposure pathway EPZ size determination analysis rule text in 10 CFR 50.33(g)(2) and, as a result, removed "less severe," "less probable," and "more severe" from the final rule SOC.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment C-1.2: One commenter suggested removing the hazard analysis or clarifying its intended scope and relationship to other requirements. Specifically, the commenter wrote that the hazard analysis is redundant to the requirements in 10 CFR 100.20(b) and associated application requirements such as 10 CFR 52.79(a)(1)(iv), which already require a hazard analysis and ensure that the risk from hazards is low. Additionally, the commenter wrote that the requirement suggests a hazard might arise at a nearby facility simultaneously with a licensee's need to implement emergency plans, which is an unlikely scenario. Additionally, the commenter wrote that examples for the hazard analysis offered in the proposed rule, specifically "notifying contiguous or nearby facilities regarding emergencies" and "providing for protective actions for the other facility's personnel," are not relevant to a hazard analysis requirement. Finally, the commenter wrote that any credible hazard should inform the plume exposure pathway EPZ size determination and emergency planning as a credible accident scenario. As a result, it is unclear why an additional hazard analysis is required. The commenter wrote that if the NRC does retain the hazard analysis requirement, then it should be clearly explained in relation to other regulatory requirements and guidance. (NSA-20, NSA-21, NSA-22, NSA-25)

NRC Response*:* The NRC disagrees with the comments. The intended scope of this rule's hazard analysis is to assess those hazards presented by a facility that is on the same site as, contiguous to, or near the applicant's or licensee's facility that could adversely impact the implementation of the applicant's or licensee's emergency plan and, therefore, require additional EP considerations relative to an independently sited facility. For example, a nuclear power facility could be sited contiguous to or near an industrial facility to supply process heat or electrical power, or an SMR could be used to power a desalination facility located on the same site. The hazards of the non-NRC-licensed facility must be factored into the EP program of the nuclear facility to provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at the nuclear facility. These hazards may not be included in the hazard analyses described in 10 CFR 100.20(b) or the application requirements in 10 CFR 52.79(a)(1)(iv).

The NRC disagrees that a hazard arising at a nearby facility simultaneously with a licensee's need to implement its emergency plan is too unlikely a scenario to be considered "credible." Events such as external hazards or natural phenomena that could affect both facilities and other case-by-case events would need to be included in the hazard analysis.

The NRC disagrees that any credible hazard should inform the plume exposure pathway EPZ size determination and emergency planning as a credible accident scenario. A "credible hazard" is not necessarily a "credible accident scenario." The accidents used to determine plume exposure pathway EPZ size are accidents at the facility. Although a hazard analysis considers hazards from the nuclear unit, the hazard analysis primarily focuses on the hazards presented by other nonnuclear, nonlicensed facilities. The hazard analysis is used to help develop planning activities or emergency response functions to address any credible hazard that would adversely impact the implementation of emergency plans.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment C-1.3: One commenter wrote that it is understood that a hazard analysis would be conducted during the siting review and asked if it is intended that EALs include the potential for nearby hazards to create an emergency. The commenter suggested the requirement be "remanded to the appropriate licensing requirements" and be included in EAL considerations but not necessarily an emergency planning effort. Another commenter wrote that the hazard analysis should be conducted before allowing the facility to proceed with proposed emergency plans. The commenter added that it should include hazards such as floodplains, proximity to coastline, fault lines, and seasonal weather patterns due to the concentration of cities and manufacturing near coastal areas. (RSX-7, CI-4)

NRC Response*:* The NRC agrees, in part, with the comments. Although a hazard analysis is conducted under 10 CFR Part 100, "Reactor site criteria," for the siting of a nuclear power reactor, that siting hazard analysis is not the same as the hazard analysis required by 10 CFR 50.160(b)(2). The hazard analysis performed for this rule evaluates hazards that have the potential to negatively impact the implementation of the emergency plan and not those hazards that could create an emergency. The NRC agrees that EALs include the potential for nearby hazards to create an emergency; however, the EALs may not be specific to the identified nearby hazard. For example, flooding from a dam failure could be a nearby hazard but flooding from a dam failure may not be the only potential source of flooding. A break in a cooling water system pipe could also be a source of flooding. Therefore, the licensee may have a generic flooding EAL instead of a specific dam failure EAL.

The NRC disagrees that the hazard analysis should be conducted before a facility proceeds with proposed emergency plans. The hazard analysis is part of the emergency plan and likely would need to be performed before the completion of the emergency plan. Nevertheless, the NRC does not require the order in which an applicant or licensee creates the content of its application. The NRC disagrees that the hazard analysis required by 10 CFR 50.160(b)(2) should include hazards such as floodplains, proximity to coastline, fault lines, and seasonal weather patterns due to the concentration of cities and manufacturing near coastal areas. These types of hazards would be evaluated in the siting hazard analysis or environmental impact assessment.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment C-1.4: Two commenters suggested that the proposed rule should require a hazard analysis and emergency planning for multiple-unit or mixed facilities. Both commenters cited the Fukushima incident as an event where a natural disaster compromised more than one reactor. One commenter noted that SMRs are often sited in close proximity to each other and responding to an incident at one reactor is vastly different from responding to multiple events at several reactors. Another commenter stated that multimodule planning is necessary despite design and safety justifications for individual modules. (NJDEP-9, UCSJT-5)

NRC Response*:* The NRC agrees with the comments. The hazard analysis required by 10 CFR 50.160(b)(2) includes any credible hazard that would adversely impact the implementation of the emergency plan. As explained in RG 1.242, the analysis should include the site-specific hazards posed by multimodular and nuclear units and nearby, adjacent, or contiguous facilities that could complicate the licensee's emergency response. Further, each module source term must be part of the aggregate considered in the dose consequence analysis for determining the spectrum of accidents for the entire facility as part of the EPZ sizing determination.

Accordingly, the NRC did not change the rule language in response to these comments.

NRC Question: To what extent should this analysis be harmonized with or rely upon the analysis conducted under 10 CFR 100.20, "Factors to be considered when evaluating sites," for man-related hazards?

Comment C-2.1: Several commenters recommended that the regulations under 10 CFR Part 100 should apply to SMRs and ONTs. One commenter suggested that an applicant should be able to rely on and reference the requirements under 10 CFR 100.20 and 10 CFR 100.21, "Non-seismic site criteria," to meet the proposed rule's hazard analysis requirements. The commenter also wrote that the NRC should also be aware that the draft guidance under development for the currently in-progress rulemaking on Alternative Physical Security Requirements for Advanced Reactors will likely include a hazard analysis focused on assessing impacts to security-related design features. (NJDEP-20, NJDEP-21, NEIA-10, CRCPD-20, CRCPD-21, IDPH-11 IDPH-12)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that 10 CFR Part 100 should apply to SMRs and ONTs within the scope of this rule, and it already does apply to them. Part 100 applies to power and testing reactors, as those terms are defined in 10 CFR 100.3, licensed under 10 CFR Part 50 or 10 CFR Part 52.

The NRC disagrees that an SMR or ONT applicant should be able to rely on and reference the analysis required under 10 CFR Part 100 to meet the hazard analysis requirement in 10 CFR 50.160(b)(2). The 10 CFR Part 100 analysis evaluates the effects of certain external hazards on the design, operation, and engineering of the site and facility, whereas the hazard analysis under 10 CFR 50.160(b)(2) would assess the effects of certain hazards on the implementation of the applicant's emergency plan. Although the two analyses may use some of the same inputs, they serve different purposes. Therefore, it is unlikely that an SMR or ONT applicant could rely on or reference the analysis required under 10 CFR Part 100 to meet the hazard analysis requirement in 10 CFR 50.160(b)(2).

Although the Alternative Physical Security Requirements for Advanced Reactors rulemaking (Docket Number NRC-2017-0227, RIN 3150-AK19) may involve a hazard analysis that assesses the impacts on security-related design features, it probably would not be a hazard analysis like the one in 10 CFR 50.160(b)(2). The hazard analyses in the two rulemakings will apply to different licensee programs (physical security and EP) and likely focus on different types of hazards.

Accordingly, the NRC did not change the rule language in response to these comments.

NRC Question: What kinds of facilities might be located contiguous or nearby to SMRs or ONTs?

Comment C-3.1: One commenter expressed support for the hazard analysis requirements and urged that the hazard analysis include consideration of Tribal customs in any planned or actual land use to alleviate potential cultural and religious risks or perceptions. (SBT-22)

NRC Response*:* The NRC agrees, in part, with the comment. Facilities contiguous to or near an SMR or ONT could have hazards with the potential to adversely impact the emergency planning, and the implementation of those plans, not only of the SMR or ONT but also State, local, and Tribal governments located near the SMR or ONT. For this reason, the NRC is

requiring an applicant or licensee to include in its application a hazard analysis under 10 CFR 50.160(b)(2). However, this hazard analysis would not consider land use as suggested by the comment. The analysis would focus on potential hazards that could adversely impact the implementation of emergency plans at the SMR or ONT facility. Land use issues are addressed by the NRC through the National Environmental Policy Act (NEPA) process during licensing reviews.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment C-3.2: One commenter supplied several online sources describing applications that could involve a nearby or contiguous facility, including the International Atomic Energy Agency (IAEA) Web page, information on nonelectric applications, a World Nuclear Organization Web page, and information on Nuclear Process Heat for Industry. (NEIA-11)

NRC Response*:* The NRC reviewed the information provided in response to this Specific Request for Comment. The Web sites described some facilities that could be located on the same site as or near an SMR or ONT and were not mentioned in the proposed rule FRN. However, any hazards presented by these nonnuclear facilities would be evaluated by the hazard analysis required by the rule.

Accordingly, the NRC did not change the rule language in response to this comment.

NRC Question: Should the NRC change the scope of the hazard analysis? If so, how should the scope of the hazard analysis change?

Comment C-4.1: Two commenters indicated that the NRC should not change the scope of the hazard analysis. (NJDEP-22, CRCPD-22)

NRC Response*:* The NRC agrees with the comments. The scope of the hazard analysis in the proposed rule would be sufficient to evaluate the potential adverse impacts on a licensee's implementation of its emergency plan from hazards presented by facilities located on the same site as, contiguous to, or near the SMR or ONT.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment C-4.2: One commenter indicated that the scope of the hazard analysis should be expanded to support a native dietary and ethnographic study of wildlife and plants consumed in Native American diets or tied to religious ceremonies. In addition, the commenter wrote that the proposed rule should include site-specific hazards, associated or not associated with nonnuclear facilities, that require expansion of existing emergency plans. Finally, the commenter urged enhancement of the notification process to Federally recognized Tribes that may be located within or near the plume exposure pathway EPZ or IPZ. (SBT-23, SBT-24)

NRC Response*:* The NRC disagrees with the comments. The NRC disagrees that the scope of the hazard analysis should be expanded. Analysis of the potential effects of a reactor site on the environment such as native dietary and ethnographic study of wildlife and plants consumed in Native American diets or tied to religious ceremonies is performed under 10 CFR Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions," and is outside the scope of this rulemaking.

The NRC disagrees that the notification process to Federally recognized Tribes located within or near the plume exposure pathway EPZ or IPZ should be enhanced. Under 10 CFR 50.160(b)(1)(iv)(B)(*1*), the emergency plan must include the contacts and arrangements made and documented by the applicant or licensee with local, State, Tribal, and Federal governmental agencies, as applicable, with responsibilities for coping with emergencies. Under 10 CFR 50.160(b)(1)(iv)(B)(*2*), the emergency plan must describe the means by which the licensee would notify these organizations in the event of an emergency. Therefore, if a Federally recognized Tribe has a responsibility for coping with emergencies within the scope of the applicant's or licensee's emergency plan, then the licensee would notify that Tribe as applicable to the Tribe's responsibilities during a given emergency. The regulations do not place a limit on the distance from the licensee's site for providers of resources identified as being needed in an applicant's or licensee's emergency plan.

The comment that the rule should include site-specific hazards, associated or not associated with nonnuclear facilities, that require expansion of existing emergency plans is outside the scope of this rulemaking because this rulemaking does not propose any changes to existing emergency plans. However, under the requirements of 10 CFR 50.54(q) and 10 CFR 50.160, licensees complying with 10 CFR 50.160 are required to maintain the effectiveness of their emergency plans, which includes updating a hazard analysis, as necessary.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment C-4.3: One commenter suggested flexibility in determining which hazards should be assessed as part of the licensing process, specifically for hazards that may not be immediately present. The commenter offered the example of a facility able to accommodate six modules but initially licensed with just two modules, writing that the applicant should be able to conduct a hazard analysis referencing only two modules and update it later as other units are added. The commenter also offered the example of a dual-purpose facility initially licensed with only one form of production. (NEIA-12)

NRC Response*:* The NRC agrees, in part, with the comment. The NRC issues individual licenses for reactors, notwithstanding the reactors' configurations. For example, an applicant that submits one application for three reactor licenses—to be constructed modularly or on contiguous sites—will result in three separate docket numbers, three separate license numbers (if all three are issued licenses), etc. The hazard analysis for that application could consider future reactors on, contiguous to, or near that site, but a future license application would still need a hazard analysis specific for that application. So, if a licensee holds licenses for three modules and wants to add another reactor at the site, then that licensee would need to submit a license application for the additional reactor and that additional application would be required to include a hazard analysis applicable to that proposed reactor. In addition, the licensee would need to update its hazard analyses for the existing three reactors to reflect the fourth reactor as required under 10 CFR 50.160(b)(1)(i) and 10 CFR 50.54(q)(2)(ii). These provisions require a licensee to maintain the effectiveness of its emergency plan. Similarly, if a nonnuclear facility is added to a reactor site or a contiguous or nearby site after the NRC licenses the reactor, then the licensee would need to update its hazard analysis as required under 10 CFR 50.160(b)(1)(i) and 10 CFR 50.54(q)(2)(ii).

Accordingly, the NRC did not change the rule language in response to this comment.

Comment C-4.4: To adjust the scope of the hazard analysis, one commenter suggested clarifying the definitions of "nearby" and "credible" hazards, which could be subjective. (HF-6)

***NRC Response**:* The NRC disagrees with the comment. Because this rule is performance based, the NRC is allowing applicants and licensees to determine which facilities are "nearby" and which hazards are "credible." The NRC will review the applicant's or licensee's use of those terms when the NRC reviews the applicant's or licensee's emergency plan and whether the hazards would adversely impact the implementation of the emergency plan.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment C-4.5: One commenter urged the NRC to consider "unknowns and uncertainties" in developing guidelines for SMRs and ONTs given their limited operational history. The commenter suggested expanding the hazard analysis to include "low-probability events, security considerations, combined emergency scenarios, and other beyond-design-basis events." (UCSJT-4)

***NRC Response**:* The NRC agrees, in part, with the comment. Low-probability events, combined emergency scenarios, and other beyond-design-basis events can include different types of hazards and events. Certain categories of low-probability events, combined emergency scenarios, and other beyond-design-basis events would be included in the case-by-case determinations of a hazard analysis, and other types of these events would be part of the analysis used to determine the size of the plume exposure pathway EPZ. These are two different types of analyses with different purposes. ~~However, security considerations are not within the scope of this rule.~~ For the purposes of this final rule, the spectrum of accidents used to develop the basis for emergency planning includes the entire collection of event sequences considered in the design and licensing basis of the facility, including those related to security.

Accordingly, the NRC provided additional clarification in the SOC~~did not change the rule language in response to these comments~~.

D. Scalable Approach for Determining the Plume Exposure Pathway Emergency Planning Zone Size—10 CFR 50.160(b)(3)

General Comments on the Scalable Approach for Determining the Plume Exposure Pathway Emergency Planning Zone Size

Comment D-1.1: Several commenters, including a form letter campaign, expressed support for a risk-informed, performance-based, and consequence-oriented approach to plume exposure pathway EPZs that reflects the advanced safety features and reduced source terms of SMRs and ONTs. Several commenters wrote that the proposed rule would introduce plume exposure pathway EPZ size requirements that would be commensurate with the risk posed by SMR technology. Several commenters wrote that the proposed rule would still retain a high level of EP protection to the public. A couple of commenters wrote that appropriate regulations for advanced technologies would have a positive impact on the development of clean energy and climate change. One commenter wrote that linking a specific plume exposure pathway EPZ size to power reactor levels, as called for by some commenters, is an arbitrary and deterministic framework. A form letter campaign contended that the NRC has decades of experience regulating hundreds of small-scale reactors with no serious release to date and therefore is well suited to regulate SMRs and other advanced reactors. One commenter highlighted progress toward the Tennessee Valley Authority Clinch River early site permit (ESP), which includes plume exposure pathway EPZ sizing in alignment with the proposed rule. One commenter

suggested that the NRC study modeling failure and size the EP plan appropriately. (AMX-1, DOE1-1, DOE1-5, JH-3, GHX-2, BGX-1, AS-1, CMXA-1, NIA-1, NIA-2, CLA-2, NM1-1, NM1-2, NM2-2, NM1-3, NNSA2-1, FL2-3)

***NRC Response**:* The NRC agrees, in part, with the comments. The performance-based, technology-inclusive, risk-informed, and consequence-oriented approach to EP requirements for SMRs and ONTs are commensurate with the potential consequences to public health and safety posed by these facilities. However, the NRC did consider power level along with other factors such as accident source term, fission product release, and associated dose characteristics. The credits for smaller sized reactors are framed in the potential benefits associated with postulated accidents, including slower transient response times, and relatively small and slow release of fission products.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.2: Several commenters supported a scalable plume exposure pathway EPZ size for SMRs and ONTs to expand the country's nuclear energy capabilities and reduce the use of combustible energy sources. Several commenters stated that SMRs and advanced nuclear technologies should not be overregulated and emphasized the need for scalable plume exposure pathway EPZ requirements to increase adoption of nuclear energy. Several commenters also related this to the role of nuclear energy in combatting climate change. One commenter said that all emergency planning activities should be informed by what is necessary to meet the consistent and objective public exposure limit and that a reduced potential source term should be considered in all plans, which could be addressed by having smaller plume exposure pathway EPZ sizes and response plans. Another commenter said that the proposed rule will reduce unnecessary public and private costs associated with "larger-than-necessary EPZs" and reduce costs for other Federal, State, and local agencies. Finally, one commenter suggested that the proposed rule would have a positive impact on the economic viability, commercialization, and deployment of the new advanced nuclear plants. (AE-1, AMX-2, JH-3, TS-2, TQ-1, TQ-3, GL-1, NR-3, NIA-3, NNSA2-8)

***NRC Response**:* The NRC agrees, in part, with the comments. Licensees' emergency plans under 10 CFR 50.160 will be informed by the source term and limits on the public's exposure to dose. Objectives for the final rule include provisions for reasonable assurance that adequate protective measures can and will be taken by an SMR or ONT licensee in the event of a radiological emergency at the facility and that the rule will promote regulatory stability, predictability, and clarity. However, the promotion of nuclear power, for any reason, is not one of the purposes of this rulemaking nor is it permissible under the NRC's statutory authority.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.3: Several commenters, including a form letter campaign, expressed opposition to what they described as the reduction or elimination of plume exposure pathway EPZ requirements for SMRs. Several commenters wrote that the proposal would be a significant risk to public health and safety. Several commenters, including a form letter campaign, stated that the proposed regulation would reverse over 40 years of emergency planning protections. One commenter suggested that the proposed changes have met opposition within the NRC and FEMA as well. One commenter wrote that the proposed requirements would put communities and the environment at risk in favor of "untested and hypothetical technologies." One commenter said that the proposed rule would allow licensees to essentially determine their own plume exposure pathway EPZ size and eliminate offsite emergency planning, while a form letter

campaign stated that the NRC is opening the door to any nuclear facility eliminating emergency planning based on a risk calculation. One commenter claimed that reducing the size of plume exposure pathway EPZs for SMRs and ONTs would not provide stability, predictability, and clarity; instead, that comes from the NRC's historic reliance on plume exposure pathway EPZs and offsite emergency plans. One commenter called the proposed approach arbitrary and not protective of public health and safety. One commenter asserted that the nuclear industry is not a safe form of energy production and never will be. The commenter stated that the NRC should require strong emergency planning for nuclear reactors. (KM-1, JL-3, JL-4, SL2-2, BRM-1, SRA-1, SRA-3, UW2-15, UW2-23, UW2-46, UW2-51, UW2-52, UW2-64, UCSJT-1, FL1-3, FL1-9)

***NRC Response**:* The NRC disagrees with the comments. The NRC is preparing for the evolving future of advanced nuclear power reactors, which includes the development of a graded approach to EP for SMRs and ONTs. While EP continues to evolve, the NRC's mission, values, and Principles of Good Regulation remain the grounding forces for the agency to ensure that the public's health and safety are maintained.

The NRC disagrees that the rule is a radical departure from current radiological EP requirements when using a scalable approach. First, the applicant or licensee has the option to use the current EP framework instead of 10 CFR 50.160. Second, the performance-based EP framework provides requirements for determining the size of the plume exposure pathway EPZ and describing ingestion response planning in the emergency plan, which would apply the same dose standard for predetermined, prompt protective measures to SMR or ONT facilities as is required of the current operating LLWR and non-power reactor facilities. The scalable methodology in the final rule is consistent with NUREG-0396/EPA 520/1-78-016, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plans," issued December 1978 (ADAMS Accession No. ML051390356), which is also the basis for the current EP requirements for operating LLWRs.

The rule's performance-based EP framework for SMR and ONT facilities under 10 CFR 50.33(g)(2) requires each applicant or licensee to justify to the NRC the technical basis for the applicant's or licensee's proposed plume exposure pathway EPZ size. The applicant's or licensee's justification analysis for the plume exposure pathway EPZ size must include an assessment of the likelihood of facility-specific accidents in association with public dose consequences. One of the requirements is that projected doses are within the 1-rem TEDE per 96-hour criterion, which must be used in the analysis for the determination of the plume exposure pathway EPZ area, with consideration of conditions such as demography, topography, land characteristics, access routes, and jurisdictional boundaries for an offsite plume exposure pathway EPZ.

The applicant or licensee must use a systematic assessment employing a method that is deterministic, mechanistic, or a combination of these methods in a risk-informed rather than risk-based approach to arrive at the required consideration of the likelihood of accidents. The NRC reviews the applicant's or licensee's assessment of licensing-basis events, event likelihood, and public dose consequences as part of the NRC's safety review of the license application, which the NRC expects to be the typical form of a request to use the EP framework of 10 CFR 50.160. The NRC's determination of the acceptability of the applicant's or licensee's assessment supports the separate review of the applicant's or licensee's emergency plans.

The NRC disagrees that the requirements of the rule would place communities and the environment at risk in favor of "untested and hypothetical technologies." The NRC has regulatory processes to address new technologies. As explained in the NRC Response to Comment A-2.2, under 10 CFR 50.43(e), the NRC requires the demonstration of the performance of safety features of new reactor designs before approving the designs.

The NRC maintains that the risks posed by SMRs and ONTs are consistently and commensurately lower in comparison with the well understood radiological risks associated with other reactors' operating power levels. These SMR and ONT designs are expected to demonstrate increased safety margins for the smaller source terms, thereby reducing the radiological risk to the public.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.4: Several commenters requested that the rule maintain the 10-mile plume exposure pathway EPZ boundary for SMRs and ONTs. Several commenters stated that this would best protect public safety, with one commenter writing that this would be an appropriate approach given that SMRs are still an unproven technology. (DBX-1, SSX-1, AN4-1, KK-1, UW2-58, UW2-60)

NRC Response*:* The NRC disagrees with the comments. The NRC has long permitted options besides a 10-mile plume exposure pathway EPZ for utilization facilities other than LLWRs because the radiological hazards to the public associated with these facilities' operations involve considerations different than those associated with LLWRs. Regulations under the current EP framework in 10 CFR 50.33(g) and 10 CFR 50.47(c)(2) provide that the size of plume exposure pathway EPZs for gas-cooled nuclear reactors and for reactors with an authorized power level less than 250 MW(t) may be determined on a case-by-case basis because of the lower potential hazard from these facilities (i.e., lower radionuclide inventory and longer times to release significant amounts of activity in many scenarios).

The NRC has licensed several small reactors with a reduced plume exposure pathway EPZ size of 5 miles (8 kilometers). These reactors include the Fort St. Vrain Nuclear Generating Station high-temperature gas-cooled reactor (842 MW(t)), the Big Rock Point boiling-water reactor (BWR) (240 MW(t)), and the La Crosse BWR (165 MW(t)). Additionally, Section I.3 of Appendix E to 10 CFR Part 50 states that the plume exposure pathway EPZs for facilities other than power reactors, such as RTRs, may also be determined on a case-by-case basis. Because of the very low potential hazard to the public, RTRs do not have a 10-mile plume exposure pathway EPZ.

The performance-based EP framework includes the determination of a scalable plume exposure pathway EPZ size instead of a fixed 10-mile plume exposure pathway EPZ size for all reactor technology designs. The scalability of the plume exposure pathway EPZ area is based on dose consequence criteria; accident likelihood and source term; timing of the accident sequence; meteorology; and the need for predetermined, prompt protective measures. An applicant or licensee must propose and justify a plume exposure pathway EPZ size as part of its emergency plan, and the NRC must approve the entire emergency plan before the licensee will be able to implement the emergency plan.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.5: Several commenters stated that the proposed plume exposure pathway EPZ size requirements as written would prevent FEMA from evaluating and assessing the adequacy of offsite emergency plans. Additionally, two commenters wrote that the proposed rule would allow facilities to eliminate emergency planning outside the site boundary with limited oversight from FEMA, endangering public safety and health. One commenter stated support for reducing the size of the plume exposure pathway EPZ for SMRs but found that a plume exposure pathway EPZ at the site boundary would hinder Federal oversight and FEMA's ability to "determine offsite reasonable assurance that the public health and safety are protected." One commenter said that in addition to a lack of oversight from FEMA, the proposed regulations do not clearly describe the process for establishing plume exposure pathway EPZs and would rely on the licensee to "provide an estimate of the source term, the full spectrum of credible accidents, and the hazard analysis." Finally, one commenter opposed the proposed scalable approach and suggested that FEMA, in addition to Federal, State, and local entities, must be involved in protective measures for EP. (FEMA-2, SRA-2, MDP-1, UCSJT-6, TKX-1, UW2-14)

NRC Response*:* The NRC disagrees with the comments. The risk-informed and consequence-oriented framework of 10 CFR 50.160 considers the potential consequences from a spectrum of accidents, including those that could result in an offsite radiological release and those that could not. The outcome is a graded approach to EP based on site-specific analyses. Part of this graded approach is a scalable plume exposure pathway EPZ size that is based on the NRC's review of an applicant's or licensee's site-specific analysis of the accident likelihood and source term, timing of the accident sequence, and meteorology. One potential result of this EP framework is a site boundary plume exposure pathway EPZ if the applicant's or licensee's analysis can support one.

Whether the NRC requires offsite radiological EP is based on the size of the plume exposure pathway EPZ. If the NRC finds acceptable a site-specific analysis supporting a site boundary plume exposure pathway EPZ, then the NRC will not require a formal offsite radiological emergency plan and FEMA evaluation of those plans. This approach is no different than the current one involving facilities such as RTRs. The NRC may find that the applicant's or licensee's analysis does not support a site boundary plume exposure pathway EPZ, thereby requiring offsite radiological EP. This is risk-informed decisionmaking.

The NRC is not saying that communities surrounding a nuclear facility with a site boundary plume exposure pathway EPZ could not have emergency response plans. Communities can still develop and maintain response capabilities, including radiological response capabilities, without an NRC requirement for an offsite plume exposure pathway EPZ. FEMA's CPG-101 provides guidance for developing offsite emergency plans and understanding risk-informed planning and preparedness. FEMA's CPG-201 provides communities with additional guidance for conducting a risk assessment and presents the basic steps of the process. Together, these two CPGs provide a risk-informed basis for the offsite planning effort, as well as encourage the engagement of the whole community to address risks that might impact a jurisdiction.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.6: One commenter wrote that emergency planning for SMRs and ONTs is necessary despite the low risk posed by nuclear reactors because minimal emergency planning may cause the public to over-evacuate, emergency planning offers defense-in-depth protection against unforeseen events, and the public demands some form of emergency planning. However, the commenter highlighted the Fukushima incident as an example of excessive action leading to unnecessary fatalities. The commenter also stated that authorities recommended

50-mile evacuations during the Fukushima incident due to concerns about spent fuel pools, but this was unwarranted given the nature of the limited risk posed by spent fuel pools. Accordingly, the commenter said that if SMR or ONT designs include a spent fuel pool, emergency plans should make it clear that plans developed for accidents involving the reactor core encompass accidents originating in the spent fuel pool. (MU-1, MU-10)

***NRC Response**:* The NRC disagrees with the comments. The decisions for evacuation and sheltering during an event are made and implemented by OROs, which include government officials. The NRC does not have the authority to mandate that the public take protective actions such as sheltering or evacuation during an event. However, the NRC requires its licensees to provide technical information and protective action recommendations to those government officials and OROs. The plume exposure pathway EPZ sizes are established for use in emergency planning to ensure that prompt and effective actions can be taken for public protection, whether on site or off site, as applicable. OROs are responsible for implementing appropriate protective actions such as sheltering or evacuation for beyond the site boundary plume exposure pathway EPZs, when necessary. Protective action implementation for a site boundary plume exposure pathway EPZ is the sole responsibility of the licensee. The proposal for plume exposure pathway EPZ size determination includes several factors, such as low dose consequence that considers accident likelihood and source term, timing of the accident sequence, and meteorology. Regarding the spent fuel pool comment, please refer to NRC Response to Comment D-1.12.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.7: One commenter stated that the rationale for smaller plume exposure pathway EPZs for SMRs is based on the assertion that SMRs have smaller source terms. However, the commenter said that this ignores the likelihood that multiple SMR modules would be grouped together in a single facility and would therefore not have a smaller source term. The commenter offered the example of NuScale's plans to build 12 50-megawatt (MW) reactors in a single chamber, which would be larger than many commercially operating nuclear reactors. Additionally, the commenter said that "small reactor modules produce more spent fuel than traditional reactors per unit of electricity," so "a dozen small modular reactors operating on various schedules would result in a significant amount of very hot spent fuel in the pool at any given time." The commenter stated that the NRC cannot ignore the cumulative size and impacts of these reactors. (SRA-12, SRA-13, SRA-14, SRA-15, SRA-16)

***NRC Response**:* The NRC disagrees with the comments. The final rule requires that applicants and licensees account for multiple reactors at a single SMR facility, as described in the NRC Response to Comment C-1.4. The final rule also requires that applicants and licensees consider all radionuclide sources, including spent fuel pools, as described in the NRC Response to Comment D-1.12.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.8: Two commenters noted that the NRC cites previous examples of small LWR and non-LWR applicants who requested exemptions from emergency planning requirements for a reduced plume exposure pathway EPZ. However, one commenter stated that in none of these examples did the NRC authorize a site boundary plume exposure pathway EPZ. One commenter highlighted that both NRC and FEMA regulations recognize the potential for smaller plume exposure pathway EPZ sizes on a case-by-case basis; however, the commenter is unaware of the NRC licensing any commercial facility with a site boundary plume exposure

pathway EPZ. The commenter stated that it does not support a 0-mile or site boundary plume exposure pathway EPZ due to the lack of offsite EP and stated that there are unique challenges accompanying a response to a radiological emergency at nuclear power facilities. Another commenter said that FEMA has previously expressed concern about a site boundary plume exposure pathway EPZ for commercial nuclear reactor facilities. As a result, the commenter suggested that the proposed methodology does not maintain the same level of protection as a 10-mile plume exposure pathway EPZ and that a methodology for plume exposure pathway EPZ sizing that accounts for nontechnical variables is more appropriate. (FEMA-8, FEMA-10, UWF2-2)

***NRC Response**:* The NRC agrees, in part, with the comments. The NRC agrees that it has not licensed a commercial nuclear power reactor facility with a plume exposure pathway EPZ area only at or within the facility's site boundary. The NRC disagrees that the EP program permitted under 10 CFR 50.160 would not provide the same level of protection as a 10-mile plume exposure pathway EPZ. Although the NRC allows for a scalable plume exposure pathway EPZ size under 10 CFR 50.33(g)(2), that approach does not guarantee that the plume exposure pathway EPZ will be less than 10 miles. More importantly, for any plume exposure pathway EPZ under 10 CFR 50.33(g)(2) and 10 CFR 50.160, the NRC applies to SMRs and ONTs the same dose standard for predetermined, prompt protective actions (e.g., evacuation, sheltering) as is required of the current operating LLWRs. As a result, the dose consequence to the public would be similar, and therefore, human health impacts would be similar. By maintaining this consistency, the regulations in 10 CFR 50.33(g)(2) and 10 CFR 50.160 afford the same level of protection of the public health and safety as the current regulatory framework does.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.9: One commenter stated that the proposed rule should consider the capabilities of Tribes near plume exposure pathway EPZs including personnel, resources, and budgets, and also consider how plume exposure pathway EPZs impact the ancestral lands of Tribes that have been relocated. Additionally, the commenter wrote that the NRC should develop a policy for site familiarization training to develop proactive relationships and coordination with Tribes if there is a need for an EP response. (NETWG-1, NETWG-2, NETWG-3)

***NRC Response**:* The NRC disagrees with the comments. For an applicant to receive a license, the NRC must first make a finding of reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. When applicable, the NRC makes this determination in consultation with FEMA, which includes a review of FEMA's determination of the adequacy of offsite EP. In the final rule, 10 CFR 50.33(g)(2)(i) and (ii) requires an applicant to submit the emergency response plans of State, local, and participating Tribal governmental entities in the United States that are wholly or partially within the plume exposure pathway EPZ. FEMA reviews these plans and makes a determination of reasonable assurance that adequate offsite protective measures can and will be taken in a radiological emergency. If FEMA's review of a given Tribe's emergency plan reveals a deficiency that prevents a finding of reasonable assurance (e.g., lack of dedicated personnel, lack of available resources), the applicant would need to determine how to address the deficiency noted in FEMA's evaluation of the Tribe's emergency plan. This process would include government-to-government consultation involving the Tribes, FEMA, and the NRC, as appropriate.

Regarding Tribes with ancestral ties to a plume exposure pathway EPZ, the NRC will engage in outreach and consultation with the Tribes on EP during individual licensing proceedings in accordance with the agency's Tribal Policy Statement and Tribal Protocol Manual.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.10: One commenter and a form letter campaign suggested that the plume exposure pathway EPZ size should be expanded rather than reduced and provided the Fukushima incident as an example. The form letter campaign stated that current emergency planning requirements under 10 CFR 50.33 have been proven to be inadequate in real-world situations. The commenters highlighted that the radiation exposure from the Fukushima disaster expanded beyond 10 miles, and the U.S. Government recommended that U.S. citizens within 50 miles evacuate. The commenters also explained that there are still restrictions on consumption of crops and food located more than 1,000 miles from Chernobyl. (GM-2, FL1-7)

NRC Response*:* The NRC disagrees with the comments. The NRC addressed similar comments and requests in a petition for rulemaking designated as PRM-50-104 (ADAMS Accession No. ML12048B004). The petitioner requested that the NRC amend its regulations to expand existing plume exposure pathway EPZs around nuclear power plants and create a new type of plume exposure pathway EPZ. The NRC denied the petition, concluding that the current size of the plume exposure pathway EPZs is appropriate for existing reactors and proposed new reactors and that emergency plans will provide an adequate level of protection of the public health and safety in the event of an accident at a nuclear power plant ("Emergency Planning Zones; Petition for rulemaking; denial" (79 FR 19501; April 9, 2014)).

In comparison with current operating reactors, SMR and ONT designs that must be approved by the NRC in a license application are expected to include technological advancements embedded in design features; safety enhancements in evolutionary and passive systems; smaller sized source terms that may provide potential benefits associated with postulated accidents, including slower transient response times; and relatively small and slow release of fission products. Such design features could provide for the EP planning necessary to reflect the lower potential radiological hazards associated with the operation of these facilities compared to LLWRs. Additionally, these features would become inputs to the site-specific analysis that would provide the basis for establishing plume exposure pathway EPZ sizes.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.11: Two commenters expressed concern over reducing plume exposure pathway EPZ sizes given the lack of operational history for SMRs. One commenter said that plume exposure pathway EPZs are designed to provide a defense-in-depth approach to low-probability and high-consequence events. The commenter wrote that as a result it would not be appropriate to reduce plume exposure pathway EPZ requirements given that the NRC has not approved any SMR designs and there is so little data on SMR technology. The other commenter asked if the European Union was already running this modular design with "reduced offsets"; the commenter expressed that it would be more comfortable with the proposed regulations if this was the case. If not, the commenter proposed that a reactor be built with the existing safety regulations and demonstrate safe operation for a few years before the NRC revises the regulations. (WSY-2, NJDEP-1)

NRC Response*:* The NRC disagrees with the comments. The NRC is not currently aware of an SMR or ONT facility licensed in the European Union under a performance-based EP

framework similar to the one in this rulemaking. The NRC disagrees that the absence of operational design data makes SMR and ONT designs unsafe because there are regulatory requirements for one-of-a-kind reactors to demonstrate that they can operate safely. As explained in the NRC Response to Comment A-2.2, 10 CFR 50.43(e) requires the demonstration of the performance of safety features of new reactor designs before approving the designs, and the NRC is maintaining its defense-in-depth philosophy with this rulemaking.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-1.12: One commenter said that the NRC is not considering accidents and radioactive releases associated with the storage of nuclear fuel in spent fuel pools. The commenter discussed concerns about the types of thin-walled canisters that hold irradiated fuel. The commenter cited Holtec cannisters and noted that both the NRC and Holtec have expressed concerns about the canister that was not designed for cracks to be found, repaired, maintained, or monitored to prevent radioactive leaks. (UW2-7)

NRC Response*:* The NRC disagrees with the comment. In the analysis for determining the spectrum of accidents to be used in support of the facility's emergency plan, the applicant or licensee must consider all radionuclide sources as explained in the NRC Response to Comment C-1.4. Depending on the design of the facility, this analysis could include a spent fuel pool. Comments concerning the design of spent fuel canisters are outside the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.13: One commenter supported the proposed approach, noting that current regulations are designed for LLWRs and do not address the advances in designs and safety offered by SMRs and ONTs. The commenter suggested that the current 10-mile plume exposure pathway EPZ standard is based on NUREG-0396, which "applied design, source term, risk, and consequence analyses information using available analytical tools that reflected the characteristics of large LWR technologies." The commenter highlighted that SMR developers are incorporating advanced safety designs with inherent, passive safety features to "improve plant resistance to design-basis and beyond design-basis accidents [BDBAs] and to assure any potential offsite dose is minimized." As a result, the commenter wrote that the probability of a significant release of radioactive material is projected to be significantly lower compared to the probability for LLWRs, and the NRC's approach "relies on an analysis of projected offsite dose from a range of design-specific potential accidents with radiological releases to establish a pre-determined plume exposure pathway EPZ to inform protective actions." (DOE1-2)

NRC Response*:* The NRC agrees with the comment. The NRC agrees that certain existing regulations and guidance are focused on LLWRs and non-power reactors. The NRC also agrees that the alternative EP requirements and guidance recognize advances in design and technological advancements embedded in design features, credit safety enhancements in evolutionary and passive systems, and credit the potential benefits of smaller sized reactors and non-LWRs associated with postulated accidents, including slower transient response times, and relatively small and slow release of fission products.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.14: One commenter asked if an LLWR with a 10-mile plume exposure pathway EPZ could use the exemption request process to replace plume exposure pathway EPZ requirements under 10 CFR 50.47, "Emergency plans," with the requirements under 10 CFR 50.160 if the facility is located adjacent to an SMR with a 10-mile plume exposure pathway EPZ. The commenter stated that this assumes that an LLWR and SMR have the same offsite radiological risks which justifies a 10-mile plume exposure pathway EPZ. The commenter requested that the answer be based on a purely technical comparison between the LLWR and the SMR, "rather than merely citing the definition and exclusion of LLWRs in the proposed 50.160 licensing rule." (BM-13)

NRC Response*:* An existing LLWR could not use the exemption process under 10 CFR 50.12, "Specific exemptions," to transition to the EP requirements under 10 CFR 50.160. Large LWRs were not included in the scope of this rule, not because of the potential radiological consequence posed by a LLWR, but because an EP licensing framework already exists for LLWRs and current LLWR licensees have not expressed an interest in changing the current framework. Comments concerning a performance-based, consequence-oriented approach to EP for entities besides SMRs and ONTs are addressed in the NRC responses to comments in Section H of this document.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.15: One commenter stated that the proposed rule would turn over responsibility for establishing plume exposure pathway EPZs to nuclear facilities themselves and suggested that the NRC is "opting out" of its responsibility to protect public health and safety. (RR-1)

NRC Response*:* The NRC disagrees with the comment. The AEA authorizes the NRC to license and regulate the Nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety and to promote the common defense and security and to protect the environment. This rule implements the agency's authority. The performance-based regimen provides the NRC with enhanced oversight of the competencies important to the protection of public health and safety. The performance-based framework, inspection and enforcement program, and design-specific review process provide reasonable assurance that protective actions can and will be taken in the event of an emergency. Regarding the plume exposure pathway EPZ, 10 CFR 50.33(g)(2) requires an applicant to perform an analysis to justify its proposed plume exposure pathway EPZ size for the facility. The NRC must approve the applicant's proposal. Additionally, the NRC determines if the final safety report in the application contains the safety and risk analyses of dose consequence assessments of the spectrum of accidents necessary to meet EP requirements.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.16: One commenter expressed concern for the accuracy of plume exposure pathway EPZ models, arguing that they constitute educated guesses on the likelihood of future events and cannot consider the impacts of risk associated with cultural or religious values. Additionally, the commenter said that models rely on assumptions and past data and cannot necessarily predict how people will react to an incident. The commenter suggested that the proposed plume exposure pathway EPZ approach could result in an EP response that is too narrow, focusing on modeled predictions rather than the area actually impacted by an incident. The commenter urged the NRC to "understand [their] concerns for the health and safety of [the] Tribal community" stating that "both the licensee and NRC have a regulatory and fiduciary

obligation to respond rapidly to a nuclear accident regardless of where the modeled plume exposure pathway EPZ is in comparison to the actual plume location." (SBT-7)

***NRC Response**:* The NRC agrees, in part, with the comment. The process to determine the area of a plume exposure pathway EPZ includes a dose consequence analysis using information from a site-specific analysis to provide the necessary information on postulated accident likelihood, source terms, timing of accident sequences, and meteorology. The applicant is also required to use dose assessment modeling predictions that are compared to the 1-rem TEDE over 96-hour acceptance criterion. The size and area of an offsite plume exposure pathway EPZ also consider local emergency response needs and capabilities as they are affected by such conditions as demography, topography, access routes, and jurisdictional boundaries. Therefore, the NRC disagrees that this rule could result in a narrow EP focus. To the extent that an applicant's proposed plume exposure pathway EPZ would encompass Tribal lands, the NRC would consult with the Tribe(s) during the licensing process to ensure consideration of Tribal concerns.

Appendix A to the guidance document accompanying this rule, RG 1.242, provides guidance on the consequence analyses that support the plume exposure pathway EPZ size determination, including consideration of uncertainty. In general, when implementing risk-informed decisionmaking, the NRC expects that appropriate consideration of uncertainty will be given in the analyses used to support the decision and in the interpretation of the findings of those analyses. To support decisions on whether the plume exposure pathway EPZ meets the regulatory requirements, the supporting assessment should clearly explain how uncertainties in factors such as accident likelihood, source terms, and meteorology would affect the result.

Regarding the response to a nuclear accident, a licensee is required to implement prompt protective measures within the site boundary, and OROs are responsible for implementing protective measures beyond the site boundary. This response would be based on actual site-specific data for the accident where a defense-in-depth dose savings posture would be taken to account for deviations from model predictions.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.17: One commenter stated that current EP regulations and guidance direct licensees to use design-basis accidents (DBAs) and other severe accidents to determine plume exposure pathway EPZ size, but the lower postulated offsite releases of advanced reactors has created the possibility for adversary actions that could result in larger offsite releases than those modeled for DBAs. (CC-1)

***NRC Response**:* The NRC disagrees with the comment. As part of the SAR, license applicants must include licensing-basis events in the required analysis to obtain the spectrum of accidents that are considered for the facility's emergency response plans. Emergency preparedness requires the knowledge of the potential dose consequences, accident timing, and radiological release characteristics that are derived from such a spectrum of accidents, which includes severe accidents. The description of the postulated accident scenarios for the facility results from the risk assessment analysis in determining the range of events including DBAs and potential severe accidents that are beyond design basis. For the purposes of this final rule, the spectrum of accidents used to develop the basis for emergency planning includes the entire collection of event sequences considered in the design and licensing basis of the facility, including those related to security.

~~In SECY-05-0010, "Recommended Enhancements of Emergency Preparedness and Response at Nuclear Power Plants in Post-9/11 Environment," dated January 10, 2005 (ADAMS Accession No. ML042720354), the NRC staff affirmed that a terrorist act cannot affect core physics and cause melt sequences to occur faster or create a larger source term than those previously analyzed and identified enhancements to improve the implementation of emergency plans in response to security events, many of which were added to the NRC's regulations and guidance in 2011 ("Enhancements to Emergency Preparedness Regulations; Final Rule" (76 FR 72560, 72600; November 23, 2011)).~~

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.18: One commenter suggested that the NRC include a new provision requiring that licensees define a long-term relocation planning zone where the intermediate protective action guide (PAG) of 2 rem in the first year would be exceeded following an incident. The commenter stated that such incidents are likely to result in substantial offsite areas that would exceed the criterion even if they would not cause early-phase PAG to be exceeded off site. The commenter stated that licensees should work together with Federal, Tribal, State, and local authorities to develop contingency plans that would ensure long-term relocations of the public within relevant zones. (UCS-15)

NRC Response*:* The NRC disagrees with the comment. The NRC does not have the authority to make public protective action decisions or develop regulations for defining a long-term relocation planning zone in association with the U.S. Environmental Protection Agency (EPA) PAG limits. State, local, and participating Tribal governments are responsible for ensuring timely and safe long-term relocations of the public within a plume exposure pathway EPZ that is beyond the licensee's site boundary. These organizations have the authority to make decisions concerning public health and safety.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.19: One commenter explained that emergency planning and plume exposure pathway EPZs are an "educational process" that involves the public and Federal, State, and Tribal governments and helps build working relationships. The commenter stated that the proposed rule would curtail or eliminate this process and said that the "needs of the reactor owners should not take [precedent] over the health and safety of local communities." (UW2-26)

NRC Response*:* The NRC disagrees with the comment. The final rule provides an alternative EP framework, including a scalable plume exposure pathway EPZ size. A scalable plume exposure pathway EPZ size will be a site-specific plume exposure pathway EPZ, which means the size of the plume exposure pathway EPZ will depend on factors unique to each SMR and ONT. Every applicant and licensee using 10 CFR 50.160 must provide a site-specific dose consequence analysis for NRC approval. Notwithstanding the size of the plume exposure pathway EPZ, the rule applies the same dose standard for predetermined, prompt protective actions to SMR or ONT facilities as is required of the current operating LLWR and non-power reactor facilities.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.20: One commenter suggested that the proposed plume exposure pathway EPZ requirements do not describe how conditions such as demography, topography, access routes, and jurisdictional boundaries will be assessed and considered, nor does it state how

"emergency response needs, capabilities, and conditions will be taken into consideration." (UW2-59)

***NRC Response**:* The NRC disagrees with the comment. The requirement cited in the comment is proposed 10 CFR 50.33(g)(2)(i)(B) and (ii), which would require the following for a plume exposure pathway EPZ that extends beyond the site boundary:

> [The] exact configuration of the plume exposure pathway EPZ surrounding the facility shall be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

The comment suggests that local emergency response needs and capabilities would be assessed separately from demography, topography, land characteristics, access routes, and jurisdictional boundaries. That interpretation is not the intent of this requirement. Instead, the final rule under 10 CFR 50.33(g)(2)(ii)(B) and (iii) requires the applicant or licensee to determine the configuration of the offsite plume exposure pathway EPZ by determining the impact of demography, topography, land characteristics, access routes, and jurisdictional boundaries on local emergency response needs and capabilities. For example, plume exposure pathway EPZ boundaries that run through the middle of schools or hospitals, or that arbitrarily carve out small portions of governmental jurisdictions, should be avoided.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-1.21: A form letter campaign stated that emergency planning is the very last line of defense to protect public health and safety, and recommended, citing the National Academy of Sciences' seventh review of the Biological Effects of Ionizing Radiation (BEIR VII), that there is no safe level of radiation exposure. (FL1-5)

***NRC Response**:* The NRC disagrees with the comment. The NRC licenses and regulates the Nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety, to promote the common defense and security, and to protect the environment. Insofar as emergency planning and preparedness requirements are concerned, nuclear facility licenses are issued only when the NRC makes a finding that the state of EP provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at the facility.

In SECY-05-0202, "Staff Review of the National Academies Study of the Health Risks from Exposure to Low Levels of Ionizing Radiation (BEIR VII)," dated October 29, 2005 (ADAMS Accession No. ML052640532), the NRC staff affirmed the following:

> The major conclusion is that current scientific evidence is consistent with the hypothesis that there is a linear, no-threshold dose response relationship between exposure to ionizing radiation and the development of cancer in humans. This conclusion is consistent with the system of radiological protection that the NRC uses to develop its regulations. Therefore, the NRC's regulations continue to be adequately protective of public health and safety and the environment. Consequently, none of the findings in the BEIR VII report warrant initiating any immediate change to NRC regulations or Federal Guidance.

Accordingly, the NRC did not change the rule language in response to this comment.

Definitions

Comment D-2.1: Several commenters requested that the NRC define the phrase, "spectrum of credible accidents." Two commenters stated that a vague definition would allow individual licensees to determine what credible accidents are, and one commenter suggested that licensees may "fudge their analyses" to ensure the plume exposure pathway EPZ remains at or close to the site boundary. One commenter also suggested this would lead to additional work for the NRC staff in negotiating with applicants and analyzing the proposed plume exposure pathway EPZ size. Another commenter said that without a clear definition of the phrase, "the whole basis of this proposed rule is weak and subject to interpretation and confusion in the future." One commenter wrote that the proposed approach for determining plume exposure pathway EPZ size is less prescriptive and technology-neutral but could benefit from a clearer description of what is considered a credible accident. One commenter suggested that the NRC develop a "solid technical basis…supported by robust independent peer review and extensive public engagement, before incorporating it into regulations." One commenter said that the definition should include numeric frequency thresholds and a listing of hazards to consider as well as guidance on which extreme external events are "credible."

One commenter wrote that the term is defined only in the proposed rule's SOC, and the rule implies that this definition is similar to one defined in the current EP planning basis, but "the definition in the SOC is not equivalent to the 'full spectrum of accidents' referred to in NUREG-0396 or the 'spectrum of radiological incidents' referred to in NUREG-0654, Revision 2," and therefore the comparison is not clear. Additionally, the commenter stated that the division between "less severe" and "more severe" BDBAs was "based on a distinction between basemat melt-through accidents, which would result in relatively small atmospheric releases, and accidents resulting in containment failure or bypass causing relatively large atmospheric releases," but that it is not clear if this distinction would relate to non-LWRs. (DBY-1, NSA-2, CRCPD-3, NNSA2-13, ANS-4, ANS-5, UCS-5, UCS-6, UCS-7, UCS-9)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC disagrees with the comments that this rule should provide a regulatory definition of "credible accident." The need to define credible accidents or the spectrum of credible accidents is out of the scope of this rule. An applicant that complies with 10 CFR 50.160 must submit for NRC approval the analysis used to establish the size of the plume exposure pathway EPZ as part of the license application, which the NRC expects to be the typical form of a request to use the EP framework of 10 CFR 50.160. The determination of licensing-basis events, including whether accidents are credible for the facility, is a part of the safety analysis for the facility. As part of the SAR required for the facility's license application, the applicant describes the postulated accident scenarios for the facility and also describes a summary of the probabilistic risk assessment (PRA) for a range of events, including potential severe accidents. The NRC reviews the applicant's assessment of licensing-basis events, event likelihood, and public dose consequences as part of the agency's safety review of the license application. The NRC's determination of the acceptability of the applicant's assessment supports the separate review of the applicant's emergency plan.

The NRC agrees with comments that there is need for clarification of the plume exposure pathway EPZ size determination requirements and has revised the text in the final rule to provide more detail. In lieu of providing regulatory definitions of "credible accident" or "spectrum of credible accidents," the NRC changed the rule text to clarify the requirement by listing the major considerations for the radiological consequence analysis to be used in determining the

appropriate plume exposure pathway EPZ size for the facility. Specifically, the NRC replaced the phrase "from the release of radioactive materials, resulting from a spectrum of credible accidents for the facility" with the phrase "from the release of radioactive materials resulting from a spectrum of accidents for the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology." To meet the requirements of this rule with respect to the analysis that aids in the determination of the plume exposure pathway EPZ, applicants may use the collection of accident scenarios and associated dose consequence assessment analyses as described in the SAR and information in the facility-specific PRA to provide the necessary information on accident likelihood, source terms, timing of accident sequences, and meteorology. Source terms are used to determine dose consequences. Timing of the accident sequence facilitates determining if prompt protective measures are warranted. Meteorology input is essential in determining the weather conditions that impact dose consequences due to atmospheric transport and dispersion of the radioactive plume.

In addition, the NRC added a second subpart to the regulatory text to clarify that the plume exposure pathway EPZ is also the area where "predetermined, prompt protective measures are necessary." This rule provision adds a functional criterion to the EPZ to be consistent with the planning basis approach in NUREG-0396 and Federal guidance contained in EPA-400/R-17/001, "PAG Manual—Protective Action Guides and Planning Guidance for Radiological Incidents" (2017 PAG Manual). The NRC provides more detail on the basis for this provision in the final rule SOC.

In DG-1350, Appendices A and B, the NRC provided additional details on developing the consequence analysis that aids in the determination of the facility's plume exposure pathway EPZ size. The NRC revised Appendix A to DG-1350 to add Section A-3.1, "Event Selection," in RG 1.242, which discusses the applicant's consideration of accident likelihood.

Accordingly, the NRC changed the rule and guidance in response to these comments.

Comment D-2.2: One commenter urged the NRC to require consideration of both credible and noncredible accidents in order to protect citizens from all potential hazards. The commenter stated that this is necessary because the NRC does not have design or operational histories for SMRs, non-LWRs, or other facilities to "make reliable determinations that certain accidents are credible and others are not-credible." (UW2-29, UW2-53)

NRC Response*:* The NRC disagrees with the comments. The primary objective of EP and planning is to provide reasonable assurance that adequate protective measures can and will be implemented should there be an accidental release of radioactive materials from a licensed facility. Preparation, planning, and implementation of the necessary predetermined, prompt protective measures in the emergency plan require understanding of the radiological release characteristics, potential consequences, and timing of accident sequence derived from a spectrum of accidents, including BDBAs.

In the final rule, 10 CFR 50.33(g)(2) requires that the applicant must submit, as part of its license application, an analysis that considers accident likelihood and source term, timing of the accident sequence, and meteorology to establish the plume exposure pathway EPZ size. The applicant may use event likelihood to determine whether to include postulated accidents in the spectrum of accidents, which are subsequently evaluated by the NRC to support the applicant's emergency plan submitted under 10 CFR 50.160. For example, facilities that use a maximum hypothetical accident should ensure that the estimated release is bounding for any event at the facility (see Chapter 13, "Accident Analyses," in NUREG-1537, Part 1, "Guidelines for Preparing

and Reviewing Applications for the Licensing of Non-Power Reactors," issued February 1996 (ADAMS Accession No. ML042430055)).

The applicant can provide analytical justification to the NRC showing that accidents that are likely not credible can be excluded from the spectrum of accidents used for EP and planning. A technical basis for the screening of any identified release scenarios from quantitative consideration (for example, based on low likelihood or very long accident progression times) would need to be provided. The Commission explained the following in the "Reactor Site Criteria Including Seismic and Earthquake Engineering Criteria for Nuclear Power Plants" final rule (61 FR 65157, 65177; December 11, 1996):

> It is worth noting that events having the very low likelihood of about 10^{-6} per reactor year or lower have been regarded in past licensing actions to be "incredible," and as such, have not been required to be incorporated into the design basis of the plant.

However, the size of the plume exposure pathway EPZ does not preclude the applicant from expanding its emergency response planning to include scenarios that could be noncredible, if they ever were to happen.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-2.3: One commenter stated that the proposed rule should also consider BDBAs in order to prepare for a radiological accident outside the site boundary. The commenter suggested that the post-September 11, 2001, threat environment includes BDBA threats from cyberterrorism, nation-state threats, and home-grown terrorism, which should be accounted for in EP preparations. The commenter criticized the use of an all-hazards approach and wrote that the Federal Government cannot be expected to provide the necessary support in a timely fashion without understanding the needs of local jurisdictions. The other commenter requested that "spectrum of credible accidents" include a "spectrum of sabotage attacks resulting in core melt and containment breach" when determining EP requirements and the plume exposure pathway EPZ size. (FEMA-11, UCS-10)

NRC Response*:* The NRC agrees, in part, with the comments. As part of the SAR, license applicants must include licensing-basis events in the required analysis to obtain the spectrum of accidents that are considered for the facility's emergency response plans. EP requires the knowledge of the potential dose consequences, accident timing, and radiological release characteristics that are derived from accidents evaluated as licensing basis events. The description of the postulated accident scenarios for the facility takes information from the risk assessment analysis in determining the range of events, including DBA and potential severe accidents that are beyond the design basis. See the NRC Response to Comment D-2.2 for more information on this topic. See the NRC Response to Comment D-1.17 regarding the consideration within the emergency planning basis of the potential consequences of terrorist events.

Accordingly, the NRC did not change the rule language in response to these comments.

Regulatory Criteria

Comment D-3.1: Several commenters proposed an alternative graded approach for determining plume exposure pathway EPZ sizes. One commenter provided a 2020 report from

Sandia National Laboratory that proposed five categories of plume exposure pathway EPZ sizes ranging from no plume exposure pathway EPZ if the projected dose is less than 1 rem at the site boundary to 10 miles if the projected dose is greater than or equal to 1 rem at 5 miles. One commenter cited previous variations in plume exposure pathway EPZ sizes for operating nuclear reactors to suggest that the NRC determine plume exposure pathway EPZ size by dividing the facility's size (MW(t)) by 100. The commenter explained that NUREG-1935, "State-of-the-Art Reactor Consequence Analyses Report," issued November 2012 (ADAMS Accession No. ML12332A057), demonstrates that a 10-mile plume exposure pathway EPZ is "overly conservative"; therefore, the approach would be sufficient and could be scaled if "future consequence analyses were to justify changes." One commenter recommended that SMR and ONT facilities following a case-by-case determination process have a plume exposure pathway EPZ of no less than 10 miles and an IPZ no less than 50 miles. The commenter also recommended that the NRC require licensees and applicants to demonstrate capabilities in coordination with Tribes in relation to the size of the plume exposure pathway EPZ.

One commenter suggested that SMRs and non-LWRs with a thermal output of less than 20 MW should be eligible for a 2-mile plume exposure pathway EPZ. Additionally, a plume exposure pathway EPZ smaller than 2 miles should be available to facilities as long as FEMA, the NRC, and local authorities all agree that the alternate plume exposure pathway EPZ would provide an adequate response in the case of an emergency. The commenter wrote that this methodology should include a plume exposure pathway EPZ sizing methodology that accounts for the possibility of accidents affecting more than one module, provides an appropriate IPZ, and maintains offsite drills every 2 years with the full suite of EP exercises every 8 years. One commenter recommended that the NRC consider developing alternative approaches to determining plume exposure pathway EPZ size than in the current proposal such as developing smaller plume and ingestion pathway EPZs applicable to all SMR and ONT facilities. The commenter wrote that this would acknowledge safety improvements in SMRs and provide a safety margin for unforeseen emergencies or issues, and this would allow the NRC to be more conservative due to a lack of operational history for SMR technologies and theoretical credible accident scenarios. (SBT-8, CLA-12, CRCPD-6, UCSJT-2, UWF1-1, UWJB-11)

***NRC Response**:* The NRC agrees, in part, with the comments. The NRC agrees with the comments suggesting a scalable approach to sizing plume exposure pathway EPZs. The proposed rule described the history behind the development of the scalable approach, including the options that existed, were considered or used in the past, and are currently available for determining the size of the plume exposure pathway EPZ. The NRC's scalable approach to sizing a licensee's plume exposure pathway EPZ is based on several factors as described in the NRC Response to Comment D-1.4. The NRC also agrees that the scalable approach should account for the possibility of accidents affecting more than one module, as described in the NRC Response to Comment D-1.7, and provide an appropriate IPZ. As described in the final rule SOC, the IPZ-related requirements of 10 CFR 50.160 would be appropriate for SMRs and ONTs.

The NRC disagrees that applicants and licensees should be required to demonstrate EP capabilities in coordination with Tribes to help determine the size of the plume exposure pathway EPZ. However, applicants and licensees are required to describe in their emergency plans the drill and exercise program that tests and implements major portions of planning, preparations, and the coordinated response by the onsite response organizations with the OROs within the plume exposure pathway EPZ, which would include Tribes that are identified in the emergency plan as having emergency response responsibilities. Identification of these Tribes would occur during the licensing of the facility, during which the NRC would follow its

Tribal Protocol Manual and Tribal Policy Statement to communicate with potentially affected Tribes.

The NRC disagrees with using fixed-sized EPZs to accommodate technology-inclusive SMR and ONT designs, and that the rule's scalability approach to plume exposure pathway EPZ sizing area is less conservative than what is currently required of LLWRs and non-power reactors. See the NRC Response to Comment D-1.8 for more information on this topic. Additionally, 10 CFR 50.33(g)(2)(ii)(B) and (iii) require that the exact configuration of the plume exposure pathway EPZ be determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

The NRC disagrees that the scalable plume exposure pathway EPZ size or variable-distance approach in the rule is purely risk based. The rule requires applicants to perform an analysis for NRC approval of the scalable plume exposure pathway EPZ size for the SMR or ONT facility. The analysis evaluates the expected public dose projected from the release of radioactive materials from the facility considering accident likelihood and other essential criteria, such as source term, timing of the accident sequence, and meteorology, against the criterion of 1-rem TEDE over 96 hours. The consideration of event sequences and their likelihood arrives at the spectrum of accidents needed for EP consideration using risk information accounting for all elements that define the plume exposure pathway EPZ size, instead of using risk-based values to determine such spectrum of accidents. Guidance is provided in RG 1.242 in support of risk-informed analyses for the radiological dose consequence assessment of the spectrum of accidents for plume exposure pathway EPZ size evaluation.

The NRC disagrees with plume exposure pathway EPZ scalability based solely on licensed reactor thermal power. The scalable approach in this rule to address plume exposure pathway EPZ size allows for the inclusion of new nuclear technologies. The design nature of some ONTs introduces source terms that are orders of magnitude smaller and with fuel enrichment potentially higher in comparison to current operating reactors, which would introduce different accounting of potential fission product releases impacting dose consequences as a function of different designs.

The NRC also disagrees that licensees should be required to maintain offsite drills every 2 years with the full suite of EP exercises every 8 years, as described in the NRC Response to Comment B-2.1.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-3.2: One commenter proposed establishing a 2-mile sheltering zone for SMRs and ONTs which would instruct the public to take shelter during an emergency prior to the release of any radioactive material. The commenter explained that this approach would provide defense-in-depth protection for unidentified accident sequences and would be an alternative to using PAGs to establish emergency planning requirements. The commenter also explained that an all sheltering area is "not particularly onerous" and would minimize the post-accident long-term sheltering problems that plagued Japan after Fukushima. Additionally, the commenter wrote that a 2-mile sheltering zone would bring the requirements for SMRs and ONTs in closer alignment with LLWRs. The commenter added that the 2-mile plume exposure pathway EPZ should be circular, rather than a keyhole design under current LLWR emergency plans, to account for shifts in wind conditions. The commenter suggested that the emergency response

beyond 2 miles downwind should be to shelter, and if the wind direction changes, then the latest group of people downwind should be alerted to shelter. (MU-15, MU-16, MU-17)

***NRC Response**:* The NRC disagrees with the comments. The plume exposure pathway EPZs are established for use in emergency planning to ensure that prompt and effective actions can be taken for public protection. The decisions for taking protective actions such as evacuation and sheltering beyond the site boundary during an event are made and implemented by OROs, which include government officials. The NRC does not have the authority to mandate the public to take protective actions such as sheltering or evacuation during an event. Therefore, the NRC cannot establish "sheltering zones." However, the NRC requires its licensees to provide OROs with technical information and protective action recommendations for public protection.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-3.3: Two commenters recommended that the plume exposure pathway EPZ requirements should take meteorological conditions into consideration. One commenter suggested that the NRC allow "normal diurnal variability in the wind direction during the 96-hour analysis period…to more accurately represent actual exposure risk to an individual at the site boundary," as the current methods assume a constant wind direction. The commenter explained that if these data are available, the NRC should develop "compass point-based sector exposure estimates" and an appendix to DG-1350 that discusses the impact of meteorological variability. The other commenter stated that meteorological conditions could create significant impacts outside the site boundary, plume exposure pathway EPZs, and IPZs. The commenter also indicated that the proposed rule does not consider the impacts of emergency responses, such as evacuations, outside these zones. (NEIA-37, UW2-39)

***NRC Response**:* The NRC agrees, in part, with the comments. Meteorological conditions must be considered in the dose consequence analysis for the determination of the plume exposure pathway EPZ size in the final rule. The proposed 10 CFR 50.33(g)(2) did not include meteorology among the factors to be considered in determining EPZ size because dose assessment analysis using software such as MELCOR Accident Consequence Code System (MACCS) accounts for meteorology when estimating the consequences of accidents. In addition, DG-1350 included meteorology among the inputs to a general methodology for determining plume exposure pathway EPZ size. However, in response to these and other comments, the NRC clarified 10 CFR 50.33(g)(2) in the final rule to state that the assessment of public dose resulting from the release of radioactive materials from the facility used to determine EPZ size must consider accident likelihood and source term, timing of the accident sequence, and meteorology.

Accordingly, the NRC revised the rule language in 10 CFR 50.33(g)(2) in response to these comments.

Comment D-3.4: One commenter stated that the primary factor that should be considered for plume exposure pathway EPZ size determination is the maximum potential source term. The commenter recommended that plume exposure pathway EPZ size and emergency response be based on potential public radiation exposures, and public exposure limits should be the same for both large reactors and SMRs. The commenter also said that other factors like "isotopic composition of the release" and environmental factors may impact plume exposure pathway EPZ size as well. (JH-1, JH-4)

***NRC Response**:* The NRC agrees, in part, with the comments. The isotopic composition and magnitude of source terms are elements in the analysis for determinizing an SMR or ONT facility's plume exposure pathway EPZ size. However, this analysis must also consider accident likelihood, timing of the accident sequence, meteorology, and the resulting spectrum of accidents. Additionally, the exact configuration of the plume exposure pathway EPZ is determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The objective of determining a facility-specific plume exposure pathway EPZ is to establish an EPZ appropriate for the facility so that the NRC has reasonable assurance that prompt protective measures can be taken to keep the public safe in the event of an accident. This objective serves a different purpose than the EPA PAGs, which are used in emergency response for recommending protective measures to provide public dose saving in the event of the release of radioactive materials from the facility.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-3.5: Two commenters asserted that the proposed rule inappropriately uses PAGs as the principal thresholds to determine if a plume exposure pathway EPZ is needed. One commenter stated that the PAGs are intended to help officials select protective actions under emergency conditions, "not to define the need for offsite preparedness" as they "do not establish an acceptable level of risk for normal, non-emergency conditions, nor do they represent the boundary between safe and unsafe conditions." One commenter also said that PAGs do not establish an acceptable level of risk for normal, nonemergency conditions, nor do they represent the boundary between safe and unsafe conditions. The commenter further asserted that a PAG is defined as the projected dose to an individual from a release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended. (FEMA-9, UWF1-3, UWF2-1)

***NRC Response**:* The NRC disagrees, in part, with the comments. The NRC agrees that the PAGs are intended to help officials select protective actions under emergency conditions; do not establish an acceptable level of risk for normal, nonemergency conditions, nor do they represent the boundary between safe and unsafe conditions; and are the approximate levels at which the associated protective actions are justified. The technical basis for the PAG values focuses on implementation of offsite protective actions to: (1) prevent acute effects, (2) balance protection with other important factors and ensure that actions result in more benefit than harm, and (3) reduce risk of chronic effects. (See 2017 PAG Manual, page 3.) The EPA PAG levels of 1 to 5 rem TEDE in the early phase of a radiological incident serve as the threshold for implementing protective actions such as evacuation or sheltering. Using the EPA PAGs to determine whether to take protective actions is the same for facilities complying with the EP framework in 10 CFR 50.160 as it is under the current EP framework for LLWRs.

However, the 2017 revision to the EPA PAG Manual states that "the size of the EPZ is based on the maximum distance at which a PAG might be exceeded…." (See 2017 PAG Manual, page 23.) The 2017 update refers to the 1992 EPA "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents" (1992 PAG Manual), Appendices B, C, and E, as the bases of its risk discussion. (See EPA-400/R-92/001, May 1992.) The 1992 PAG Manual states, "Since it will usually not be necessary to have offsite planning if PAGs cannot be exceeded offsite, EPZs need not be established for such cases." (See 1992 PAG Manual, page 2-3.) Thus, under the EPA's guidance, if an applicant or licensee can show that the maximum distance at which a PAG could be exceeded does not extend beyond a certain point (e.g., the site boundary, 2 miles from the site boundary), then no preplanned protective

measures would be needed beyond that point. If the PAG used is the early-phase PAG of 1–5 rem TEDE (specifically 1 rem, which represents the lowest dose at which preplanned protective measures should be considered), then such a framework would be a conservative approach to emergency planning. This conservative approach is part of the framework of this final rule.

Under 10 CFR 50.33(g)(2), every applicant must provide as part of its application the analysis used to establish the size of the plume exposure pathway EPZ. The 1-rem TEDE over 96 hours dose criterion is one factor in determining the plume exposure pathway EPZ size. The final rule requires applicants to submit an analysis that evaluates expected public dose projected from the release of radioactive materials from the facility considering accident likelihood and other essential criteria, such as source term, timing of the accident sequence, and meteorology, against the criterion of 1-rem TEDE over 96 hours. Additionally, the rule requires that the exact configuration of the offsite plume exposure pathway EPZ be determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-3.6: Three commenters recommended that the NRC use "a substantial reduction in early severe health effects" for severe BDBAs as a criterion for establishing plume exposure pathway EPZs. One commenter wrote that while it is unlikely that the 200-rem whole body dose requirement would be applied to SMRs and ONTs, its inclusion would support the basis that a reduced plume exposure pathway EPZ size can protect the public in similar ways to a 10-mile plume exposure pathway EPZ. Another commenter stated that NUREG-0396 also included a substantial reduction in early severe health effects for severe BDBA, and this criterion appears to form a primary basis for the 10-mile plume exposure pathway EPZ. The commenter also stated that if the "credible accidents" referred to in the proposed regulations include more than just "credible scenarios," then this second criterion must be used. The commenter also requested that the NRC "provide an explanation for not including the more severe Class 9 accident 200 rem whole body dose criteria in the methodology of Appendix A or add it to Appendix A." Another commenter added that the proposed rule does not appear to include this criterion for BDBAs. (DOE1-3, NSA-1, ANS-7, ANS-8)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that the 200-rem whole body dose value in NUREG-0396 (Figure I-11) was provided among "critical values for which emergency planners should be concerned" and as "the dose at which significant early injuries start to occur" (NUREG-0396, page I-37). This criterion for the development of the 10-mile plume exposure pathway EPZ evaluated accidents with the potential for large releases to the atmosphere. The analysis in NUREG-0396 showed that the conditional probability of exceeding a dose of 200-rem whole body at distances exceeding 10 miles is very low and decreases rapidly. This high dose to distance was calculated based on an LLWR core melt accident with release to the atmosphere from failure of the containment, assuming that no protective actions were taken and assuming a straight-line plume trajectory from the source to approximately 10 miles downwind.

In contrast, this final rule is not designed for LLWRs. Each applicant complying with 10 CFR 50.160 will have to provide a site-specific analysis based on the design of its facility. Unlike the evaluation in NUREG-0396, in which Class 9 accidents such as core melt were specifically defined for LWRs, the spectrum of accidents for a given applicant complying with 10 CFR 50.160 may not include a core melt, such as for a molten salt reactor, but would need to

consider accidents specific to the facility's technology and design. Some applicants with advanced light-water SMR designs could potentially include accident scenarios with large releases to the atmosphere similar to those in NUREG-0396. These applicants will use the final rule's 1-rem TEDE over 96 hours criterion for design-specific accidents selected considering accident likelihood and source term, timing of the accident sequence, and meteorology, for determining the size of the EPZ.

Using a 200-rem whole body dose criterion would be contrary to the approach of this final rule, in which margins of performance exist to avert immediate safety concerns. For these reasons, an applicant that meets the plume exposure pathway EPZ criteria established by 10 CFR 50.33(g)(2) would certainly meet a 200-rem whole body dose criterion for prevention of early health effects with large margin, making it unnecessary to establish such a high dose criterion in this rule. Similarly, the use of the 200-rem whole body dose criterion need not be included in RG 1.242.

Accordingly, the NRC did not change the rule language or guidance in response to these comments.

Comment D-3.7: One commenter stated that the current plume exposure pathway EPZ rules are not "technically sound" and that the technical basis for the current 10-mile plume exposure pathway EPZ is dated, vague, and was demonstrated by Fukushima to be insufficiently protective. The commenter recommended that the NRC determine plume exposure pathway EPZ size informed by "mechanistic source term information, assuming that sufficient safety margin will be provided to fully account for the large uncertainties associated with such analyses." The commenter described how both the NRC and the National Atmospheric Release Advisory Center (NARAC) found that dose rates following the Fukushima event were high enough to exceed the EPA PAG well beyond 10 miles. The NARAC found that "the thyroid dose to a 1-year-old child could have exceeded the 5 rem PAG for potassium iodide (KI) prophylaxis as far as 150 km (over 90 miles) from Fukushima." The commenter said that the NRC should not assume that a mechanistic source term evaluation, with full accounting for uncertainties to provide sufficient defense in depth, would result in smaller plume exposure pathway EPZs for SMRs and ONTs. (UCS-2, UCS-3)

NRC Response*:* The NRC disagrees with the comments. This rule includes alternatives—to use either the current EP framework or the option of a risk-informed, performance-based, and technology-inclusive EP approach for SMR and ONT designs. The option for the new performance-based EP framework contains a shift from the current and traditional deterministic approach the NRC used in the EP framework for LLWRs, and both alternatives can accommodate a wide range of reactor and ONT designs. However, this final rule does not include within its scope emergency planning, preparation, or response for LLWRs, which, under this final rule, are reactors that are licensed to produce greater than 1,000 MW(t). Therefore, the comments associated with the criterion and manner of offsite response that were implemented during the Fukushima accident for those LLWRs are outside the scope of this rulemaking. The NRC addressed similar comments and requests in a petition for rulemaking designated as PRM-50-104, as described in the NRC Response to Comment D-1.10.

The NRC is not assuming that mechanistic source term evaluation, with full accounting for uncertainties and providing sufficient defense in depth, would result in smaller plume exposure pathway EPZs for SMRs and ONTs. A plume exposure pathway EPZ for an SMR or ONT could extend 10 miles from the facility, end at the site boundary, or be some other size. The regulatory criteria in 10 CFR 50.33(g)(2) require a license applicant for an SMR or ONT facility

to submit an analysis for NRC approval for determining the plume exposure pathway EPZ size. This analysis, whether using a method that is mechanistic, deterministic, or a combination thereof, considers many factors, including the likelihood of accidents, public dose consequences, meteorology, and for offsite plume exposure pathway EPZs, demography, topography, land characteristics, access routes, and jurisdictional boundaries. The resultant plume exposure pathway EPZ and NRC-approved emergency plan provide the same level of EP for SMRs and ONTs as the current EP requirements for LLWRs.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-3.8: One commenter stated that NuScale's research and NRC documents show that NUREG-0396 used exposure durations much shorter than 96 hours for each dose type. The commenter recommended that the regulations clarify that exposure durations may not be consistent with NUREG-0396 and justify this difference. (NSA-6)

NRC Response*:* The NRC agrees, in part, with the comment. NUREG-0396 did consider exposure durations shorter than the 96 hours in the proposed rule, such as the 2-hour whole body dose for a loss-of-coolant accident (LOCA) in Figure I-8 on page I-32. However, Figure I-8 in the NUREG cannot be compared with 10 CFR 50.160 because the analysis behind Figure I-8 relies on several assumptions such as windspeed, distance, and atmospheric dispersion from 67 different nuclear power plants, whereas the analysis required by this final rule requires an applicant to provide an analysis for only its facility. As stated in NUREG-0396, "The results of the conservative licensing calculations for the DBA-LOCA vary from plant-to-plant because of plant design and variation in meteorology." Additionally, basing the plume exposure pathway EPZ size on an analysis that includes the lower end of the EPA early-phase PAG dose range of 1-rem TEDE, and a dose projection period of 96 hours from the time that the licensee would make the evaluation to support a protective action recommendation, provides assurance to OROs that the licensee's determination of the EPZ size encompasses the area where, in the unlikely event of a release, OROs may need to use the early-phase PAG to make protective action decisions.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-3.9: One commenter suggested that the rule include the EPA's recommendation that KI be administered when the thyroid dose to a 1-year-old child or other vulnerable populations is projected to exceed 5 rem. The commenter suggested that this recommendation be included as a separate criterion for determining plume exposure pathway EPZ size. (UCS-11)

NRC Response*:* The NRC disagrees with the comment. Although KI is a possible protective measure in the event of a radiological emergency at a nuclear power plant, the dose criterion for administration is not a decisive factor in determining plume exposure pathway EPZ size. The NRC and EPA in NUREG-0396 concluded that thyroid dose, other organ dose, and external whole body dose showed similar characteristics when evaluated over the same distances. Furthermore, the EPA 2017 PAG Manual states that the former thyroid range of 5 to 25 rem is well covered by projections of whole body dose at 1 to 5 rem. Because the final rule already requires consideration of whole body dose, the consideration of thyroid, or any organ dose, would not add value to the determination of EPZ size. Additionally, use of the child thyroid PAG would be problematic as it does not pertain to the whole population. The EPA has guidance on the recommended KI dose for certain thyroid exposures. For adults over 40 years, the thyroid exposure is at least 500 rem, which is equivalent to 20-rem whole body. So, 1-rem

whole body for EPZ size considerations bounds thyroid considerations for the population as a whole. Furthermore, the use of a thyroid PAG value in EPZ size determinations would be applicable only to accidents that have iodine-131 as a significant release characteristic.

In addition, the NRC does not require the use of KI. The use and dosage of KI by the public in the unlikely event of a severe nuclear reactor accident is the responsibility of OROs. Additional information on the use of KI and the U.S. Food and Drug Administration (FDA) guidelines, "Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies," are available at the NRC's public Web site at https://www.nrc.gov/about-nrc/emerg-preparedness/about-emerg-preparedness/potassium-iodide-use.html.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-3.10: One commenter recommended that the NRC should specify in the rule, not just guidance documents, the parameters that must be used in conducting radiological assessments to ensure "consistency, clarify, and sufficient level of conservatism with regard to source term composition, release, atmospheric dispersion, and deposition." Alternatively, the commenter stated that a safety factor could be applied to the criterion itself, such as a 0.1-rem value. (UCS-16)

NRC Response*:* The NRC disagrees with the comment. The final rule provides a technology-inclusive regulatory approach to EP that recognizes advances in new nuclear technologies that are embedded in design features, such as safety enhancements in evolutionary and passive systems available to respond to accidents. The range of these technological designs and features can vary widely in source term size and composition, fuel enrichment and type, chemical processes, and facility utilization and location. To allow for the variety of potential applicants, the performance-based requirements in 10 CFR 50.160 do not contain any technology-specific language, and applicants and licensees must demonstrate how the EP requirements are met based on their design- and site-specific considerations.

For determining EPZ size, 10 CFR 50.33(g)(2) requires applicants to include an analysis of a collection of accident scenarios and associated dose consequence assessments as described in the SAR to provide the necessary information on accident likelihood, source terms, timing of accident sequences and meteorology. Specifically, in the use of meteorological data, facility location and weather patterns must be considered separately for each facility, as is typically the case in codes such as MACCS, which uses those site-specific source terms, along with site-specific weather, to model atmospheric transport and dispersion of released radionuclides, public protective actions, exposures, and health effects to compute offsite dose consequences.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-3.11: One commenter recommended that the NRC publish a description of the process to review source term determination and hazard analysis that includes technical experts outside the NRC to evaluate the technical basis for EPZ determination. The commenter stated that, given that no operational history exists for SMRs and ONTs, the NRC should promulgate stringent review practices for EPZ determination. (UCSJT-7)

NRC Response*:* The NRC disagrees with the comment. As stated in Appendix B to RG 1.242, each applicant should develop potential source terms for the accident analyses for its facility. The NRC expects that the same methods that the applicant used in the safety analysis for the plant license application would also be used by the applicant in the dose analysis to support

EPZ size determination. The NRC review of accident source terms is part of the safety review for the license application under either 10 CFR Part 50 or 10 CFR Part 52 and is not specific to the analyses supporting 10 CFR 50.160. Similarly, the hazard analysis required by 10 CFR 50.160(b)(2) considers some of the potential hazards required to be evaluated by the siting requirements in 10 CFR 100.21(e). As with an applicant's source term determination, the NRC has the technical capability to assess these analyses. The NRC's NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," is an example of the type of guidance that the NRC uses in reviewing license applications. NUREG-0800 provides guidance on the acceptance criteria, technical rationale, review procedures, and evaluation findings used in each review.

Additionally, as explained in the NRC Response to Comment A-2.2, under 10 CFR 50.43(e), the NRC requires the demonstration of the performance of safety features of new reactor designs before approving the designs.

Accordingly, the NRC did not change the rule language in response to this comment.

NRC Question: Is the proposed 10-millisievert (mSv) (1-rem) criterion appropriate? Are there particular factors and technical considerations that need to be included in an EPZ size analysis?

Comment D-4.1: Several commenters expressed support for the 1-rem criterion. One commenter stated that it is "as strict as the dose thresholds used to establish the 10-mile plume exposure pathway EPZ for large water-cooled nuclear power plants in NUREG-0396," as well as conservative and consistent with EPA guidance. Another commenter suggested that the NRC also consider a criterion that "accounts for a substantial reduction in early severe health effects," highlighting the plume exposure pathway EPZ sizing methodology included in the Clinch River Nuclear Site ESP. (NNSA2-3, NEIA-13, HF-7)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC disagrees with the direct comparison of the 1-rem TEDE over 96 hours criterion in the rule with the EPA PAG lower limit dose thresholds that were used in NUREG-0396 to establish the 10-mile plume exposure pathway EPZ for LLWRs. As noted in the NRC Responses to Comments D-3.4 and D-3.5, the EPA PAGs are used by OROs to implement offsite protective actions, whereas the 1-rem TEDE over 96 hours criterion in the final rule is only one of the parameters that must be used to determine the size of the plume exposure pathway EPZ.

The NRC also disagrees with considering an additional plume exposure pathway EPZ sizing criterion for this final rule because the plume exposure pathway EPZ sizing methodology described in the NRC-approved Clinch River Nuclear Site ESP is based on the current deterministic EP framework, which used NUREG-0396 considerations of conditional probability of acute dose exceeding a 200-rem whole body dose at distances outside of the 10-mile plume exposure pathway EPZ from more severe accident scenarios. The alternative EP framework in this final rule does not allow for a plume exposure pathway EPZ area boundary in exceedance of 1-rem TEDE over 96 hours from the release of radioactive materials from the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-4.2: Two commenters opposed the use of 10-mSv TEDE over 96 hours as the criterion to establish the plume exposure pathway EPZ size. The two commenters explained that the regulations place too much emphasis on one criterion as there are far too many other assumptions in calculations used to model offsite dose projections. One commenter stated that smaller release doses below the 1-rem PAG still threaten the safety and health of the public, and that 1-rem TEDE over a period of 96 hours does not "adequately account for the unique aspects of a radiological incident." The commenter stated that the NRC must consider other factors including political considerations, environmental issues, and public trust. Additionally, variables such as the meteorological data, the dispersion model, the dosimetry model, and the source term selection, are left up to the licensees and applicants. The commenters said that while the NRC will review the licensees' and applicants' analyses, "there remains subjectivity in the review." (NJDEP-3, NJDEP-23, CRCPD-4, CRCPD-23)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that 1-rem TEDE over 96 hours should not be the sole requirement for plume exposure pathway EPZ size determinations. The NRC revised 10 CFR 50.33(g)(2) in the final rule to provide more details by replacing the phrase "from the release of radioactive materials, resulting from a spectrum of credible accidents for the facility" with the phrase "from the release of radioactive materials resulting from a spectrum of accidents for the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology," and added a second subpart to the regulatory text to clarify that the function of the plume exposure pathway EPZ is to designate the area where "predetermined, prompt protective measures are necessary." Moreover, for an offsite plume exposure pathway EPZ, 10 CFR 50.33(g)(2)(ii)(B) and (iii) in the final rule require the following:

> …the exact configuration of the plume exposure pathway EPZ be determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

Accordingly, the NRC changed the rule language in 10 CFR 50.33(g)(2) in response to these comments.

Comment D-4.3: Two commenters suggested additional considerations to include in the determination of plume exposure pathway EPZ size. One commenter discussed consideration of accident scenario frequency, the appropriate cutoff criteria to remove extremely rare events and sequences from the sizing analysis, and the timing of a radiological release and exceedance of 1-rem TEDE over 96 hours. The commenter explained that OROs would have already taken actions under all-hazards plans; therefore, releases occurring late in an accident sequence could be screened out. Another commenter asserted that using the 1-rem TEDE standard as the sole determination for plume exposure pathway EPZ does not adequately address anticipated ingestion pathway impacts and other offsite communication and coordination needed to address public concern with radiological releases. The commenter explained that emergency planning for all nuclear facilities should address offsite capabilities for critical specialized assets such as dose assessment and field survey and sampling to ensure maintenance of these specialized assets within the offsite jurisdictions. (NEIA-14, IDPH-4, IDPH-13, IDPH-14)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that 1-rem TEDE over 96 hours should not be the sole requirement for plume exposure pathway EPZ size determinations. The NRC revised 10 CFR 50.33(g)(2) in the final rule to provide more details by

replacing the phrase “from the release of radioactive materials, resulting from a spectrum of credible accidents for the facility” with the phrase “from the release of radioactive materials from the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology,” and added a second subpart to the regulatory text to clarify that the function of the plume exposure pathway EPZ is to designate the area where “predetermined, prompt protective measures are necessary.” Moreover, for an offsite plume exposure pathway EPZ, 10 CFR 50.33(g)(2)(ii)(B) and (iii) in the final rule require the following:

> …the exact configuration of the plume exposure pathway EPZ be determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

The NRC disagrees that emergency planning for all nuclear facilities should address ingestion pathway impacts and offsite capabilities. As explained in the NRC Response to Comment B-7.2, the final rule provides for a scalable plume exposure pathway EPZ size. If the NRC finds acceptable a site-specific analysis supporting a site boundary plume exposure pathway EPZ, then the NRC will not require a formal offsite radiological emergency plan. Communities can still develop and maintain radiological response capabilities without an NRC requirement for an offsite plume exposure pathway EPZ. Furthermore, for the reasons explained in the proposed rule SOC and the NRC Responses to Comments E-1.1 and E-2.1, the NRC is not requiring a formal ingestion pathway EPZ in the final rule.

The NRC disagrees with adding cutoff criteria to identify and remove extremely rare events and sequences from the EPZ sizing determination analysis. The information needed to support the EPZ sizing determination analysis, such as accident likelihood, source terms, timing of accident sequences and meteorology, is found in the safety analysis for the plant license application, which contains the applicable accident scenarios and associated dose consequence assessment analyses. As explained in the NRC Response to Comment D-3.11, the NRC expects that the same methods that the applicant used in its safety analysis for the license application would also be used by the applicant in the dose consequence analysis to support EPZ size determination. Thus, requirements on how applicants perform this analysis would be outside the scope of this rulemaking.

Nevertheless, the NRC revised the draft guidance supporting this rule to provide additional details on developing the consequence analysis that aids in the determination of the facility’s plume exposure pathway EPZ size. The NRC revised Appendix A to DG-1350 to add Section A-3.1, “Event Selection,” in RG 1.242 where consideration of accident likelihood is discussed to arrive at the spectrum of accidents used in 10 CFR 50.160. Additionally, applicants could use RG 1.233, “Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology To Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors,” issued June 2020 (ADAMS Accession No. ML20091L698). This RG endorses the methods in Nuclear Energy Institute (NEI) 18-04, Revision 1, “Risk-Informed Performance-Based Technology Inclusive Guidance for Non-Light Water Reactor Licensing Basis Development,” issued August 2019 (ADAMS Accession No. ML19241A472), which contains threshold values for event selection that could be used in determining the spectrum of accidents used for dose assessment.

Accordingly, the NRC changed the rule language in 10 CFR 50.33(g)(2) and the guidance in response to these comments.

NRC Question: If the analysis demonstrates that the EPZ is within the facility's site boundary, would the need for a dedicated, Federal-mandated offsite radiological EP program exist?

Comment D-5.1: Several commenters stated that facilities with a site boundary plume exposure pathway EPZ should have an offsite EP program. Three commenters stated that using the 1-rem TEDE dose criterion is too narrow, and offsite emergency planning should be required. One commenter said that the need for offsite EP is demonstrated through the need for ingestion pathway planning even when the 10-mSv (1rem) TEDE over 96 hours criterion does not require a plume exposure pathway EPZ. (NJDEP-24, CRCPD-24, IDPH-15)

NRC Response*:* The NRC agrees, in part, with the comments. As explained in the NRC Response to Comment D-4.2, the NRC changed the 1-rem TEDE dose criterion for determining the size of plume exposure pathway EPZs under 10 CFR 50.160 in the final rule. However, the NRC disagrees that it must require an offsite radiological EP program for facilities with a site boundary plume exposure pathway EPZ. As explained in the NRC Response to Comment B-7.2, the final rule provides for a scalable plume exposure pathway EPZ size. If the NRC finds acceptable a site-specific analysis supporting a site boundary plume exposure pathway EPZ, then, using a risk-informed decisionmaking process, the NRC will not require a formal offsite radiological emergency plan. Communities can still develop and maintain emergency response capabilities, including radiological emergency response, without an NRC requirement for an offsite plume exposure pathway EPZ. Regarding ingestion pathway planning, for the reasons explained in the NRC Responses to Comments E-1.1 and E-2.1, the NRC is not requiring formal ingestion pathway EPZ planning in the final rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-5.2: One commenter asserted that there is no technical basis for requiring an offsite radiological EP program if the plume exposure pathway EPZ is within the facility's site boundary. The commenter explained that the plume exposure pathway EPZ sizing requirements reflect the NRC's Principles of Good Regulation in that they are "based on the best available knowledge from research and operational experience." Further, the commenter stated that offsite planning will be accomplished through communication and cooperation between State and local governments and the facility owner, similar to planning for other industrial facilities using guidance developed by the U.S. Department of Homeland Security. (NEIA-16)

NRC Response*:* The NRC agrees, in part, with the comment. As explained in the NRC Response to Comment B-7.2, the final rule provides for a risk-informed decisionmaking process that produces a scalable plume exposure pathway EPZ size. If the NRC finds acceptable a site-specific analysis supporting a site boundary plume exposure pathway EPZ, then the NRC will not require a formal offsite radiological emergency plan. However, the NRC is not requiring facility licensees to be involved in offsite planning in these situations and cannot agree with the statement in the comment that offsite planning will be accomplished through communication and cooperation between State and local governments and the facility owner.

Accordingly, the NRC did not change the rule language in response to this comment.

Risk-Informed Approach

Comment D-6.1: Several commenters, including a form letter campaign, suggested that plume exposure pathway EPZ size considerations should not be based solely on risk probabilities and offered additional factors to consider. One commenter highlighted that NUREG-0396, developed by the NRC and EPA, indicates that radiological emergency planning should not be based on risk probabilities but perceptions of what could be done to protect public health and safety, and indicates that plume exposure pathway EPZ requirements should consider BDBAs and provide defense-in-depth protection. The commenter stated that the NRC and EPA recognized that, though extreme accidents were unlikely, nuclear accidents are unique, and the consequences require specialized planning considerations. The commenter stated that these considerations are ignored in the proposed rule, and instead, plume exposure pathway EPZ sizing is purely a quantitative, risk-based consideration. One commenter stated that the proposed approach could open the door to reactors of any size reducing emergency planning requirements based on a calculation of risk.

Another commenter said that to manage the risk from developing threats to commercial nuclear power plants, the proposed rule must consider the full threat spectrum and potential BDBAs. One commenter said that the plume exposure pathway EPZ size should consider defense in depth, human judgment, and certain communities that need to be protected.

One commenter stated that the NRC failed to ensure that the proposed regulations do not cause disproportionate impacts on communities of color or economically disadvantaged groups as it exempts applicants who are able to meet the proposed criteria from offsite emergency planning, and this puts the burden of protecting the public from potential accidents on the State, Tribal, and local governments. Additionally, the commenter said that the single dose-based criterion does not take into account disparities in health care that could make a significant difference for cancer survival rates and a range of other conditions resulting from cancer morbidity.

A form letter campaign highlighted that while SMRs are smaller than traditional LLWRs, most facilities are expected to group multiple units together. The commenter wrote that the Fukushima incident demonstrated that a single event can cause multiple reactors to fail at the same time. As a result, the commenter stated that it is "arbitrary and capricious for NRC to assume that licensee applicants…should be able to exempt themselves from emergency planning" based solely on risk calculations. (SL2-6, FEMA-3, UCS-12, UCS-13, UW2-32, UW2-34, UWJB-2, UWJB-3, UWJB-4, FL1-8)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that 1-rem TEDE over 96 hours should not be the sole requirement for plume exposure pathway EPZ size determination. The NRC revised 10 CFR 50.33(g)(2) in the final rule to provide more details by replacing the phrase "from the release of radioactive materials, resulting from a spectrum of credible accidents for the facility" with the phrase "from the release of radioactive materials resulting from a spectrum accidents for the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology," and added a second subpart to the regulatory text to clarify that the function of the plume exposure pathway EPZ is to designate the area where "predetermined, prompt protective measures are necessary." Moreover, for an offsite plume exposure pathway EPZ, 10 CFR 50.33(g)(2)(ii)(B) and (iii) in the final rule require the following:

> …the exact configuration of the plume exposure pathway EPZ be determined in relation to local emergency response needs and capabilities, as they are affected

by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

Thus, the sizing of plume exposure pathway EPZs is risk informed and consequence oriented. See also the NRC Responses to Comments D-1.3 and D-3.1 for more information on this topic.

In DG-1350, Appendices A and B, the NRC provided draft guidance on developing the consequence analysis that aids in the determination of the facility's plume exposure pathway EPZ size. The NRC revised Appendix A to DG-1350 to add Section A-3.1, "Event Selection," in RG 1.242 where consideration of accident likelihood is discussed to arrive at the spectrum of accidents used in 10 CFR 50.160. Additionally, applicants could use RG 1.233, which endorses the methods in NEI 18-04, Revision 1, which contains threshold values for event selection that could be used in determining the spectrum of accidents used for dose assessment.

The comment concerning environmental justice is correct in that if the NRC does not require offsite radiological EP, then protecting the public from potential accidents is a responsibility shared by all OROs. However, protecting the public from any natural or manmade hazard is a responsibility shared among many OROs and potentially all of them depending on the hazard. Further, the comment assumes that an accident would occur at the facility and individuals nearby would develop cancer as a result of a radiological dose from the accident. The NRC does not assume that an offsite radiological release will occur and nearby individuals will develop cancer. That approach would be risk-based regulation, and the NRC is a risk-informed regulator. The NRC addresses environmental justice issues through the NEPA process during licensing reviews. If an applicant decides to comply with the requirements of this final rule, then the NRC would consider the environmental justice impacts of constructing and operating the proposed facility on nearby communities during the NEPA review.

Regarding the comments concerning multiple reactors at a single site, in addition to the response above, see the NRC Response to Comment C-1.4.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-6.2: Several commenters expressed support for the proposed rule's plume exposure pathway EPZ sizing methodology, writing that it is appropriately risk based. Two commenters stated that the proposed rule continues to provide defense-in-depth protection and would allow for the same level of protection as current standards. One commenter noted that facilities will be able to reduce their plume exposure pathway EPZs below the default of 10 and 50 miles only by meeting the "strict standards" of the rule and will be required to "increase the level of protection afforded by all layers of DID [defense in depth], specifically accident prevention and mitigation measures, thereby preventing significant radiological releases from occurring." One commenter expressed support for the proposed rule and said that the regulations appropriately organize regulatory requirements around metrics of radiological risk rather than generic compliance. The commenter further stated that the proposed regulations justly focus on the objective of dose reduction rather than targeting the existing 10-mile plume exposure pathway EPZ regulation. One commenter supported the proposed approach, arguing that the two accidents associated with "water moderated reactors" have had virtually no impacts on plume exposure pathway EPZs. (GHX-3, DOE1-4, NR-4, HF-1, NNSA2-4)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC considers emergency planning and response as the facility's last layer of defense in depth. In this final rule, the NRC recognizes advances in design and technological advancements embedded in

design features and credits safety enhancements in evolutionary and passive systems. These newer, safer, and more advanced reactor designs will support the same level of EP as the current fleet of operating reactors through a risk-informed and consequence-based EP approach. However, the NRC does not consider this rule to be risk based, as explained in the NRC Responses to Comments D-1.3 and D-3.1.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-6.3: Three commenters stated that the proposed rule does not account for the simultaneous failure of multiple SMR units at the same facility. One commenter noted that SMR designs show that numerous SMR units would share the same control room at a single site. The commenter expressed concern that one control room for multiple sites brings forth the possibility of common mode failure accidents involving multiple units. The commenter wrote that such an accident would be characterized by large radiological source term releases to the environment. The commenter further stated that the proposed rule creates a critical failing in preparedness by eliminating offsite EP and therefore essentially removing FEMA from the licensing process. One commenter wrote that the proposed plume exposure pathway EPZ sizing methodology evaluates each reactor in isolation and ignores the possibility of a disaster that can simultaneously threaten multiple reactors at a site, such as the Fukushima disaster. (BN-5, UW2-35, UWJB-8)

NRC Response*:* The NRC disagrees with the comments. FEMA will still make reasonable assurance findings and determinations on offsite radiological emergency response plans when the plume exposure pathway EPZ extends beyond the site boundary. Regarding the comments concerning multiple reactors at a single site, see the NRC Response to Comment C-1.4.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-6.4: One commenter noted that LWRs, SMRs, and ONTs present small risk profiles should a core melt sequence occur. The commenter explained that these risk profiles are achieved by designs within the nuclear facilities themselves and through natural forces acting within the containment building. The commenter suggested that naturally occurring, consequence-reducing actions that take place outside the facility, such as wind shifts and human biology, lessen risk and that it would require large amounts of radiological exposure to cause an early health effect. Therefore, emergency plans should be simple and emphasize sheltering in place to avoid over-evacuation. The commenter also discussed potential accidents known as “unknown unknowns” and explained that SMRs and ONTs are better designed to handle these rare emergencies than LWRs. (MU-3, MU-4)

NRC Response*:* The NRC agrees, in part, with the comments. The rule credits several concepts that could reflect the lower potential radiological risk hazards associated with SMR and ONT facilities such as advances in design and technology advancements embedded in design features, safety enhancements in evolutionary and passive systems, and the potential benefits of smaller sized reactors and non-LWRs associated with postulated accidents, including slower transient response times and relatively small and slow release of fission products. In the license application, the applicant is required by the NRC to provide site-specific information sufficient to support NRC safety findings for those design features, which includes dose-consequence assessment analyses informing the SAR and facility-specific risk assessment providing the necessary information on accident likelihood from a spectrum of accidents that inform emergency planning and response.

However, the NRC does not require emergency plans to emphasize sheltering in place. OROs make the decision to implement public protective measures such as sheltering in place and evacuating. In the final rule, the NRC requires emergency plans to describe the protective measures to be taken within the EPZ to protect the health and safety of the public in the event of an emergency but does not mandate that certain protective actions be recommended or taken.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-6.5: One commenter explained that the use of PRA to determine the likelihood of accident scenarios has improved since the development of NUREG-0396. The commenter said that the NRC's proposed approach is more conservative than requiring a 10-mile plume exposure pathway EPZ for facilities of all sizes and that DG-1350 requires sufficient emergency planning and hazard identification to mitigate the impacts of these identified multimodule hazards. The commenter outlined what the PRA should consider, such as "internal and external hazards, all modes of operation, and all significant radionuclide sources," and include "event sequences involving single or multiple modules [and] units." (NNSA2-6, NNSA2-7)

NRC Response*:* The NRC agrees, in part, with the comments. Significant design-specific and plant-specific PRA information has been developed since NUREG-0396 was published in 1978. The Commission's PRA Policy Statement (60 FR 42622; August 16, 1995) states the following:

> The Commission believes that the use of PRA technology in NRC regulatory activities should be increased to the extent supported by the state-of-the-art in PRA methods and data and in a manner that complements the NRC's deterministic approach and supports the NRC's deterministic approach.

Although PRA is not required for obtaining risk insights, the final rule allows for applicants to use PRA as one option to support a risk-informed approach for the development of the source terms event analysis that would determine the spectrum of accidents used for SMR and ONT licensing. For example, RG 1.233 endorses NEI 18-04, Revision 1, which provides guidance to applicants for using PRA insights as an advanced licensing tool for providing information sufficient to support NRC safety findings for advanced reactor designs. Also, even though not yet endorsed by the NRC, American Society of Mechanical Engineers/American Nuclear Society RA-S-1.4-2021, "Probabilistic Risk Assessment Standard for Advanced Non-Light Water Reactor Nuclear Power Plants," dated February 8, 2021, could be used to inform the applicant's information, as applicable. The NRC also provides guidance in RG 1.242 on the use of PRA to meet the requirements of 10 CFR 50.160.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment D-6.6: One commenter disagreed with the argument that the proposed rule does not account for the possibility of multiple SMR accidents at a site. The commenter said that the licensing process for SMRs has proven them to be "walk-away safe." The commenter further asserted that the Fukushima event involved the destruction of three reactors, but there was almost no release of radiation from the reactors themselves as most of the radiation came from spent fuel cooling vessels. The commenter noted that modern SMRs will not have such a fuel feature and instead will be manufactured with fuel inside. (GHX-5)

NRC Response*:* The NRC agrees, in part, with the comment. The final rule accounts for multiple reactor units at a single site, as explained in the NRC Response to Comment C-1.4.

However, the licensing process does not show that SMRs are inherently "walk-away safe" from a foreseeable accident. Each applicant must provide a safety analysis for its facility, and the NRC must approve it before the agency will issue a license.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-6.7: One commenter said that emergency planning for nuclear power plants is focused on preventing early health effects of radiation exposure, but the long-term health effects of exposure can be reduced by actions taken to prevent early health effects. The commenter defined early health effects as any consequences of radiation that manifest themselves within 60 days of exposure and long-term health effects as consequences that may not be apparent until years after exposure. The commenter stated that various studies of nuclear accidents have shown that the range of early fatality risk is between 0 and 1 mile from point of release. The commenter further wrote that the range for radiation sickness is 0 to 2 miles from the point of release. The commenter said that knowledge of these ranges is helpful in emergency planning for SMRs and ONTs. (MU-7)

NRC Response*:* The NRC agrees, in part, with the comment. The final rule requirements for SMRs and ONTs are commensurate with the potential radiological dose consequences to public health and safety posed by these facilities. The NRC identified emergency response functions that licensees must implement through emergency plans, thereby allowing for the licensee and OROs to take adequate protective measures resulting in dose savings and reduction in early health effects to the public. However, the NRC does not necessarily agree with or has not confirmed some of the statements in the comment, such as defining early health effects from radiation exposure as any consequences of radiation that manifest themselves within 60 days of exposure and that the range for radiation sickness is 0 to 2 miles from the point of release.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment D-6.8: One commenter wrote that some commenters have requested that the proposed rule require consequence analysis for low-probability events, security considerations, and other beyond-design-basis events to inform the final plume exposure pathway EPZ determination, but this is not a current requirement of the existing EP framework. The commenter stated that the proposed rule would require SMRs and ONTs to develop a documented evaluation of the consequences of low-probability and other beyond-design-basis events. The commenter noted that security considerations are addressed under different rules for both the existing and proposed EP approaches. The commenter further asserted that under the new rule, these documented evaluations and considerations would inform any changes in the plume exposure pathway EPZ size. (NNSA2-11)

NRC Response*:* The NRC agrees~~, in part,~~ with the comment. In 10 CFR 50.33(g)(2), the applicant is required to provide the technical basis for its proposed plume exposure pathway EPZ size, which includes an analysis of the facility-specific assessment of the spectrum of accidents in association with dose consequences to individuals and the public. The spectrum of accidents includes dose consequence assessments of a wide range of DBAs and BDBAs necessary to meet the facility's EP and response plan requirements. ~~The NRC disagrees that security considerations would inform changes in the EPZ size because, as the comment notes, security considerations are outside the scope of this rulemaking.~~ For the purposes of this final rule, the spectrum of accidents used to develop the basis for emergency planning includes the entire collection of event sequences considered in the design and licensing basis of the facility,

including those related to security~~Changes to plume exposure pathway EPZ size could be made under the applicable provisions of 10 CFR 50.54(q)~~.

Accordingly, the NRC provided additional clarification in the SOC~~did not change the rule language in response to this comment~~.

Comment D-6.9: One commenter stated that plume exposure pathway EPZ requirements do not consider an accident scenario consisting of long-term storage and transportation of irradiated fuel at the reactor site. The commenter noted that within such a scenario, the NRC does not consider the risks and hazards of loading thin-walled canisters containing irradiated fuel into dry casks, long-term storage of canisters that cannot be monitored or repaired, and transporting canisters and casks on site and off site. (UW2-54)

NRC Response*:* The NRC disagrees with the comment. Irradiated fuel stored on the site of a nuclear power reactor is stored in spent fuel pools or independent spent fuel storage installations (ISFSIs). An ISFSI is licensed under 10 CFR Part 72, "Licensing requirements for the independent storage of spent nuclear fuel, high-level radioactive waste, and reactor-related greater than Class C waste." A 10 CFR Part 72 specific license ISFSI must comply with the EP requirements in 10 CFR 72.32. Most power reactor licensees have 10 CFR Part 72 general licenses for their ISFSIs. For these ISFSIs, 10 CFR 72.32(c) provides that the emergency plan required by 10 CFR 50.47 satisfies the EP requirements of 10 CFR 72.32. This same policy applies to an ISFSI on the site of a power reactor whose licensee is complying with 10 CFR 50.160. In the final rule, the NRC made a conforming change to revise 10 CFR 72.32(c) to clarify that the emergency plan required by 10 CFR 50.160 also satisfies the EP requirements of 10 CFR 72.32. Additionally, 10 CFR 50.160 requires an analysis for determining the spectrum of accidents to be used in support of the facility's emergency plan. In that analysis, the applicant or licensee must include considerations of all radionuclide sources, including an ISFSI if one is or will be located on the site. Although loading, storing, and transporting spent fuel canisters and casks on site and off site are not within the scope of this rule, additional information on spent fuel storage and transportation may be found at https://www.nrc.gov/waste/spent-fuel-storage.html and https://www.nrc.gov/waste/spent-fuel-transp.html.

Accordingly, the NRC did not change the rule language in response to this comment but included a conforming change to 10 CFR 72.32(c) in the final rule.

Comment D-6.10: One commenter discussed the general concern regarding the need for proposed regulations to address hazard analysis and emergency planning for mixed-mode or multimodule advanced reactor facilities. The commenter said that, similar to the current EP framework, the multimodule events are addressed in regulatory guidance. The commenter said that DG-1350 requires identification and characterization of specific hazards posed by multimodule units, as well as evaluation of impacts and descriptions of the emergency planning or response functions in place to mitigate impacts of identified hazards. The commenter also said that other aspects of the NRC regulatory framework ensure that multimodules and other types of facilities will not result in undue risk. (NNSA2-12)

NRC Response*:* The NRC agrees, in part, with the comment. The proposed rule included regulations to address hazard analysis and emergency planning for mixed-mode or multimodule advanced reactor facilities. The NRC carried these regulations forward into the final rule. In the final rule, 10 CFR 50.160(b)(2) requires a licensee to do the following:

> …conduct a hazard analysis of any contiguous facility, such as industrial, military, and transportation facilities, and include any credible hazard into the licensee's emergency preparedness program that would adversely impact the implementation of emergency plans.

Furthermore, each module source term must be part of the aggregate considered in the dose consequence analysis for determining the spectrum of accidents for the entire facility as part of the EPZ sizing determination. The NRC agrees that RG 1.242 provides guidance to applicants and licensees on how to comply with these requirements.

Accordingly, the NRC did not change the rule language in response to this comment.

E. Requirement To Describe Ingestion Response Planning—10 CFR 50.160(b)(4)

General Comments on the Requirement To Describe Ingestion Response Planning

Comment E-1.1: Several commenters expressed concern over what they described as an elimination of ingestion planning requirements. Some commenters stated that the proposed rule's IPZ requirements will not protect the public from ingestion of water and food products contaminated by radioactive isotopes. Some commenters suggested that IPZs are essential for a timely and effective emergency response. One commenter requested stricter IPZ requirements, stating that the COVID-19 pandemic is an example of ineffective Federal response to an emergency and that such a situation could easily happen during a nuclear incident. The commenter suggested that to avoid a similar inefficient emergency response, the NRC must codify all EP and response strategies and reexamine planning, response, quarantines, and embargoes. If not, the NRC will be required to activate its incident response program. Finally, one commenter wrote that the lack of drill and exercise requirements for facilities with a site boundary plume exposure pathway EPZ contradicts the need to demonstrate public protective actions related to ingestion pathway exposures. (SBT-9, BN-6, IDPH-8, IDPH-16, UCS-14, UW2-36)

NRC Response*:* The NRC disagrees with the comments. Ingestion response planning focuses planning efforts on the identification of major exposure pathways for ingestion of contaminated food and water resulting from an accident involving the release of radioactive material from a nuclear power plant. These response activities include the sampling, assessing, and imposing of a quarantine or embargo of food and water to prevent contaminated food and water from entering the ingestion pathway. These response activities are implemented in the intermediate or later stage response to an accident involving the release of radioactive material. The duration of any exposure to contaminated food or water could range from weeks to months and represents a long-term response need. Federal intermediate and later stage emergency response activities are described in the NRIA to the Response and Recovery FIOP in the NRF. See the NRC Responses to Comments B-1.6, B-4.8, and B-7.2 for more information concerning the planned Federal intermediate and later stage emergency response activities.

In addition to the Federal planning and resources that would be called on to respond to a radiological emergency, this final rule requires applicants and licensees complying with 10 CFR 50.160 to describe in their emergency plans the capabilities to prevent contaminated food and water from entering the ingestion pathway. The capabilities described in the emergency plan need to address major exposure pathways associated with the ingestion of contaminated food and water. Even in cases where the facility's plume exposure pathway EPZ is bounded by the site boundary, the applicant or licensee must reference capabilities of

Federal, State, and local authorities. These requirements provide the same capabilities available to identify and interdict contaminated food and water in the event of a radiological emergency as required under the EP regulations in Appendix E to 10 CFR Part 50 for currently operating nuclear power reactor licensees.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment E-1.2: One commenter stated that the proposed rule gives no consideration to Tribal communities and suggested that the NRC provide ongoing outreach and training activities to Tribes related to the ingestion pathway planning and response. The commenter stated that natural resources are vital to the subsistence lifestyle of Tribal communities and that contamination of said natural resources can have a disproportionate impact on Tribes. The commenter asserted that natural resource access restrictions due to contamination can have a significant impact on traditional ceremonies and religious practices. The commenter further wrote that the NRC must add a provision to the rule requiring case-by-case evaluations of projects to fully assess corresponding impacts to Tribes' use of lands, water, wildlife, plants, and other important resources used for cultural and ceremonial purposes specified in treaty rights that are protected under the Fort Bridger Treaty of 1868, which must be included in IPZ evaluation criteria.

Additionally, the commenter recommended that the NRC expand the definition of public outreach in the proposed rule to include Tribal outreach which can include "the consumption and/or limited access to wildlife, fish, migratory birds, medicinal plants or other natural and cultural resources" that are often consumed in Native American diets or used in religious activities." (SBT-10, SBT-19)

NRC Response*:* The NRC disagrees with the comments. The NRC, not an applicant, is required to comply with treaties between the U.S. Government and Tribes. Also, the NRC is not requiring an applicant complying with 10 CFR 50.160 to have an IPZ. Therefore, the NRC did not revise the rule to require applicants to include, in their ingestion response planning, assessments of impacts to Tribes' use of land, water, and other resources used for cultural and ceremonial purposes specified in treaty rights. The potential impacts to Tribes' use of land, water, and other resources used for cultural and ceremonial purposes specified in treaty rights will be analyzed by the NRC in site-specific licensing actions and in government-to-government consultation between the Tribes and the NRC.

Nevertheless, the NRC's guidance for reviewing applications that would comply with 10 CFR 50.160 will direct the NRC staff to consider, consistent with the Tribal Policy Statement, whether the action may have a substantial direct effect on one or more Tribes. The NRC also revised DG-1350 to inform potential applicants that they may need to reach out to States or the NRC or another Federal agency, as applicable, to coordinate with Tribes to obtain information to meet the NRC's application requirements for emergency planning.

The NRC's NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan," issued June 2013 (ADAMS Accession No. ML13106A246), and NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," issued August 2003 (ADAMS Accession No. ML032450279), direct the NRC staff to review the impacts of a proposed licensing action on a number of environmental areas. Specifically, the environmental standard review plan directs the staff's identification and assessment of environmentally related authorizations required by Federal, State, regional, local, and affected Tribal agencies as a prerequisite to the licensing action.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment E-1.3: One commenter stated that the proposed rule will not weaken or eliminate IPZ requirements. The commenter wrote that the proposed rule would allow applicants and licensees the flexibility to propose strategies that will meet intended safety outcomes and make their case to the NRC as to why their proposed strategy can succeed. The commenter further stated that under the proposed rule, the NRC will maintain the ability to review applicant technology and ensure public safety. (NNSA2-9)

NRC Response*:* The NRC agrees with the comment. The comment supports the proposed rule and suggests no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to this comment.

Contents of Emergency Plan Capabilities

Comment E-2.1: Several commenters stated that the requirement to describe ingestion response planning capabilities is not sufficient and called for the proposed rule to include offsite ingestion response planning in EP requirements. One commenter recommended that the proposed rule should require that applicants and licensees describe specific ingestion pathway limits or criteria for the various food and water contamination exposure pathways. If not, the NRC should describe why such limits are not needed. Finally, one commenter wrote that onsite and offsite environmental contamination concerns are within the spectrum of credible consequences that will need to be managed within the first 4 days of a response, and plant operators and local jurisdictions will not be ready to manage contamination if they do not plan for it.

One commenter criticized the proposed rule's IPZ requirements, calling it a reactionary, response-oriented approach. The commenter wrote that derived intervention levels, which represent the dose threshold at which the FDA recommends consideration of protective actions, can be exceeded at a much lower level of radiation than PAGs, and this only reinforces the need for ingestion pathway preparedness and a specific IPZ. Additionally, the commenter wrote that the two examples offered in the proposed rule of government capability to interdict contaminated food and water actually led to contamination resulting in injury and death. (BM-10, FEMA-15, UCSJT-3)

NRC Response*:* The NRC agrees, in part, with the comments. The concept of an IPZ was created in the 1970s. Significant improvements have been made in the Federal radiological emergency response infrastructure since then that support the identification and removal of radiologically contaminated goods from food chains. The EPA and the FDA develop the protective actions and associated guidance for State and local governments for human food and animal feed, and ingestion pathway protective actions are implemented by OROs with the support of their Federal partners. The NRC Responses to Comments B-1.6, B-4.8, and B-7.2 describe the Federal resources that would be available during an emergency. Based on the additional resources available and an improved understanding of the process and timing for identifying and removing radiologically contaminated goods from food chains, SMRs and ONTs that choose to comply with 10 CFR 50.160 do not need an IPZ.

The NRC disagrees with the suggestion that the rule should require that applicants and licensees describe specific ingestion pathway limits or criteria for the various food and water

contamination exposure pathways. The NRC also disagrees with the comment that the fact that derived intervention levels can be exceeded at a much lower level of radiation than PAGs reinforces the need to require in this rule that applicants and licensees specify an IPZ. The NRC does not require currently operating nuclear power reactor licensees to describe specific ingestion pathway limits or criteria for the various food and water contamination exposure pathways, and the comments do not provide a basis for why SMRs and ONTs should be required to do so. As noted above, the EPA and the FDA develop the protective actions and associated guidance for State and local governments for human food and animal feed.

Onsite and offsite environmental contamination could occur within the first 4 days of a release of radioactive material from a nuclear power plant. The final rule requires an applicant's or licensee's emergency plan to describe the early-phase, short-term response actions that the licensee would take in the event of a radiological emergency at its facility. These actions include recommending applicable protective measures to the OROs if the emergency plan includes an offsite plume exposure pathway EPZ. The NRC Responses to Comments B-1.6, B-4.8, and B-7.2 describe the Federal resources available to support early-phase State and local response.

The NRC agrees with the comment that *E. coli* and *Salmonella* contamination are significantly different from radiological contamination. Biological contaminations such as *E. coli* and *Salmonella* contamination have to be present in the food chain and have a noticeable effect on the public before the food can be interdicted. However, the radiological contamination hazard presented by a fixed nuclear facility can be projected, measured, mitigated, and prevented from impacting the food chain.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment E-2.2: One commenter suggested that there is a disconnect in the proposed rule because facilities with an offsite plume exposure pathway EPZ and facilities without an offsite plume exposure pathway EPZ both would be subject to the same ingestion pathway requirements. The commenter suggested the NRC include a brief discussion that explains why additional ingestion pathway requirements are not needed if the plume exposure pathway EPZ extends beyond a site boundary.

By extension, the commenter asked if an LLWR with a 10-mile plume exposure pathway EPZ could use the exemption request process to replace its IPZ and instead meet the requirements under the proposed rule to describe offsite contamination control capabilities with the argument that an SMR with a 10-mile plume exposure pathway EPZ has the same offsite radiological risk. The commenter further requested more information on whether an existing LLWR could use the license amendment request process under the proposed 10 CFR 50.54(q)(7) to transition to the ingestion control requirements under proposed 10 CFR 50.160. The commenter asserted that the NRC should base their response to these questions on a purely technical comparison, rather than citing their definitions. (BM-9, BM-11)

NRC Response*:* The NRC disagrees with the comments. The NRC disagrees with the suggestion that there is a disconnect in the proposed rule because facilities with an offsite plume exposure pathway EPZ and facilities without an offsite plume exposure pathway EPZ have the same ingestion pathway requirements. The basis for and timeframes of plume exposure pathway EPZs and IPZs are independent of each other. A plume exposure pathway EPZ is a planning tool to determine the area where the preplanning of early-phase, short-term protective actions to provide dose savings to the public closest to the facility would be

warranted. Similarly, an IPZ is a long-term tool to determine the area where preplanning would be needed for contamination to a level warranting food and water interdictions based on public consumption and exceedance of FDA PAGs. Regardless of whether an accidental radioactive release was to exceed the EPA early-phase PAGs, the long-term FDA food and water PAGs would still need to be evaluated.

Any LLWR licensee with a 10-mile plume exposure pathway EPZ will have been licensed under 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 and is not eligible to use the provisions of this final rule. Such a licensee cannot use a license amendment request to replace its IPZ with the ingestion control requirements of this final rule. Within 10 CFR Part 50, 10 CFR 50.54 describes the conditions of licenses. Specifically, 10 CFR 50.54(q) describes how a licensee is to maintain compliance with the applicable EP requirements, which in the case of the comment includes 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. If a licensee were to switch to only the IPZ requirements of 10 CFR 50.160, then the licensee would no longer be meeting the regulatory requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50, and the NRC could not approve such a request. An LLWR licensee using the exemption process would have to provide an explanation of how an exemption from the 10 CFR 50.54(q) requirement meets the requirements for specific exemptions in 10 CFR 50.12. The commenter did not provide a basis.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment E-2.3: One commenter said that the proposed rule's requirements that licensees demonstrate and have the ability to recommend protective actions to offsite authorities, make notifications to external organizations with the necessary interdiction capabilities, monitor and assess radiological conditions to support protective actions, and maintain staffing needed to implement said functions, ensure that ingestion pathway mitigation capabilities are provided and can be used in the event of an accident. (NNSA2-10)

NRC Response*:* The NRC agrees with the comment. The comment supports the proposed rule and suggests no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to this comment.

NRC Question: If the applicant or licensee provides an adequate description of the existing Federal, Tribal, State, and local Federal capabilities to interdict contaminated food and water, would the need for an IPZ exist?

Comment E-3.1: Several commenters observed that the need for an IPZ would exist even if an applicant provides adequate description of existing capabilities to interdict contaminated food and water because of the unique problems presented by radioactive contamination even under small amounts. One commenter suggested that the examples offered in the proposed rule of the government's ability to interdict *E. coli* and *Salmonella* contamination are significantly different from radiological contamination, which requires additional EP.

One commenter stated that under the proposed rule there would be no IPZ if a facility does not have an offsite plume exposure pathway EPZ. The commenter said that without this coordination plan, State and local jurisdictions may not have the expertise necessary to respond to a radiological emergency under their all-hazards plan. The commenter suggested that EP for all nuclear plants should include a mechanism to ensure offsite radiological assessment and

planning beyond the plume exposure pathway EPZ. (NJDEP-8, NJDEP-25, CRCPD-5, CRCPD-25)

***NRC Response**:* The NRC disagrees with the comments. For the reasons provided in the NRC Responses to Comments E-1.1 and E-2.1, the NRC is not requiring a formal ingestion pathway EPZ in the final rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment E-3.2: One commenter suggested that an IPZ would not be needed if an applicant provides an adequate description of existing capabilities to interdict contaminated food and water. The commenter said that an IPZ is not needed under these circumstances as there are numerous Federal, regional, and State resources available to monitor food and water sources as needed. The commenter asserted that the NRC does not require an IPZ for non-power reactor facilities that do not have an offsite plume exposure pathway EPZ. The commenter asserted that IPZs are not needed for any facilities where the plume exposure pathway EPZ does not encompass offsite areas. (NEIA-17)

***NRC Response**:* The NRC agrees with the comment. The comment supports the proposed rule and suggests no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to this comment.

Comprehensive All-Hazards Plan

Comment E-4.1: One commenter wrote that the proposed rule does not provide a FEMA evaluation of the changes to IPZ requirements or a discussion of the effectiveness of "ad hoc" responses to previous radiological incidents. The commenter also wrote that under the proposed rule's rationale, IPZ requirements could be eliminated for LLWRs. (UWJB-10)

***NRC Response**:* The NRC disagrees with the comment. The NRC has given great consideration to all aspects of offsite emergency response and recognizes that State and local all-hazards response plans are tested by real events almost daily across the United States. For the reasons explained in the proposed rule SOC and the NRC Responses to Comments E-1.1 and E-2.1, the NRC is not requiring a formal ingestion pathway EPZ in the final rule. The NRC Responses to Comments B-1.6, B-4.8, and B-7.2 describe the Federal resources available to OROs to respond to a radiological emergency.

Accordingly, the NRC did not change the rule language in response to this comment.

F. Implementation Schedule

Comment F-1: One commenter suggested that the NRC and DOE increase funding for public engagement in communities where SMRs will be deployed. The commenter further urged the NRC to increase public outreach as it would build public trust. The commenter suggested public engagement sessions and other means for the public to participate, such as group discussions and public comment periods. (AN9-1)

***NRC Response**:* The NRC agrees, in part, with the comment. The NRC agrees that public engagement is important. The NRC does not agree that funding for public engagement is within the scope of the rulemaking. The NRC notes that the licensing process includes a number of

opportunities for public engagement in communities where facilities may be located, such as draft environmental impact statement public scoping meetings and government-to-government meetings. These public engagement opportunities arise after an applicant submits a license application and the NRC accepts it for review. Openness is among the NRC's organizational values and Principles of Good Regulation, and it is the NRC's general policy to share information with the public in a transparent manner.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment F-2: One commenter wrote that some applicants will seek exemptions from existing NRC EP requirements. The commenter suggested that the final rule provide clarity regarding the processing of applications submitted before the completion of the rulemaking and address the integration of approved alternative exemptions with the requirements of the final rule. The commenter wrote that the rule should also recognize that existing applicants will adhere to their compliance dates established through the licensing process. (NEIA-19)

NRC Response*:* The NRC disagrees with the comment. This final rule is voluntary, so applicants need not comply with it. An applicant with an application being reviewed by the NRC when this rule goes into effect that chooses to comply with this rule would need to amend its application to meet the requirements of this rule. In the final rule, 10 CFR 50.54(q)(7) allows any existing or future holder of an OL under 10 CFR Part 50 or a 10 CFR Part 52 COL for an SMR or non-LWR, or any future holder of an OL for an NPUF, to change its emergency plan to comply with 10 CFR 50.160 by submitting a license amendment request with the proposed changes to its emergency plan.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment F-3: One commenter noted that for sites with a plume exposure pathway EPZ encompassing areas outside the owner controlled area, implementation of this rule will be influenced by FEMA requirements. Also, the proposed rule's implementation will be influenced by the EPA as it issues the PAG referenced in the proposed rule. (NEIA-20)

NRC Response*:* The NRC agrees, in part, with the comment. The NRC agrees that licensee implementation of some of the final rule requirements may be affected by FEMA evaluations of OROs' exercise performance. However, the NRC disagrees that implementation of the final rule would be influenced by the EPA because the EPA issues PAGs. This comment assumes two things: (1) the EPA issues a new PAG, and (2) the EPA's issuance of a new PAG would cause the NRC to change this rule. The NRC has no knowledge that the EPA intends to issue a new PAG. Even if the EPA issued a new early-phase PAG, the new PAG may not compel a change to this final rule that would influence implementation of this rule.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment F-4: One commenter stated that it has not identified any unintended consequences of the proposed rule. (NEIA-21)

NRC Response*:* The comment suggests no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to this comment.

G. Administrative and Clarifying Changes to the Regulations

Comment G-1: Two commenters wrote that the reference to FEMA "deficiencies" under 10 CFR 50.54(gg)(1) should be changed to "Level 1 Findings" to reflect FEMA's language. (BM-16, DBY-8)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC acknowledges that FEMA has changed its terminology from "deficiency" to "level 1 finding." However, FEMA has not updated its regulations to reflect this change. As a result, the NRC uses the term "deficiencies" rather than "level 1 findings" in this final rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment G-2: One commenter stated that the last sentence in the third paragraph in Section II.B of the proposed rule FRN references "hazardous chemicals," NUREG-1537, and NUREG-1520, Revision 1, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," issued May 2010 (ADAMS Accession No. ML101390110), but the proposed rule does not explain their relevancy or relationship to EP for SMRs and ONTs. The commenter explained that EP is generally associated with radiological hazards and not necessarily hazardous chemicals. The commenter also noted that DG-1350 mentions hazardous chemicals and 10 CFR 70.4, "Definitions," but not the relationship to NUREG-1537 or NUREG-1520. The commenter requested that the NRC clarify how "hazardous chemicals" are relevant to the proposed rule and DG-1350 and "correct any inconsistency in listing of references." (BM-4)

NRC Response*:* The NRC disagrees with the comment. The discussion in the proposed rule FRN referenced in the comment is in the background section of the notice of proposed rulemaking and describes the existing EP framework for NPUFs. As stated at the beginning of Section I.B. of the notice, the purpose of this discussion is to demonstrate how EP can vary depending on the type of facility. The NRC uses hazardous chemicals only as an example of an emergency planning consideration for a radioisotope production facility. As a result, there is no need to clarify this discussion.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment G-3: One commenter recommended that the subsection title "Performance-based approach" under "Proposed Changes" in Section III. "Discussion," of the proposed rule FRN should be changed to "Performance-based approach to Emergency Planning." The commenter also suggested that the title "Technology-Inclusive Approach" should read "Technology-Inclusive Approach to Emergency Planning" to be consistent with the subheading "Risk-Informed and Consequence-Oriented Approaches to Emergency Planning." (BM-8)

NRC Response*:* The NRC agrees with the comment. Revising the headings in Section III as suggested in the comment would improve the consistency of the FRN.

Accordingly, the NRC revised headings in Section II of the final rule FRN to read, "Performance-Based Approach to Emergency Planning" as opposed to "Performance-Based Approach" and "Technology-Inclusive Approach to Emergency Planning" as opposed to "Technology-Inclusive Approach."

Comment G-4: One commenter suggested that the phrase "This majority of the provisions" in the third sentence of the first paragraph in Section XI should read "The majority of the provision." (BM-15)

***NRC Response**:* The NRC agrees, in part, with the comment. To improve clarity, the NRC agrees that the word "This" should be revised to "The." However, the word "provisions" needs to remain plural because the NRC is referring to more than one provision.

Accordingly, the NRC revised the third sentence of Section XI in the final rule FRN to read "The majority of the provisions…."

Comment G-5: One commenter suggested changing the phrase "The NRC will not issue an initial operating license to a licensee unless" in 10 CFR 50.160(b) to read "The NRC will not issue an initial operating license to an applicant" because the applicant is not a licensee until after the NRC issues the initial OL. (BM-17)

***NRC Response**:* The NRC agrees, in part, with the comment. An applicant is not a licensee until the NRC issues the license. However, the NRC revised 10 CFR 50.160(b) from the proposed rule to state that the reasonable assurance finding made under 10 CFR 50.47(a)(1) necessary to issue an OL, COL, or ESP to an applicant complying with 10 CFR 50.47 and Appendix E to Part 50 is also necessary to issue an OL, COL, or ESP to a power reactor applicant complying with 10 CFR 50.160.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment G-6: One commenter suggested that, under proposed 10 CFR 50.160(b)(1)(iii)(C), the phrase "and make notifications to response personnel and organizations" be changed to "and make notifications to onsite and offsite response personnel and organizations."

The commenter also suggested that a similar revision be made under 10 CFR 50.160(b)(1)(iii)(F)(*1*), to change the phrase "and report radiological conditions to the response organization" to read "and report radiological conditions to the onsite and offsite response organizations."

Also, in 10 CFR 50.160(b)(1)(iii)(F)(*3*), the commenter recommended that the NRC change the phrase "and report to the response organization" to read "and report to the onsite and offsite response organizations."

Finally, the commenter suggested that the NRC change the phrase "report to the response organization" in 10 CFR 50.160(b)(1)(iii)(F)(*4*), to read "report to the onsite and offsite organizations." (BM-18)

***NRC Response**:* The NRC agrees, in part, with the comments. The references to "response organization" in proposed 10 CFR 50.160 (F)(*1*), (F)(*3*), and (F)(*4*) should be clarified. However, not all of the response organizations referenced in these provisions refer to onsite and offsite organizations, as the comments suggest. Proposed 10 CFR 50.160(b)(1)(iii)(C) would have required the licensee to have the capability to establish and maintain effective communications with the licensee's ERO. The licensee would also have to have the capability to "make notifications to response personnel and organizations who may have responsibilities for responding during emergencies." Thus, the first part of this provision refers to the ERO, and the second part refers to the NRC and OROs. The NRC did not change this provision in the final rule.

In the proposed rule SOC, the NRC explained that the information to be reported under 10 CFR 50.160(b)(1)(iii)(F)(*1*), (*3*), and (*4*) (i.e., radiological conditions; the extent and magnitude of damage to the core or other vessel containing irradiated special nuclear material; and the extent and magnitude of all radiological releases, including releases of hazardous chemicals produced from licensed material, respectively) would be reported to the ERO. However, in light of this comment, the NRC determined that that information would need to be reported to only certain personnel within the ERO. Therefore, the NRC changed these rule provisions, so the information is reported to the "applicable response personnel."

Accordingly, the NRC revised 10 CFR 50.160(b)(1)(iii)(F)(*1*), 10 CFR 50.160(b)(1)(iii)(F)(*3*), and 10 CFR 50.160(b)(1)(iii)(F)(*4*) in the final rule to change "response organization" to "applicable response personnel."

Comment G-7: One commenter explained that Section II, "Background," Subsections A and B, reference two "most notable" EP guidance documents, NUREG-0654/FEMA-REP-1, Revision 2, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," issued December 2019 (ADAMS Accession No. ML19347D139), and RG 1.219, Revision 1, "Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors," issued July 2016 (ADAMS Accession No. ML16061A104) but do not reference NUREG-0800, Section 13.3, "Emergency Planning," and Section 14.3.10, "Emergency Planning—Inspections, Tests, Analyses, and Acceptance Criteria," issued March 2007 (ADAMS Accession Nos. ML063410307 and ML070730206), which apply to 10 CFR Part 50 and 10 CFR Part 52 applications. The commenter asked that these sections of NUREG-0800 be referenced as additional EP guidance documents. The commenter also requested that the NRC add a reference to RG 1.233 under Section XVII because it also addresses EP and is relevant to DG-1350. (BM-3)

NRC Response*:* The NRC agrees with the comment. NUREG-0800, Section 13.3, provides the criteria that the NRC staff uses in reviewing applicants' emergency plans as described in the SARs for license applications to construct and operate LWR nuclear power plants. NUREG-0800, Section 14.3.10, provides the criteria that the NRC staff uses in reviewing applicants' proposed inspections, tests, and analyses applicable to emergency planning that the licensee will perform and the associated acceptance criteria. RG 1.233 provides guidance on the selection of licensing-basis events; classification and special treatments of structures, systems, and components; and assessment of defense in depth for non-LWRs. These applicants can use RG 1.233 in the development of the analysis required by 10 CFR 50.33(g) for determining EPZ size.

Accordingly, the NRC revised Section I.A., "Existing Emergency Preparedness Framework for Nuclear Power Reactors," and the Availability of Documents table in Section XVII of the final rule FRN to include references to NUREG-0800, Sections 13.3 and 14.3.10, and RG 1.233.

H. Scope of the Proposed Rule

General Comments on the Scope of the Proposed Rule

Comment H-1.1: One commenter stated that the proposed rule does not provide a sufficient technical or adequate justification for excluding LLWRs from its scope. The commenter suggested that instead, the proposed rule notes that LLWRs are not included as they already have an EP licensing framework, and licensees have not expressed "clear interest" in changing that framework. The commenter said that the nuclear industry has continuously encouraged the NRC to adopt some aspects included in the proposed rule, and the term "clear interest" is subjective and insufficient to justify an NRC policy position. The commenter suggested that at a minimum, the proposed rule should provide an adequate technical justification to support the exclusion of LLWRs. Finally, the commenter noted that the proposed rule, in the section "Risk-Informed and Consequences-Oriented Approaches to Emergency Planning," provides a technical relationship between dose standards for LLWRs and SMRs which "appear contrary to the non-technical justification(s)" given for excluding LLWRs. (BM-1, BM-2)

NRC Response*:* The NRC disagrees with the comments. The NRC provided a justification in the proposed rule FRN for excluding LLWRs from the scope of the proposed rule. This justification is a policy decision expressed by the Commission several times in various staff requirements memoranda (SRM) (e.g., SRM-SECY-16-0069, "Rulemaking Plan on Emergency Preparedness for Small Modular Reactors and Other New Technologies," dated June 22, 2016 (ADAMS Accession No. ML16174A166); SRM-SECY-18-0103, "Proposed Rule—Emergency Preparedness for Small Modular Reactors and Other New Technologies," dated December 17, 2019 (ADAMS Accession No. ML19351C729)). The comments provide no substantive support for the claim that the Commission's policy decision is "insufficient" and that the nuclear industry "has continuously encouraged the NRC to adopt some aspects included in the proposed rule." In contrast, when given the opportunity to comment on the proposed rule, the industry's representative stated, "[T]here is no pressing need for a performance-based, consequence-oriented approach to EP for large LWRs." See the comment from the NEI, Attachment 1, page 2, dated September 22, 2020 (ADAMS Accession No. ML20267A326).

The NRC disagrees that the discussions in the proposed rule FRN concerning dose standards for SMRs and ONTs and LLWRs and the technical basis for plume exposure pathway EPZ sizes are contrary to the "nontechnical" policy decision for excluding LLWRs from the rule. Those discussions concern the dose criterion when protective measures are recommended. That criterion is the same for LLWRs as it is for SMRs and ONTs, but the EP framework for the two groups of licensees does not need to be the same. In this final rule, the NRC offers SMRs and ONTs an alternative EP framework for the reasons provided in the proposed rule FRN and comments such as Comment D-1.13, and the NRC responses to those comments.

Accordingly, the NRC did not change the rule language in response to these comments.

NRC Question: Are the proposed "non-light-water reactor," "non-power production or utilization facility," and "small modular reactor" definitions in § 50.2 sufficient to address EP for existing and anticipated technologies? Are there any unintended consequences of including each of these classes of facilities within the scope of this proposed rule?

Comment H-2.1: Several commenters said that the proposed definitions for non-LWR, NPUF, and SMR are adequate. One commenter wrote that the definitions are sufficient to address EP

activities for existing technologies, but that they will withhold judgment on anticipated technologies. (SBT-14, NJDEP-12, CRCPD-11)

***NRC Response**:* The NRC agrees, in part, with the comments. The definitions of "non-light water reactor," "non-power production or utilization facility," and "small modular reactor" in the rulemaking are adequate to address EP not only for existing technologies but also for anticipated technologies.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment H-2.2: One commenter wrote that the NRC's explanation of why it used MW(t) instead of megawatt electric (MW(e)) was confusing. Specifically, the commenter points out that MW(t) reflects a reactor's maximum design output as an allowable limit for power operation, while MWe reflects the overall plant electrical output efficiency, which can vary. (BM-5)

***NRC Response**:* The NRC agrees, in part, with the comment. The NRC did not base its decision to use the thermal power equivalent of electric power generating capacity MW(t) on the distinction between MW(t) and electric power generating capacity MW(e). As the NRC explained in the proposed rule FRN, the NRC used MW(t) in the definition of SMR instead of MW(e) because MW(e) is not a criterion the NRC uses to determine EP requirements. For example, in 10 CFR 50.33(g) and 10 CFR 50.47(c)(2), EPZ size may be determined on a case-by-case basis for reactors with an authorized power level less than 250 MW(t).

Accordingly, the NRC did not change the rule language in response to this comment.

Comment H-2.3: One commenter wrote that the proposed rule should indicate that an SMR can have a licensed thermal power up to 1,000 MW(t) and that this limit applies to each module in a facility rather than the total thermal power of all modules in a facility. The commenter said that it did not identify any unintended consequences of including these classes of facilities within the scope of the proposed rule. (NEIA-2)

***NRC Response**:* The NRC agrees with the comment. The proposed rule's definition of "small modular reactor" does not clearly state that the 1,000-MW(t) limit applies to each module of an SMR. The proposed rule's definition of "small modular reactor" is a power reactor, licensed under 10 CFR 50.21, "Class 104 licenses; for medical therapy and research and development facilities," or 10 CFR 50.22, "Class 103 licenses; for commercial and industrial facilities," to produce heat energy up to 1,000 MW(t), that may be of modular design as defined in 10 CFR 52.1. Additionally, 10 CFR 52.1 defines "modular design" as follows:

> …a nuclear power station that consists of two or more essentially identical nuclear reactors (modules) and each module is a separate nuclear reactor capable of being operated independent of the state of completion or operating condition of any other module co-located on the same site, even though the nuclear power station may have some shared or common systems.

One reading of the proposed rule definition of "small modular reactor" is that an SMR is a power reactor that may consist of two or more separate, independent reactors, and each of the reactors in an SMR may produce heat energy up to 1,000 MW(t). Another reading of the proposed definition is that an SMR is a power reactor that is licensed to produce heat energy up to 1,000 MW(t) and may be of modular design. In that case, the 1,000-MW(t) limit would apply to the facility. To clarify this potential ambiguity, the NRC in the final rule revised the definition

of “small modular reactor” to read “a power reactor, which may be of modular design as defined in § 52.1 of this chapter, licensed under § 50.21 or § 50.22 to produce heat energy up to 1,000 megawatts thermal per module.” This is consistent with the discussion in the proposed rule SOC of the definition of “small modular reactor” in 10 CFR 171.5, “Definitions”:

> The § 171.5 definition of “small modular reactor” means, for the purpose of calculating fees, the class of light-water power reactors having a licensed thermal power rating less than or equal to 1,000 MW(t) per module.

The NRC is also unaware of any unintended consequences of including non-LWRs, NPUFs, and SMRs within the scope of the final rule.

Accordingly, the NRC changed the rule language in response to this comment.

Comment H-2.4: One commenter stated that it is unclear what the term “facility” means in regard to SMRs with multiple modules in one building and questioned if the term is referring to one module or the entire plant. The commenter suggested that the NRC define the term “facility” for multimodule plants and that such a definition should align with the discussion of consequences “per module” discussed in the rule. (NSA-5)

NRC Response*:* The NRC agrees, in part, with the comment. References to “per module” consequences could be confusing in light of the use of the term “facility” to refer to an entire SMR or ONT. However, because the NRC refers to “per module” consequences only twice in the FRN and uses the term “facility” to mean all of the potential modules of a single SMR or ONT, the NRC did not define the term “facility” in the final rule.

Accordingly, the NRC did not change the rule language in response to this comment.

NRC Question: Should the NRC consider a performance-based, consequence-oriented approach to EP for entities besides SMRs and ONTs (e.g., LLWRs, fuel cycle facilities, and currently operating NPUFs) in a future rulemaking?

Comment H-3.1: Several commenters expressed opposition to potentially using a performance-based, consequence-oriented approach to EP for other reactors. One commenter wrote that they supported a performance-based approach to EP, but reserved judgment on expanding it to ONTs until additional information becomes available. One commenter wrote that requesting comments on the applicability of the proposed rule to the existing fleet is outside the scope of the rulemaking and premature. Another commenter wrote that the NRC should continue to embrace a performance-based, consequence-oriented approach to EP, but changes are not required for existing technologies. One commenter wrote that other reactors such as LLWRs should be included in a new rule for a “technically defensible EPZ,” but the plume exposure pathway EPZ should be kept at minimum of 10 miles. The commenter opposed adding LLWRs to the scope of the proposed rule and wrote that this question would open the door to a reduced plume exposure pathway EPZ size for LLWRs. (SBT-16, FEMA-5, NJDEP-14, CLA-10, UCS-18, UWJB-7)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that this rule’s performance-based and consequence-oriented EP framework should be available to SMRs and ONTs but not LLWRs at this time and that changes to the existing regulations for the currently operating reactors are not necessary. The NRC disagrees with comments regarding

the effects of including LLWRs in this rulemaking and will use those comments to inform future considerations by the NRC.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment H-3.2: Several commenters expressed support for including LLWRs within the scope of the proposed rulemaking. One commenter wrote that regulations for LLWRs would be improved if organized around a performance-based and consequence-oriented framework, and such a framework should be made available to such facilities as an option. The commenter stated that there is some dissonance created by the proposed regulation's creation of two different standards for a reactor requiring an offsite plume exposure pathway EPZ: standards and procedures under 10 CFR 50.47 which are organized around the generic 10-mile plume exposure pathway EPZ, and those for the proposed 10 CFR 50.160(b)(i-iv)(A) and (B) which are based on the 10-mSv TEDE standard. The commenter wrote that the EP framework under the proposed rule highlights that the current requirements, particularly a generic 10-mile plume exposure pathway EPZ, are arbitrary in nature, and it would serve the public well to allow existing facilities to opt into the new framework. One commenter wrote that LLWRs should be able to adopt a performance-based approach if there is evidence it will not decrease the effectiveness of the emergency plan, but it is doubtful many will choose to do this due to the "potential for unintended consequences." One commenter wrote that the NRC can regulate a variety of designs with the proposed framework, and it should also be applied to the framework currently in development for advanced reactors. (NJDEP-13, NSA-24, HF-3, HF-4, HF-5, CLA-11)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that regulations for LLWRs could be enhanced using a performance-based approach. However, in SECY-14-0038, "Performance-Based Framework for Nuclear Power Plant Emergency Preparedness Oversight," dated April 4, 2014 (ADAMS Accession No. ML13238A018), the NRC staff concluded that, although a performance-based regimen could enhance EP oversight, the existing program for LLWRs provides reasonable assurance of adequate protection of public health and safety, and licensees for these plants have not expressed a clear interest in changing the current framework. In SRM-SECY-14-0038, dated September 16, 2014 (ADAMS Accession No. ML14259A589), the Commission approved the staff's recommendation to not pursue rulemaking to provide a performance-based EP framework for LLWRs.

The NRC disagrees that having two different standards for a reactor requiring an offsite EPZ creates dissonance. The EP framework in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 and the provisions of 10 CFR 50.160 have distinct regulatory approaches and entry conditions. For example, 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 establish a prescriptive capability approach that was developed to be generically applicable to the current fleet of reactors after many of the plants were built. Additionally, 10 CFR 50.160 is forward-looking and not limited by potential reactor technologies. An applicant complying with the 10 CFR 50.160 framework could have a 10-mile EPZ like a current LLWR, a site boundary EPZ, or a different sized-EPZ. The performance-based approach of the final rule allows for a scalable plume exposure pathway EPZ size and emergency plans that are appropriate for the applicant based on several factors such as location, source term, accident likelihood, and meteorology.

The NRC also disagrees that the 10 CFR 50.160 EP framework highlights that the EP requirements under 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50, particularly a generic 10-mile EPZ, are arbitrary. In adopting the current 10-mile EPZ concept, the Commission decided to have a conservative emergency planning policy in addition to the conservatism

inherent in the defense-in-depth philosophy captured in NUREG-0396 and endorsed in the Commission's policy statement, "Planning Basis for Emergency Responses to Nuclear Power Reactor Accidents" (44 FR 61123; October 23, 1979).

The NRC agrees that, under this rule, the agency can regulate a variety of reactor designs; however, application of performance-based requirements using a graded approach based on site-specific consequence analyses to the regulatory framework currently under development for advanced reactors would be beyond the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment H-3.3: Two commenters agreed that the NRC should consider a performance-based and consequence-oriented approach to EP for entities besides SMRs and ONTs. One commenter wrote that this should not be a priority rulemaking as it will benefit a limited number of facilities. (NEIA-3, CRCPD-13)

NRC Response*:* The NRC agrees with these comments. Consistent with SRM-SECY-14-0038, the NRC will continue to assess the NRC's EP program for entities besides SMRs and ONTs for the possibility of moving to a performance-based framework in the future.

Accordingly, the NRC did not change the rule language in response to these comments.

NRC Question: If the NRC considers a performance-based, consequence-oriented approach to EP for entities other than SMRs and ONTs, what criteria should such entities be required to meet to use a performance-based, consequence-oriented approach to EP in a future rulemaking?

Comment H-4.1: Two commenters wrote that criteria for a performance-based, consequence-oriented approach for other entities should be built on concepts established in NUREG/CR-7160, "Emergency Preparedness Significance Quantification Process: Proof of Concepts," issued June 2013 (ADAMS Accession No. ML13164A285). The commenters also wrote that current NRC EP performance indicators could be supplemented by additional indicators. (NJDEP-15, CRCPD-14)

NRC Response*:* The NRC agrees with these comments. The concepts established in NUREG/CR-7160 could be useful in a future performance-based, consequence-oriented EP rulemaking.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment H-4.2: One commenter said that DG-1350 presents appropriate criteria for a performance-based, consequence-oriented approach to EP for entities other than SMRs. (NEIA-4)

NRC Response*:* The NRC agrees with the comment. The criteria in RG 1.242 could be useful in future performance-based, consequence-oriented EP rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

NRC Question: If the NRC does not consider a performance-based, consequence-oriented approach to EP for entities other than SMRs and ONTs, should the NRC offer mechanisms (other than the existing exemption process) that would allow other entities to request NRC approval to use the EP framework proposed in this rulemaking?

Comment H-5.1: Two commenters wrote that a rule change would be required for facilities outside of SMRs and ONTs to use the proposed EP framework. One commenter suggested changing EP regulations so licensees other than SMRs and ONTs can choose between either the existing or proposed framework and allowing the option under either framework to determine a plume exposure pathway EPZ size through site-specific analysis. (NJDEP-16, NEIA-5, CRCPD-15)

NRC Response*:* The NRC agrees, in part, with the comments. Rulemaking would be required to allow entities other than SMRs and ONTs to request NRC approval to use the EP framework in 10 CFR 50.160.

The NRC cannot agree at this time with the comment that entities other than SMRs and ONTs should be able to have the option, through a future rulemaking, to determine plume exposure pathway EPZ size through site-specific analysis even when not using a performance-based, consequence-oriented approach to EP. However, the NRC will use that comment to inform future agency considerations.

Accordingly, the NRC did not change the rule language in response to these comments.

I. Draft Regulatory Analysis

General Comments on the Draft Regulatory Analysis

Comment I-1.1: One commenter asked that the NRC clarify how the economic benefit received from an SMR license is related to the costs and benefits of the proposed rule and associated guidance. The commenter wrote that the proposed rule's regulatory analysis (RA) includes savings to the nuclear industry and NRC that are different than what is described as "fair" in the proposed rule's discussion of the NRC's fee regulations. The commenter asked that the NRC explain this discrepancy. In addition, the commenter requested that the NRC clarify the distinction between MW(t) and MW(e) and remove or explain the reference to 10 CFR Part 171, "Annual fees for reactor licenses and fuel cycle licenses, including holders of certificates of compliance, registrations, and quality assurance program approvals and government agencies licensed by the NRC," and the discussion of fairness with regard to the payment of annual fees. (BM-6, BM-7)

NRC Response*:* The NRC disagrees with the comments. The economic benefit received from an SMR license due to aspects of the fee rule is not related to the costs and benefits of this final rule. The comment is conflating the issue of fairness in the fee rule with the context in which it was used in the proposed rule FRN (i.e., the definition of the term "small modular reactor"), and those two usages of the term are not connected.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment I-1.2: Several commenters wrote that the proposed rule does not completely account for costs related to public health and safety. One commenter wrote that the proposed rule considers benefits only to the licensee and applicants and should include costs related to

"failure of a licensee and a community to be adequately prepared in the event of an accident and release of radioactive materials." Additionally, the commenter wrote that the NRC does not have adequate information about the design of facilities and site-specific characteristics to fully evaluate costs.

One commenter wrote that the proposed rule should include protections for accidents in Category C for the "worst" core melt sequences. The commenter wrote that the alternative in the RA with a requirement for a substantial reduction in risk similar to the evaluation in NUREG-0396 should be included in the proposed rule, and as a result, the rule is inconsistent with the current planning basis and the RA. (UW2-21, UCS-8)

***NRC Response**:* The NRC agrees, in part, with the comments. The NRC disagrees that the proposed rule did not account for costs related to public health and safety. The proposed rule would provide an alternative EP framework that would afford the same level of protection as exists under current regulations. Therefore, the proposed rule would have no incremental impact to public health, safety, and the community. The same holds true for the final rule. If an applicant or licensee complies with the final rule's emergency plan requirements, then the NRC has reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at the licensed facility.

With regard to the comment addressing the statement in the proposed rule RA related to substantial reduction in risk to public health and safety, the NRC acknowledges that the language was erroneously included in the RA. The NRC deleted this language from the final rule RA. For additional explanation of why the proposed rule did not address the issue of substantial reduction in risk, please refer to the NRC Response to Comment D-3.6.

The NRC disagrees that the "worst" core melt sequences are not accounted for in the current EP planning basis. NUREG-0396 defines Class 9 events as sequences leading to total core melt and consequent degradation of the containment boundary and those events leading to gross fuel clad failure or partial melt with independent failures of the containment boundary. Today, these events are referred to as BDBAs. RG 1.242 discusses in both Appendix A and Appendix B how applicants and licensees should include the analysis of BDBAs.

Accordingly, in response to these comments, the NRC updated the RA to delete the language "applicants would also need to show a substantial reduction in risk to public health and safety at the chosen plume exposure pathway EPZ outer boundary for very severe accidents similar to the evaluation in NUREG-0396."

Comment I-1.3: One commenter noted that the RA states that a "qualitative consideration" of the proposed rule is promotion of a performance-based framework. The commenter said that because there is no performance history for SMRs and ONTs, it is not appropriate to promote the qualitative benefits of a performance-based regulatory framework. (UW2-22)

***NRC Response**:* The NRC disagrees with the comment. A performance-based framework for SMRs and ONTs is appropriate, and qualitative benefits of this framework can be assumed. Under the final rule, the NRC will review performance indicators provided by the applicant, and RG 1.242 provides guidance on this topic to applicants and licensees. The NRC expects that operational experience will be obtained during the design and testing phases of SMRs and ONTs. Additionally, the performance-based concept allows for NRC inspection of licensees meeting or failing performance goals. The performance criteria are meant to be technology inclusive and do not require prior performance. Therefore, the performance-based framework

offers regulatory efficiency to the applicants and licensees, which is discussed qualitatively in the RA.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment I-1.4: One commenter wrote that the proposed rule should recognize the averted costs of avoiding an offsite EP program, which would amount to $135 million in savings over the 40-year life of a facility. (NEIA-22)

NRC Response*:* The NRC disagrees with the comment. The NRC disagrees that the RA does not address the averted costs of offsite EP programs. The purpose of an RA is to discuss the different incremental costs between alternatives. The RA discusses, in detail, in the final two paragraphs of Section 5.1 that these costs would be averted under both Alternatives 1 and 2 and are therefore not considered as averted costs under the rule. The NRC added language to this part of the RA to indicate that these costs could be averted via exemption request without the rule being in effect. Therefore, the NRC did not estimate the cost of offsite EP for this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

NRC Question: The NRC is seeking information on the incremental cost estimates for any additional PRA modeling necessary to generate the credible accident sequences and the development of the source terms used in determining a site-specific EPZ size.

Comment I-2.1: Two commenters wrote that cost estimates for additional PRA modeling would be dependent on the type of facility and given that there is no history or track record to base estimates on, it is not possible to develop accurate cost estimates at this time. The commenter suggested that the NRC provide additional guidance on how to select credible accident sequences.

The other commenter wrote that the final cost for a sizing analysis would be “dependent on the number of sequences determined to be credible and potentially bounding for an EPZ analysis.” The commenter wrote that, assuming four candidate sequences, the total cost would be $100,000. The commenter added the incremental cost could vary based on the complexity of the design. (NJDEP-26, CRCPD-26, NEIA-18)

NRC Response*:* The NRC reviewed the information provided by the commenters and has used this additional information to inform the RA. The final rule may require applicants to perform additional analyses and, as a result, incur additional costs.

Accordingly, the NRC has updated the final rule RA to account for these additional incremental costs.

J. Information Collection

Comment J-1: One commenter wrote that the information collection is necessary as it would allow the NRC to better evaluate a licensee’s EP program elements required by this rule. (NEIA-23)

NRC Response*:* The NRC agrees with the comment. The NRC agrees that information collection will allow the agency to evaluate a facility’s EP program.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment J-2: One commenter noted that there are no opportunities for minimizing the burden of the proposed information collection. The commenter added that the NRC offers several ways of electronic transmission and submittal, and the NRC is able to receive performance indicator data electronically as part of the ROP. Therefore, the commenter expressed that all responses likely will be filed electronically. (NEIA-26)

NRC Response*:* The comment suggests no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to this comment.

K. Draft Environmental Assessment

Comment K-1: One commenter asked the NRC to revisit portions of the proposed rule that place long-term, offsite hardships related to EP on Tribes. The commenter wrote that the draft environmental assessment did not fully analyze the "disproportionate environmental justice and socioeconomic concern" related to these hardships. (SBT-6)

NRC Response*:* The NRC disagrees with the comment. Environmental justice and socioeconomic concerns of the Tribes in relation to 10 CFR 50.160 will be addressed during a license application involving the EP framework in 10 CFR 50.160 in accordance with the Commission's Tribal Policy Statement. The Tribal Policy Statement is intended to encourage and facilitate Tribal involvement in activities under NRC jurisdiction. It provides guidance to ensure consistency across the agency in government-to-government relations with Federally recognized Tribes. The Policy Statement also underscores the NRC's commitments to conducting outreach to Tribes and engaging in timely consultation and to coordinating with other Federal agencies. The NRC expects all program and regional office consultation and coordination practices to be consistent with or adhere to the NRC Tribal Policy Statement.

This final rule does not place new or different long-term hardships related to EP on Tribal communities relative to the current EP requirements. The NRC will not approve an emergency plan that does not meet the NRC's EP requirements in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 or the requirements in 10 CFR 50.160. Under 10 CFR 50.33(g)(2), an applicant must include the response plans for OROs (such as participating Tribal communities) that are wholly or partially within the plume exposure pathway EPZ. As stated in 10 CFR 50.160(b), "The applicable requirements of § 50.47(a)(1) apply to applications submitted under this section." Section 50.47(a)(1) states that the NRC will not issue an initial OL, COL, or ESP unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. These protective measures include the response measures described in the offsite response plans. FEMA reviews these plans and makes a determination of reasonable assurance that adequate offsite protective measures can and will be taken in the event of a radiological emergency. If FEMA's review of a given Tribe's emergency plan reveals a deficiency that prevents a finding of reasonable assurance (e.g., lack of dedicated personnel, lack of available resources), the license applicant would need to determine how to address the deficiency noted in FEMA's evaluation of the Tribe's emergency plan. This process would include government-to-government consultation involving the Tribes, FEMA, and the NRC, as appropriate.

Even in the case of a site boundary plume exposure pathway EPZ, offsite communities could still develop and maintain emergency response capabilities, including radiological emergency response capabilities, without an NRC requirement for an offsite plume exposure pathway EPZ. FEMA's CPG-101 provides guidance for developing offsite emergency plans and understanding risk-informed planning and preparedness. FEMA's CPG-201 provides communities with additional guidance for conducting a risk assessment and presents the basic steps of the process. Together, these two CPGs provide resources to OROs and a risk-informed basis for the offsite planning effort, as well as encourage the engagement of the whole community to address risks that might impact a jurisdiction.

Accordingly, the NRC did not change the rule language in response to this comment.

L. Draft Regulatory Guide

Comment L-1: Several commenters suggested that the NRC clarify certain definitions or phrases in DG-1350:

a. One commenter requested that the NRC clarify the term "Incident Commander" as it is used for the first time on page 17 of DG-1350. The commenter explained that it is not clear if this role is related to the role "emergency team leader" used on page 16 in Section 5.h.4.a-b.

b. One commenter had several suggestions for the Glossary on page 24 of DG-1350:

   In the definition of "non-power production or utilization facility," the phrase "or 10 CFR 50.22, as applicable, that is not a nuclear power reactor or production facility as defined under…" should be changed to "or 10 CFR 50.22, that is not a nuclear power reactor or production facility, as defined under…."

   For the definition of "performance-based," the phrase "of EP and planning upon the…" should read "of emergency planning upon the…."

   Under the definition of "site boundary," the phrase "(Ref. 20), specifically 20.1003" should be changed to "(Ref. 20), Section 20.1003."

   The definition for "technology-inclusive" should be clearer, especially in the context of DG-1350.

c. One commenter asked if the term "personnel" mentioned in the Communications subsection e.(1) on page 13 of DG-1350, as well as subsection f.(1) on page 13 and g.(1) on page 14, means that the personnel should be described by "title or position."

d. One commenter requested clarification on when offsite dose projections (on page 21) apply (always or only with an offsite plume exposure pathway EPZ).

e. One commenter mentioned the reference to NRC Management Directive 8.4, "Management of Backfitting, Forward Fitting, Issue Finality, and Information Requests," and said that it implies that an applicant or licensee would follow the NRC internal process. The commenter asked if management directives apply to applicants or licensees or are only internal to the NRC.

f. One commenter stated that the title “Releases” in Subsection C.5.h.(4) on page 16 of DG-1350 may be misleading and that the NRC should change it to “Releases to the Environment” to “clarify that a leak into containment or into another interfacing system is not in the intended scope.”

g. One commenter said that Section C.8 on page 22 of DG-1350 should address expectations for identifying common-cause initiating events when analyzing site-specific hazards posed by multireactor modules or units.

h. One commenter suggested that the NRC provided guidance on an acceptable cutoff time for releases discussed in DG-1350, Appendix A, Section A-1.b. For example, the commenter said that the staff has previously determined that 10 hours is an acceptable cutoff time in approved exemption requests related to EP requirements for decommissioning reactors. Similarly, another commenter noted that the guidance states that an applicant or licensee may demonstrate that protective measures are not required due to timing of releases from a credible accident, but there is no guidance on acceptance criteria or methodology.

i. In relation to Appendix A, Section A-3.1 to DG-1350, one commenter asked the NRC if one bounding release scenario could be selected for the plume exposure pathway EPZ sizing analysis, assuming it could be justified based on PRA results.

j. One commenter suggested that the NRC clarify guidance on identifying and assessing wind sectors within Appendix A to DG-1350.

k. One commenter requested that the NRC expand on the term “plume buoyancy” in Appendix A, Section A-3.1 of DG-1350 by explicitly stating “plume energy” and differentiating it from “neutral density.”

(BM-25, BM-28, DBY-14, DBY-16, DBY-18, NEIA-33, NEIA-38, NEIA-39, NEIA-41, NEIA-42, NSA-9, NSA-12)

***NRC Response**:* The NRC agrees, in part, with the comments.

a. The term “Incident Commander” is defined in FEMA’s National Incident Management System as an offsite response position, while the emergency team leader position listed on page 16 of DG-1350 is an onsite response position. For added clarity, the NRC added the FEMA definition of “Incident Commander” to footnote 5 in RG 1.242.

b. The term “Non-power production or utilization facility” is defined in the NRC’s regulations, and guidance cannot change a regulation. The NRC did not change DG-1350 in response to this comment.

The comment provided no basis for the suggested change to the definition of “Performance-based.” The NRC did not change DG-1350 in response to this comment.

The NRC revised the definition of “Site boundary” based on this comment. The NRC removed “specifically” because that word was unnecessary.

The NRC changed the definition of the term “Technology-inclusive” in DG-1350 based on this comment to clarify that “Technology-inclusive” means that the requirements are

developed so that they apply to more than one technology. The new definition is "The principle of establishing performance requirements developed using methods of evaluation that are flexible and practicable for application to a variety of power reactor and NPUF technologies."

c. The term "personnel" used in Sections C.5.e.(1) and f.(1) of the DG is a generic term used to indicate "one or more persons." In the DG, this reference is used for both site employees who may not have an emergency response function and those site employees who are part of the site ERO. The applicant's or licensee's emergency plan does not need to identify these personnel by title or position. The NRC did not change DG-1350 in response to this comment.

d. The offsite dose projections in Section C.7.g of the DG were included in Section C.7, which provides guidance on the emergency plan description of the required offsite planning activities. Section C.7 of DG-1350 includes a statement that the planning activities listed in Section C.7 "are required for only those SMR, non-LWR, and NPUF applicants and licensees who propose a plume exposure pathway EPZ that extends beyond the site boundary." Therefore, the emergency plan for an applicant or licensee with a site boundary plume exposure pathway EPZ does not need to address offsite dose projections as described in Section C.7.g. The NRC did not change DG-1350 in response to this comment.

e. NRC Management Directive 8.4 contains direction to the NRC staff regarding backfitting, forward fitting, and issue finality. It also contains an appeal process on these matters that licensees can use. The NRC did not change DG-1350 in response to this comment.

f. The NRC disagrees with the suggestion to change the title of Section C.5.h.(4), "Releases," in the draft guidance to "Releases to the Environment." The heading for this section is based on language used in other NRC documents (e.g., NUREG-0654/ FEMA-REP-1, Revision 2, and NUREG-0396). Although an atmospheric release to the environment is a concern as a final outcome of a potential event, any release, even a controlled release into a containment system, needs to be assessed, monitored, and reported to the emergency team leader as a potential release to the environment. The NRC did not change DG-1350 in response to this comment.

g. The NRC does not consider common-cause failures as an appropriate initiating event to be identified for a multimodular site-specific hazard analysis. Common-cause failures are broadly defined as the failure of two or more facility components at the same time, or within a short interval, because of a shared cause. Common-cause events are not site-specific hazards posed by multimodular and nuclear units or nearby, adjacent, or contiguous facilities that could complicate the SMR's or ONT's emergency response. Common cause failure events could happen at any site, so they are not site-specific. Moreover, the applicant or licensee does not know that components will fail, whereas the hazard analysis looks at hazards that already exist or the applicant or licensee knows will exist (e.g., a chemical plant being constructed contiguous to the SMR or ONT). The NRC did not change DG-1350 in response to this comment.

h. In response to several comments, the NRC revised Appendix A to DG-1350 to add Section A-3.1, "Event Selection," in RG 1.242. This new section on event selection includes a discussion on timing considerations but does not suggest a "cutoff" time. Rather, Appendix A discusses that an analysis of the timing of the event needs to be

performed. Timing of the radiological release to the environment, as justified, may be used to determine whether an accident scenario should be included in the consequence assessment to determine the size of the plume exposure pathway EPZ. Appendix A provides an example of an analysis of timing considerations to show how a previous methodology was used to risk-inform the selection of events warranting predetermined, prompt protective measures. This example, the Low-Power Rule ("Emergency Planning and Preparedness Requirements for Nuclear Power Plant Fuel Loading and Low-Power Testing – Final Rule," 53 FR 36955; September 23, 1988), included an analysis on the need for predetermined, prompt protective measures. Due to the substantial reduction in the likelihood of an accident and potential accident consequences for low power testing as compared to continuous full power operation, the analysis for this example identified a time period of 10 hours (from the start time of the initiating event to the start time of a potential major release) as a reasonable amount of time for OROs to take appropriate response actions that provide for public health and safety without the need for predetermined, prompt protective measures.

i. With respect to the comment on the use of one bounding release scenario, although the proposal to assess one release that bounds the facility's licensing-basis events is not part of the methodology, it is only one acceptable method, and applicants and licensees are not required to follow it. The applicant or licensee may choose other methods to perform this analysis and provide justification for the specific proposal chosen. The NRC will evaluate each application on a case-by-case basis. The NRC did not change DG-1350 in response to this comment.

j. The NRC revised Sections A-3.3 and A-3.4 of Appendix A to DG-1350 to indicate that applicants and licensees should use wind directions as an additional input parameter for meteorological data during the development of a source transport model. The NRC also revised the DG to indicate that applicants and licensees should identify the approaches for the treatment of wind shifts during the release that were used during the development of the atmospheric transport model.

k. The NRC revised Section A.2.c of Appendix A to expand and clarify plume buoyancy for an atmospheric release as follows:

> The U.S. Nuclear Regulatory Commission developed the guidance in this methodology under the assumption that the atmospheric release may be modeled as a neutral density plume that does not undergo chemical or physical transformations after release to the atmosphere, with corrections for radioactive decay and ingrowth, wet or dry deposition (or both), and plume rise due to buoyancy or momentum (or both), as appropriate. If the chemical or physical form of the atmospheric release requires more complex atmospheric transport modeling, additional analyses may be needed.

Accordingly, the NRC revised DG-1350 as described above.

Comment L-2: Commenters suggested the following editorial changes to DG-1350:

a. Change the phrase "authorization for termination and transition to recovery," to "authorization for emergency declaration, termination, and transition to recovery," on page 14 of Section C.5.g.(1)(c) of DG-1350.

b. Change the phrase “to train and retrain facility personnel” on page 14 in Section C.5.g.(2)(a) of DG-1350 to “to train and re-train facility personnel” and change the phrase “within the emergency plan including” to read “within the emergency plan, including.”

c. Change the phrase “methods to expand, relax, suspend, or terminate the protective actions” to “methods to initiate, expand, relax, suspend, or terminate the protective actions” in Section C.7.c.(5) of DG-1350.

d. Replace “periodicities” and “periodicity” with “frequencies” and “frequency” in Section C.7.j.(2) and k.(3) of DG-1350, as the words “frequencies” and “frequency” are used on page B-1 of Appendix B.

e. Eliminate the definition of “TEDE” in Appendix A, Section A-3.5 as the term is already defined in Section A-3.1.

f. Choose to use either “1 rem” or “one rem” for consistency in Appendix A, Section A-1.

g. Change “deployment” on page 17, Subsection 6.b.(8) to “development.”

h. Make the note regarding free play following Section C.5.g.(2)(a) a new section as it seems to be missing formatting.

i. Insert “to” between “taken” and “protect” in the first sentence of Section C.7.c, “Protective Measures,” on page 20 of DG-1350.

j. Revise Section C.5.d to remove the redundant content, such as “determining protective actions,” and state the “expected scope of the protective actions” because sentences in Subsections C.5.d.(1) and d.(2) on page 13 of DG-1350 appear to be redundant and unclear.

k. One commenter pointed out that the references on pages 25 and 26 “do not appear to have been reviewed by a technical editor, as they are inconsistent in format” and incorrect. The commenter suggested that the NRC include the following edits:

   Item 10: Add “Revision 1.”

   Item 11: Add “Revision 3,” “March 2007,” “Section 13.3, Emergency Planning.”

   Item 15: Add the document number and revision number for the FEMA NRF, as applicable.

   Item 16: Change “EPA-400/R-17/001” to read (something like) “U.S. EPA Report No. EPA-400/R-17/001.”

   Item 18: Change to read “NUREG/CR-7002 (SAND2010-0016P), ‘Criteria for Development of Evacuation Time Estimate Studies,’ November 2011 (Jones et al.).”

l. One commenter suggested that the NRC cite RG 1.233, issued June 2020, which references DG-1350.

(BM-22, BM-23, BM-26, BM-27, BM-29, BM-31, DBY-15, NEIA-36, NSA-27, NEIA-32)

***NRC Response**:* The NRC agrees, in part, with the comments.

a. The NRC revised Section C.5.g.(1)(c) in DG-1350 to add the authorization for making emergency declarations as a responsibility to be considered in the analysis used to determine the minimum positions and corresponding responsibilities to perform the emergency response functions described in the emergency plan. The DG included the responsibilities to authorize termination and transition to recovery but omitted one of the essential roles in the emergency plan: the authorization to make emergency declarations.

b. The NRC revised the second sentence in Section C.5.g.(2)(a) and did not make the changes suggested by the commenter.

c. The NRC added the word “initiate” to Section C.7.c.(5) in DG-1350 (Section C.8.c.(6) in RG 1.242) because the emergency plan should describe how the organization responsible for issuing protective measures would do so.

d. The NRC made the editorial changes to Section C.7.j.(2) and k.(3) in DG-1350 (Section C.8.i.(2) and 7.f.(3) in RG 1.242) to use consistent terminology.

e. The NRC removed the definition of the abbreviation “TEDE” in Section A-3.5 of Appendix A to DG-1350 (Section A-3.6 of Appendix A to RG 1.242) because that abbreviation is previously defined in Section A-1 of Appendix A.

f. The NRC changed “one rem” to “1 rem” for consistent style.

g. The NRC changed “deployment” to “development” in Section C.6.b.(8) in DG-1350 (Section C.7.b.(8) in RG 1.242) to use the appropriate word.

h. The NRC added a new subsection, C.5.g.(2)(b), to the Staffing and Operations section in DG-1350 (Section C.6.g.(2)(b) in RG 1.242) to designate the sentence concerning the free play component associated with drill performance that was undesignated in DG-1350.

i. The NRC inserted the word “to” between “taken” and “protect” in the first sentence of Section C.7.c in DG-1350 (Section C.8.c. in RG 1.242) to correct a grammatical error.

j. The NRC agrees with the comment to revise the language in Section C.5.d of DG-1350 (Section C.6.d. in RG 1.242) to provide the capabilities for protective actions examples in a format that follows the format used in other sections of the guidance and to reduce the redundancy noted in the comment. The DG was revised as a result of this comment.

k. The NRC made some of the edits to the references suggested in the comment. The NRC did not make the edits that would have resulted in inconsistent formatting.

l. As stated in the NRC Response to Comment G-7, the NRC added RG 1.233 as an additional reference document in DG-1350. RG 1.233 provides guidance on the selection of licensing-basis events; classification and special treatments of structures,

systems, and components; and assessment of defense in depth for non-LWRs. Applicants can use RG 1.233 in the development of the analysis for determining EPZ size.

Accordingly, the NRC revised DG-1350 as described above.

Comment L-3: Several commenters provided suggestions for defining certain words or phrases:

a. One commenter said that Section A-1.b on page A-1 in Appendix A introduces the concept of an "all-hazards emergency management plan" and requested that the NRC add a definition or a description of an all-hazards plan, including its content within DG-1350 and the proposed rule.

b. One commenter said that "may" and "minimize" within DG-1350 provide no quantitative guidance for the size of the plume exposure pathway EPZ and suggested that either should be defined or replaced with specific quantitative criteria.

c. One commenter suggested that the NRC expand the guidance and define the terms "neutral density" and "non-reactive aerosols" for atmospheric release, as the terms can be interpreted differently. The terms are discussed under Appendix A, Section A-2.c on page 28 of DG-1350.

d. One commenter pointed out that the terms DBA and BDBA in the appendices are not quantitatively defined "in terms of probability or annual frequency of exceedance." The commenter suggested that the NRC provide detailed guidance on the basis for DBA and BDBA selection. For example, the commenter suggested that "DBA could be >1E-6 per year and a BDBA could be >1E-7 per year."

e. One commenter said that the phrase "as realistic as possible" in Section B-5 in Appendix B to DG-1350 could be interpreted differently by NRC reviewers. The commenter suggested that the NRC revise B-5 to "specifically and definitively quantify" a definition for the term "as realistic as possible" and cite NRC references such as State-of-the-Art Reactor Consequence Analyses (SOARCA).

f. One commenter said that the phrases "sufficient safety margins" and "all significant radionuclide sources" within Section B-2 in Appendix B to DG-1350 are open to "considerable" interpretation by NRC reviewers. The commenter suggested that the NRC quantify or provide specific references to NRC documentation to provide context for these phrases. For example, the commenter said that a "sufficient safety margin" is one that has been previously established by industry codes or NRC precedent, and a "significant radionuclide source" can potentially affect calculated dose by more than 1 percent.

g. One commenter said that the NRC needs to expand the definition of ONTs as it is too narrow and restrictive. The commenter suggested that the NRC develop footnote 1 on page 6 of DG-1350 to include licensing under 10 CFR Part 52 and add "other non-electric power production purposes."

(BM-30, NSA-8, NSA-11, NSA-13, NSA-15, NSA-16, NSA-17)

***NRC Response**:* The NRC agrees, in part, with the comments.

a. In Section A-1.b of Appendix A to DG-1350, the NRC referred to an "all-hazards emergency management plan" to describe a scenario in which certain actions could be initiated (i.e., the use of an all-hazards emergency management plan) following a radiological release but before the need for evacuation or sheltering, such that the accident resulting in that release could be excluded from consideration in determining the size of the plume exposure pathway EPZ. The NRC revised DG-1350 to remove the reference to an "all-hazards emergency management plan."

b. The NRC disagrees with the comment concerning the use of the terms "may" and "minimize" in relation to the EPZ sizing methodology. These terms are used as a general description of the more specific (yet still high level) guidance in Appendix A. The NRC did not change DG-1350 in response to this comment.

c. The NRC revised Section A-2.c of Appendix A to DG-1350 to describe neutral density and its transformation process following its release to the atmosphere and removed reference to nonreactive aerosols and gasses.

d. The NRC disagrees with the comment requesting that DG-1350 provide detailed guidance on the basis for DBA and BDBA selection. This DG provides generalized methodologies for determining plume exposure pathway EPZ size and information on source terms related to EPZ size development, which assumes that adequate information on licensing-basis events, radiological source terms, and, as appropriate, PRA is available as part of the applicant's license application. The NRC's review of licensing-basis events, including DBAs and BDBAs, is part of the NRC's SAR evaluation. Therefore, detailed guidance on the basis for DBA and BDBA selection is beyond the scope of this DG. The NRC did not change DG-1350 in response to this comment.

e. The NRC disagrees with the comment that it should quantify a definition for the phrase "as realistic as possible" in Section B-5 in Appendix B to DG-1350. The phrase "as realistic as possible" is determined through engineering judgment (for both the NRC and the applicant) and provides flexibility to the applicant to use the information available to it for its particular plant and justify its specific use of the information, including consideration of uncertainty. The NRC did not change DG-1350 in response to this comment.

f. The NRC disagrees with the comment that it should quantify or provide specific references to NRC documentation to provide context for the phrases, "sufficient safety margins" and "all significant radionuclide sources," in Section B-2 of DG-1350. These phrases are items that ensure an integrated risk-informed decisionmaking process. Maintaining sufficient safety margins in a plant's licensing basis is a key principle in risk-informed decisionmaking, as discussed in more detail in RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis." To ensure a complete evaluation and comparison to the relevant metric, radiological consequence analyses should include all sources that would significantly affect the results of the analyses. The determination of sufficient safety margin and whether all significant radionuclide sources have been included is related to the consideration of uncertainty in the radiological consequence analyses, in that there is sufficient margin to account for uncertainty in the analyses and data, and the results take into account significant radionuclide sources in order to reduce

uncertainty. The NRC will evaluate each applicant's analysis on its own merits. The NRC did not change DG-1350 in response to this comment.

g. The NRC expanded footnote 1 in RG 1.242 to explain the scope of the term "other new technologies" consistent with the explanation in the final rule FRN.

Accordingly, the NRC revised DG-1350 as described above.

Comment L-4: Two commenters requested clarification of the EAL scheme. One commenter asked for clarity on expectations regarding State and local review of the EAL scheme and NRC approval.

The other commenter requested clarification of multiple EAL scheme issues. First, the commenter suggested that the NRC ensures that the example EAL scheme in Table 1 on page 12 is viewed as just one possible scheme and "that the reactor design-specifics are the final determination of the actual EAL structure and content." The commenter explained that the proposed rule acknowledges that some reactor designs may "employ a non-traditional containment approach which would conflict with the containment barrier EAL example in Table 1."

Second, the commenter noted that DG-1350 does not mention existing industry EAL guidance and suggested that the NRC include a statement in DG-1350 similar to "Should elements of existing NRC-endorsed EAL guidance be applicable to the SMR/ONT design, these elements may be used in the development of the site-specific EALs."

Finally, the commenter requested that the NRC clarify that, in Table 1 on page 12, the radiation monitors to be included in EALs are only those associated with detecting and monitoring a radiological release from the facility. The commenter went on to say that radiation monitors not associated with detecting and monitoring radiological release such as those upstream, or located in internal areas and processes need not be included, unless the licensee "wishes to credit them as alternative methods to detect and monitor a release in the event an effluent monitor is unavailable." (DBY-13, NEIA-29, NEIA-30, NEIA-31)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC inserted a new Section C.5.c.(3)(b) in DG-1350 (Section C.6.c.(3)(b) in RG 1.242) to clarify that the applicant or licensee should consider guidance provided or endorsed by the NRC for initial EAL scheme development. The NRC inserted into Section C.7.f.3 in RG 1.242 that the EAL scheme should be reviewed annually with any offsite organization that may have emergency response responsibilities, if applicable. There is no requirement in the final rule for prior ORO agreement of EALs.

The NRC revised Section C.5.c.(3)(c) in DG-1350 (Section C.6.c.(3)(d) in RG 1.242) to indicate that the example EALs listed in Table 1 in RG 1.242 are only one example of EALs that could be used by an applicant or licensee, and they can develop other EALs for submittal to the NRC. The NRC did not make any revisions to the examples provided in Table 1 associated with radiation monitors (effluents) because these are listed as one example of monitors that can be used by applicants and licensees as deemed appropriate by the applicant and licensee. Table 1 is guidance and does not establish a requirement of monitors that must be used.

Accordingly, the NRC revised DG-1350 as described above.

Comment L-5: Two commenters noted that the reference to NUREG-0654/FEMA-REP-1 only includes the November 1980 revision. Both commenters suggested that the NRC include a reference to a more recent revision, such as Revision 2, issued December 2019. One commenter asked if, by referencing the 1980 version, it is the NRC's intent to exclude all later supplements and revisions from the guidance. (DBY-9, NSA-19)

NRC Response*:* The NRC agrees with the comments. The NRC and FEMA revised and published NUREG-0654/FEMA-REP-1, Revision 2, in December 2019. The NRC added Revision 2 as an additional guidance document available for use in support of RG 1.242.

Accordingly, the NRC revised DG-1350 to include a reference to NUREG-0654/FEMA-REP-1, Revision 2, in response to these comments.

Comment L-6: Under Appendix B-2 to DG-1350, one commenter asked if there are other acceptable approaches to identifying the spectrum of credible accidents in addition to the guidance in RG 1.174. (NEIA-44)

NRC Response*:* DG-1350 states the following:

> The NRC issues RGs to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations…. Methods and solutions that differ from those set forth in RGs will be deemed acceptable if they provide a basis for the findings required for the issuance or continuance of a permit or license by the Commission.

Thus, applicants and licensees can propose for NRC review methods other than the approach described in RG 1.174.

Accordingly, the NRC did not change the guidance in response to this comment.

Comment L-7: One commenter suggested defining the term "credible accidents," which is mentioned on page 7 and page A-1 of DG-1350. The commenter explained that, without a clear understanding of how the term is "defined, identified, or determined, the whole basis of this proposed rule is weak and subject to interpretation and confusion in the future." One commenter recommended that the NRC should define the term "credible hazard" on page 11 in Subsection C.5.c.(3)(b) and page 22 in Subsection 8 of DG-1350. (DBY-10, DBY-12, DBY-17)

NRC Response*:* The NRC disagrees with the comments. As explained in the NRC Response to Comment D-2.1, the NRC removed the term "credible accident" from the final rule. Consequently, the NRC removed that term from DG-1350. The NRC did not define the term "credible hazard," as described in the NRC Responses to Comments C-1.1 and C-1.2.

Accordingly, the NRC did not change the guidance in response to these comments.

Comment L-8: One commenter noted that "hazardous chemicals" are mentioned on page 16 of DG-1350 with a reference to 10 CFR 70.4. The commenter explained that EP rules and guidance pertain to "radiological hazards"; therefore, the NRC should explain the context of the term "hazardous chemicals" in relation to how it is addressed in DG-1350 and define the term as well. (BM-24)

***NRC Response**:* The NRC disagrees with the comment. The draft guidance document does pertain to radiological hazards. Radioactive fission products exist in a variety of physical and chemical forms that would need to be considered during a radiological release. The release of certain hazardous chemicals produced from licensed material that could be toxic, explosive, flammable, corrosive, or reactive can endanger life and health and impact the response to an incident at a site. Therefore, these chemicals, if released, would need to be monitored and controlled by the licensee to minimize any impact to life or health of emergency responders. For example, Section 13b, "Radioisotope Production Facility Accident Analyses," of "Interim Staff Guidance Augmenting NUREG-1537, Part 1, 'Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content,' for Licensing Radioisotope Production Facilities and Aqueous Homogeneous Reactors," dated October 17, 2012 (ADAMS Accession No. ML12156A069), includes a Section 13b.3, "Analyses of Accidents with Hazardous Chemicals," that provides that a radioisotope production facility license application should include "[a] conclusion that the applicant has reasonable assurance that measures to mitigate the consequences of accidents [with hazardous chemicals] are consistent with actions described in the emergency plan."

Accordingly, the NRC did not change the guidance in response to this comment.

Comment L-9: One commenter suggested that the second paragraph under Performance-Based Framework on page 10 of DG-1350 does not provide clear guidance for the application of what the NRC may find acceptable, nor does it provide the NRC reviewer with an acceptable framework. (DBY-11)

***NRC Response**:* The NRC disagrees with the comment. As stated in the guidance, "The staff will evaluate applications using a graded approach based on site-specific consequence analyses." As noted in DG-1350, the performance-based framework of 10 CFR 50.160 and anticipated variances in SMR and ONT designs mean that the methods applicants and licensees will need to demonstrate compliance with the applicable EP requirements will vary based on design- and site-specific considerations. Therefore, in RG 1.242, the NRC is providing general guidance on the content of emergency plans. If design-specific guidance is developed by the NRC or industry at a future date, applicants may reference those documents within their applications.

Accordingly, the NRC did not change the guidance in response to this comment.

Comment L-10: One commenter recommended that the NRC revise the Reentry section on page 16 of DG-1350. The commenter suggested that Section C.5.i.(1) should be revised so it reads "capabilities to develop and implement reentry plans for access to the facility after radiological emergencies including the methods…" and a new Section C.5.i.(3) should be added that reads "if applicable, capability to develop and implement coordinated reentry plans after hostile action-based emergencies including…." The commenter stated that the reentry after hostile action-based events would be coordinated with site security, offsite supporting organizations, or both, which would be consistent with Subsection C.6.b.(7). (NEIA-34)

***NRC Response**:* The NRC agrees with the comment. The capabilities for reentry following a hostile action-based emergency should be coordinated with site security and the Incident Command Post, if applicable. This coordination would not be necessary for reentry plans following a radiological emergency. Therefore, the NRC separated the reentry provisions for radiological emergencies and hostile-action-based emergencies in RG 1.242.

Accordingly, the NRC revised DG-1350 so that Section C.6.i. of RG 1.242 reads as follows:

> (1) capabilities to develop and implement reentry plans for access to the facility after radiological emergencies, including the methods, processes, equipment, facilities, and personnel; (2) capabilities to develop and implement reentry plans for access to the facility following hostile action-based emergencies including the methods, processes, equipment, facilities, and personnel in coordination with site security and the Incident Command Post (ICP), if applicable … .

Comment L-11: One commenter suggested that bullet 2, "Evaluated Exercises," under Section C.5.g.(2)(a) of DG-1350 should be moved since exercises are not drills and should be replaced with a new Section C.5.g.(3), which reads as follows:

> Evaluated exercises are used to demonstrate proficiency in the major portions of the emergency plan and, as such, cannot be used for training and instruction. Participation in an evaluated exercise is not required in advance of being assigned to an emergency response role. (NEIA-35)

NRC Response*:* The NRC agrees with the comment. The discussion in DG-1350 of evaluated exercises should not be in the same section that describes the various types of drills used for training. The NRC moved the discussion of evaluated exercises to a new Section C.6.g.(2)(c) in RG 1.242 that defines the purpose of evaluated exercises and explains how they differ from the drills listed in Section C.6.g.(2)(a).

Accordingly, the NRC revised DG-1350 in response to this comment.

Comment L-12: One commenter suggested that guidance provided in Appendix A, Section A-2 to DG-1350 "should also permit consideration of factors mitigating an atmospheric radiological release." The commenter explained that many advanced reactor designs include subterranean reactor vessels and support systems, which would result in greater particulate removal than is currently recognized in guidance. (NEIA-40)

NRC Response*:* The NRC disagrees with the comment. Consideration of factors that would affect the release to the atmosphere such as particulate removal in subterranean areas of the facility is part of the source term development, which should model the transport of fission products across all barriers and pathways to the environs. The NRC provides high-level guidance on the development of source terms in Appendix B to RG 1.242.

Accordingly, the NRC did not change the guidance in response to this comment.

Comment L-13: One commenter suggested that dose aggregation guidance in Appendix A, Section A-3.6 would benefit from the addition of an acceptable limiting dose exceedance frequency or identifying sources of an acceptable frequency. (NEIA-43)

NRC Response*:* The NRC agrees with the comment. Applicants and licensees would benefit from additional guidance on an acceptable dose exceedance frequency. The NRC revised Appendix A Section A-3.6, "Probabilistic Dose Aggregation," of DG-1350 (Appendix A, Section A-3.7 in RG 1.242) to state that the likelihood of exceeding a TEDE of 1 rem at the proposed EPZ boundary should be consistent with the evaluation in Appendix I to NUREG-0396, and to identify relevant information from NUREG-0396 that may be used by applicants and licensees to

inform selection of a limiting dose exceedance frequency to inform the size of the plume exposure pathway EPZ.

Accordingly, the NRC revised DG-1350 in response to this comment.

Comment L-14: In relation to Appendix A, Section A-3.1 and Appendix B, Section B-5, one commenter asked if it is acceptable to use source terms that reflect a hybrid approach of deterministic and probabilistic considerations. The commenter said that this approach may be helpful to some applications dealing with large uncertainties in their PRA models. (NEIA-45)

NRC Response*:* The NRC agrees, in part, with the comment. The NRC agrees that an applicant is not required to use a mechanistic source term for the dose analysis to support plume exposure pathway EPZ size determination. As stated in Appendix B to RG 1.242, each applicant should develop potential source terms from accidents for its facility. Applicants can use the same methods in the analysis to support plume exposure pathway EPZ size determination that they use in the safety analysis for the license application. The NRC review of accident source terms is part of the safety review for the license application and supports its separate review of the applicant's emergency plans. However, the NRC is not commenting on whether a hybrid approach could be useful to certain applicants and not providing detailed guidance on other potential approaches to develop accident source terms. An RG provides one acceptable approach, and applicants can propose a different method for NRC review.

Accordingly, the NRC did not change the guidance in response to this comment.

Comment L-15: One commenter suggested that the NRC revise item e under Appendix A, Section A-2 to state that one 96-hour exposure with no protective action credit shall be assumed, as the assumption of a specified exposure duration with no protective action credit contradicts the introduction paragraph in Section A-1. (NSA-10)

NRC Response*:* The NRC agrees with the comment. To be consistent with the introductory paragraph in Appendix A, Section A-1 of DG-1350, Section A-2.e should be clarified to state that the exposure duration should be 96 hours. In addition, no credit for protective actions should be assumed in the analysis to ensure that the plume exposure pathway EPZ encompasses areas where prompt protective measures are necessary.

Accordingly, the NRC revised Appendix A, Section A-2.e in DG-1350 to clearly state that an exposure duration of 96 hours from the start of the release with no credit for protective actions should be assumed.

Comment L-16: One commenter discussed the statement on modeling fission product transfer across all barriers and pathways to the environment. The commenter recommended that this section be expanded to state that credit for nonsafety-related structures, systems, and components is acceptable for BDBAs. The commenter also suggested that the NRC define the term "transport" in a footnote that includes the physical movement as well as the "natural processes of FP depletion including, but not limited to, gravitational settling, diffusiophoresis, thermophoresis, spray depletion, and chemical reactions." (NSA-14)

NRC Response*:* The NRC agrees with the comment. Additional clarity could be added on modeling fission product transport to be consistent with current practice and regulatory guidance on radiological consequences of DBAs in NUREG-0800, Section 15.0.3, "Design Basis Accident Radiological Consequences of Analyses for Advanced Light Water Reactors," issued

March 2007 (ADAMS Accession No. ML070230012), and RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," issued July 2000 (ADAMS Accession No. ML003716792), and the discussion for non-LWR determination of licensing-basis events in RG 1.233. The NRC revised Appendix B, Section B-4, to DG-1350 to explain that the evaluation of DBAs should assume only safety-related structures, systems, and components are available to mitigate the accident. Consistent with modeling practices for severe accident analysis and PRA, beyond-design-basis events may model structures, systems, and components according to their capability under the plant conditions for the event. The NRC also added a footnote to DG-1350 to clarify what is meant by "transport of fission products" as suggested in the comment.

Accordingly, the NRC changed Appendix B to DG-1350 in response to this comment.

Comment L-17: One commenter stated that Section B in DG-1350 does not definitively state whether this guidance fully complies with IAEA general safety requirements (GSR) Part 7. The commenter suggested that the NRC add a summary or conclusion that clarifies this. (NSA-18)

NRC Response*:* The NRC agrees, in part, with the comment. DG-1350 does not definitively state whether DG-1350 fully complies with IAEA GSR Part 7. There is no requirement for NRC guidance documents to comply with IAEA guidance documents.

The section of GSR Part 7 entitled "Application of the Safety Requirements" provides the basis as to why the document is not binding on the NRC. It states, in part, the following:

> These safety requirements are to be applied by the Sponsoring Organizations to their own operations in line with their respective mandates. States that are member states of the Sponsoring Organizations other than the IAEA may adopt these safety requirements, at their own discretion, or in accordance with their membership obligations, for application to their own activities.

The NRC is a member state of IAEA, a Sponsoring Organization. Based on GSR Part 7's applicability, the NRC considered GSR Part 7 and utilized discretion in adoption of its safety standards during the development of DG-1350.

The NRC revised the "Harmonization with International Standards" section of DG-1350 consistent with standard changes the NRC makes to new or revised RGs, but the NRC did not change DG-1350 in response to this comment.

Comment L-18: One commenter said that the scope and intent of the hazard analysis requirement in Section C of DG-1350 is unclear. The commenter said Section C also provides little guidance on how to conduct a hazard analysis, or its relationship with associated regulations and guidance. (NSA-23)

NRC Response*:* The NRC agrees, in part, with the comment. RG 1.242 provides high-level guidance on the means of conducting the hazard analysis. As explained in Section C.5 of DG-1350, the NRC is providing general guidance on the content of emergency plans but not specific methods for compliance: "The methods needed to demonstrate preparedness will vary based on design- and site-specific considerations." Each hazard analysis supporting the method for compliance will also be site specific. The SOC for the final rule contains additional information related to the hazard analysis.

Accordingly, the NRC did not change the guidance in response to this comment.

Comment L-19: One commenter said that advanced reactor designs could address performance-based requirements in the rule differently and the associated guidance should reflect this. As an example, the commenter referred to concerns related to events that impact multiple reactor modules in one location and noted that guidance should address EP for multiple reactor modules. (CLA-3)

NRC Response*:* The NRC agrees with the comment. The guidance document is written to support a performance-based framework for a variety of reactor technologies, as its title indicates. Thus, different applicants could propose to address the requirements in 10 CFR 50.160 in different ways. Further, the final rule requires that applicants and licensees account for multiple reactors at a single site, as described in the NRC Response to Comment C-1.4. As explained in Section C.9.a of RG 1.242, the hazard analysis should include the site-specific hazards posed by multimodular and nuclear units and nearby, adjacent, or contiguous facilities that could complicate the licensee's emergency response.

Accordingly, the NRC did not change the guidance in response to this comment.

Comment L-20: One commenter noted that RG 1.242 does not specify new performance indicators beyond those used for LLWRs, and current requirements under 10 CFR 50.47 have largely been rewritten and reproduced in the proposed rule and guidance. The commenter stated that the proposed rule introduces a second set of planning standards for facilities with an offsite plume exposure pathway EPZ. The commenter suggested that the two sets of planning standards (i.e., 10 CFR 50.160 and 10 CFR 50.47) could "cause confusion across the stakeholder community." (CRCPD-9)

NRC Response*:* The NRC disagrees with the comment. The final rule clearly states that applicants and licensees must use either the EP framework of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 or the requirements in 10 CFR 50.160. Performance indicators are part of the NRC's oversight and inspection program and will be developed in the future for SMRs and ONTs.

Accordingly, the NRC did not change the guidance in response to this comment.

Comment L-21: One commenter stated that the final RG should clarify that the facilities required by 10 CFR 50.160(b)(1)(iv)(A)(*4*) and 10 CFR 50.160(b)(1)(iv)(B)(*6*) may be collocated with a facility serving another purpose. (NEIA-9)

NRC Response*:* The NRC disagrees with the comment. The emergency response facilities required by 10 CFR 50.160(b)(1)(iv)(A)(*4*) and 10 CFR 50.160(b)(1)(iv)(B)(*5*) (formerly 10 CFR 50.160(b)(1)(iv)(B)(*6*) in the proposed rule) will be site-specific, design-specific, or both. The guidance allows for a range of designs based on these site-specific and design-specific criteria. Collocation of the emergency response facilities with a facility serving another purpose is one possible scenario, but the NRC did not include in RG 1.242 examples of the types of facilities that could satisfy the requirements of 10 CFR 50.160(b)(1)(iv)(A)(*4*) and 10 CFR 50.160(b)(1)(iv)(B)(*5*).

Accordingly, the NRC did not change the guidance in response to this comment.

M. Requests for Extension of the Comment Period

Comment M-1: Several commenters, and a form letter campaign, recommended a 6-month extension of the comment period, citing the complexity and significant impacts of the proposed rule. One commenter wrote that the extension would have a positive impact on the quality of the comments. Additionally, some commenters, including a form letter campaign, cited the COVID-19 pandemic as a rationale for extending the comment period by 6 months or 6 months after the COVID-19 crisis is over. One commenter said that there is not an urgent and immediate need for the proposed rule. The commenter also wrote that communities of color, who face structural racism related to proximity to and the impact of nuclear power plants, have been disproportionately impacted by the pandemic and may not have the time or resources to comment on the rule. (SL1-1, PL-1, UW1-1, UW1-3, SL2-1, GW-1, NGO-1, FL1-2)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC seeks to ensure that the public and other stakeholders have a reasonable opportunity to provide the NRC with comments. The NRC acknowledges that the rulemaking documents contain a significant amount of information. However, the NRC disagrees that a 6-month extension was warranted in this case.

Accordingly, the NRC extended the comment period for the proposed rule for an additional 60 days, which provided a reasonable opportunity for all stakeholders to review these documents and to develop informed comments on these documents. The public comment period was originally scheduled to close on July 27, 2020, and the NRC extended the comment period for an additional 60 days to September 25, 2020.

Comment M-2: Commenters requested that the comment period be extended because additional information is needed on the design, safety, and risks of SMR reactor designs, and will become available after the end of the comment period. Specifically, the commenters referred to the proposed NuScale Power LLC SMR design, which is the first multimodule SMR design to be considered by the NRC. The commenter noted that the NRC and Advisory Committee on Reactor Safeguards (ACRS) review of the proposed project's application is relevant to the rulemaking but will not be final by the time the comment period concludes. (UW1-2, NGO-2)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC extended the original public comment period to allow more time for members of the public and other stakeholders to develop and submit their comments. The public comment period was originally scheduled to close on July 27, 2020, and the NRC extended the comment period to September 25, 2020. But the NRC disagrees that the comment period needed to be extended for the availability of additional information on reactor designs because the final rule is technology inclusive. Thus, the NRC's completion of this rulemaking does not depend on the design of any SMR or ONT.

N. Additional Comments on the Proposed Rule

Comment N-1: Two commenters expressed opposition to FEMA's comments on the proposed rule that suggest congressional action may be necessary for the NRC to finalize this rulemaking due to alterations to the consultative relationship between FEMA and NRC. The commenters explained that, under the AEA, the NRC has the authority to create regulations that protect the health and safety of the public and said that the proposed rule fits within this authority. One commenter discussed the relationship between the NRC and FEMA, and stated that Congress, through language in NRC Authorization Acts, and the U.S. Courts of Appeals have recognized that the NRC has the final authority regarding whether an applicant or licensee has provided

reasonable assurance that adequate protective measures will be implemented in the case of a radiological emergency. The commenters explained that this responsibility is essential as it avoids "unnecessary and inefficient dual regulation by multiple Federal agencies."

The commenters stated that for facilities with a plume exposure pathway EPZ that extends beyond the site boundary, NRC and FEMA coordination on this rule's offsite EP planning requirements would remain unchanged. According to the commenters, the rule also explains that facilities with a site boundary plume exposure pathway EPZ do not affect FEMA's responsibility for overall emergency management in providing assistance to State and local governments, nor does it impact the emergency management responsibilities of State and local governments. As a result, the proposed rule does not involve a matter of significant public policy that would require congressional action.

One commenter also highlighted the history of the proposed rulemaking, stating that the Commission, noting the need for regulations that meet the needs of advanced reactors and reduce the need for exemptions, unanimously initiated the rulemaking in 2015. Soon after, the Tennessee Valley Authority submitted an ESP application requesting a 2-mile plume exposure pathway EPZ option. The NRC staff conducted a technical review of the application and addressed FEMA's concerns at that time related to the proposed scalable emergency planning approach. Ultimately the Commission issued the ESP and noted that the NRC staff's responses addressed FEMA's concerns. (NEICL-1, NEICL-2, NEICL-3, NEICL-4, NEICL-5, CLA-6, CLA-7, CLA-8, CLA-9)

***NRC Response**:* The NRC agrees with the comments. As explained in the proposed rule FRN, the NRC has the congressional authority under the AEA to establish standards for both onsite and offsite radiological emergency response plans and for making licensing decisions regarding the overall adequacy of EP for a nuclear power plant site. This rulemaking is conducted within this authority.

The NRC also agrees that this rulemaking does not seek to alter the consultative relationship between the NRC and FEMA. When a plume exposure pathway EPZ extends beyond the licensee's site boundary, the NRC consults with FEMA on offsite radiological EP. This rulemaking does not change that relationship. The NRC Response to Comment N-7 discusses in more detail the consultative relationship between the NRC and FEMA as it relates to offsite emergency planning.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-2: Several commenters stated that the proposed rule is consistent with the Nuclear Energy Innovation and Modernization Act (NEIMA) and abides by its requirements. The commenters stated that NEIMA directed the NRC to establish a risk-informed, technology-inclusive framework to license and oversee advanced nuclear technologies.

One commenter further stated that NEIMA instructed the NRC to submit a report on EP enhancement activities. The commenter wrote that the report anticipated that future advanced reactor designs would require different EP requirements than the current fleet of LLWRs, and the NRC would need to develop new EP requirements to reduce the reliance on exemption requests. (NEICL-6, NSCL-2, CLA-5, NNSA2-2, ANS-3)

***NRC Response**:* The NRC agrees with the comments. The comments support the proposed rule and suggest no changes to the proposed rule.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-3: Several commenters asserted that the assumptions used by the NRC to evaluate the safety of SMR and ONT designs are not supported by any evidence. One commenter said that there is no basis for the assumption that SMR and ONT designs are inherently safer, have lower risk, and have less demanding accident conditions. This commenter said that the proposed rule does not adequately consider a number of risks associated with new technologies and SMRs. The commenter further stated that the NRC should not make any assumptions regarding reactor safety until there has been a period of operational experience. Another commenter further said that unreconciled weaknesses in SMR design and performance make it impossible for the NRC to reach any conclusion regarding the safety of SMRs. The commenters offered NuScale's SMR design as an example. (SRA-5, SRA-6, SRA-7, SRA-8, SRA-9, UW2-12, UW2-18, UW2-38, UW2-40, UW2-42)

NRC Response*:* The NRC disagrees with the comments. Based on experiences to date, such as the Clinch River ESP and preapplication discussions, the NRC expects SMR and ONT facilities to have smaller reactor core sizes, lower power densities, reduced likelihood of severe accidents, slower accident progression, and reduced likelihood of accident offsite consequences. With the expected safety enhancements in SMR designs, the NRC is allowing SMR applicants to develop plume exposure pathway EPZ sizes commensurate with their accident source terms, fission product releases, and accident dose characteristics.

To meet the requirements of this rulemaking's performance-based, technology-inclusive, risk-informed, and consequence-oriented EP framework, each applicant will need to demonstrate these safety enhancements for its design. Additionally, as explained in the NRC Response to Comment A-2.2, under 10 CFR 50.43(e), the NRC requires the demonstration of the performance of safety features of new reactor designs before approving the designs. The NRC Response to Comment N-6 discusses in more detail the safety enhancements expected in SMR and ONT facilities.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-4: Several commenters, including a form letter campaign, stated that nuclear reactors are a low risk technology that can mitigate climate change and air pollution. One commenter and a form letter campaign said that advanced nuclear reactors are clean, non-CO_2 emitting power sources that can benefit the fight against climate change. The form letter campaign asserted that advanced nuclear reactors have numerous environmental benefits, such as replacing fossil fuel power plants, and that it is imperative they are not hindered by unnecessary regulations. One commenter said that evidence suggests countries with sources of nuclear energy have fewer public health issues from air pollution. Another commenter stated that nuclear technology has its drawbacks like any technology, but ultimately, it is one of the safest forms of electricity production. The commenter added that the total deaths and lasting injuries associated with major accidents such as Chernobyl, Three Mile Island, and Fukushima have been very low. Also, the commenter stated that this rulemaking is a step in the right direction to give the nuclear power industry the regulatory framework needed to balance technological advancement with a continuing expectation of safety for both people and the environment. Finally, the commenter asserted that relative to other renewable energy sources such as wind, solar, or hydropower, nuclear energy can produce the same amount of energy with a smaller land use footprint. (NR-6, RB-1, FL2-5)

***NRC Response**:* The NRC agrees, in part, with the comments. The NRC agrees that it should proceed with the rulemaking. However, the promotion of nuclear power, for any reason, is not one of the purposes of this rulemaking nor is it permissible under the NRC's statutory authority.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-5: One commenter asked the NRC to incorporate and consider multiple statements from FEMA; statements by Commissioner Baran; and the ACRS NuScale SMR DC Lessons Learned Letter Report, dated October 2, 2020 (ADAMS Accession No. ML20267A655). Regarding letters from FEMA, the commenter said that the July 8, 2019, FEMA letter (ADAMS Accession No. ML19189A318) directly applies to this rulemaking and that FEMA should be the primary responsible entity that the NRC relies on because of FEMA's knowledge and expertise. The commenter further said that the August 24, 2019, FEMA letter (ADAMS Accession No. ML19240A938) applies to this rulemaking and that the NRC must respond to all of the letter's concerns as a part of the rulemaking. (UW2-3, UW2-4, UW2-5, UW2-6)

***NRC Response**:* The NRC agrees, in part, with the comments. The NRC has incorporated into the commenter's submission FEMA's July 8, 2019, letter regarding the Clinch River ESP application; FEMA's August 24, 2019, letter regarding testimony at the Clinch River ESP hearing; and the separate views of NRC Commissioner Baran included in the proposed rule FRN. The NRC responds to the content of these specific comments in other NRC responses to comments in this document. However, the NRC disagrees that it must consider the ACRS NuScale SMR DC Lessons Learned Letter. The ACRS's recommendations are for advanced reactor design reviews, whereas the final rule establishes a technology-inclusive EP framework for the regulation of SMRs and ONTs. Thus, the NRC's completion of this rulemaking does not depend on the design of any SMR or ONT. Further, the ACRS letter did not discuss the topic of this rulemaking—EP.

Accordingly, the NRC did not change the rule language in response to these comments requesting the incorporation of other stakeholders' statements and letters.

Comment N-6: One commenter asked for specific evidence for some of the claims presented in the proposed rule. First, the commenter said that the proposed rule references "advances in designs and safety research and their application to future operation of SMRs and ONTs" but does not provide any information on what these advances are. The commenter wrote that the NRC should conduct a full technical study and risk analysis of the specific designs to which the proposed rule would apply. Second, the commenter wrote that the proposed rule indicates that the new EP requirements would "recognize advances in design and technological advancements embedded in design features." The commenter asked that the NRC specifically reference these advancements and added that "risks, potential problems during reactor operation, and any other aspect of the reactor that could lead to accidents and offsite radiological releases and exposure to the public" be considered. Finally, the commenter wrote that the proposed rule indicates that new EP requirements would "credit safety enhancements in evolutionary and passive systems" but asked the NRC to detail what these safety enhancements are and how they will be balanced with a lack of operational history in SMR facilities. (UW2-11, UW2-16, UW2-17)

***NRC Response**:* The NRC disagrees with the comments. SMRs and ONTs are expected to incorporate design and safety enhancements, including inherent passive safety characteristics, below-grade or in-ground construction, natural circulation decay heat removal, interconnected systems, and advanced fuel types. These designs are associated with a potential low likelihood

of severe accidents, slower transient response times, and relatively small and slow release of fission products. The final rule assesses and takes into account the smaller reactor core and source terms for these designs, which potentially could provide for lower risk to the public as compared to the risk from LLWRs. For example, locating part or all of the reactor and structures below ground level would result in a ground-level release, which would affect the dispersion of the plume; buried reactor structures and pools may have longer coolant loss times and correspondingly longer accident progression times; and passive safety features that do not depend on electric power also could lead to longer accident progression times. Based on this, the NRC concludes that a graded approach to EP for SMRs and ONTs is appropriate.

Nevertheless, this final rule is technology inclusive. Any SMR or ONT applicant needs to demonstrate that its design meets the NRC's safety standards. As explained in the NRC Response to Comment A-2.2, under 10 CFR 50.43(e), the NRC requires the demonstration of the performance of safety features of new reactor designs before approving the designs. Whether the applicant's emergency plan meets the requirements of the NRC's EP requirements is determined based on inquiries that are both dependent and independent of the NRC's safety reviews. For example, the NRC reviews the applicant's assessment of licensing basis events, event likelihood, and public dose consequences as part of the agency's safety review of the application. The NRC's determination of the acceptability of the applicant's assessment supports the review of the applicant's emergency plan. The NRC's review of the emergency plan is also independent of the safety review, as described in the NRC Responses to Comments D-1.3 and D-2.1. These reviews occur regardless of the reactor design submitted by the applicant.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-7: Two commenters stated that the NRC and FEMA have a consultative relationship and that community radiological EP is a shared responsibility between the agencies. One commenter stated that the NRC has the authority, utilizing FEMA input, to determine the "relative importance" of offsite EP in its licensing decision. The commenter expressed concern that the proposed rule alters this consultative relationship and asserted that this is a matter of significant public policy, which will have to be resolved by Congress. Another commenter echoed the importance of FEMA's determinations in the NRC's licensing process but said that under the proposed rule, FEMA would have "no role" in assessing offsite emergency plans for reactors with a site boundary plume exposure pathway EPZ. (FEMA-7, UWJB-6)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that it has a consultative relationship with FEMA, and the NRC and FEMA executed a memorandum of understanding that outlines the responsibilities of both agencies as they relate to offsite radiological emergency planning.

The NRC disagrees with the comments because, in carrying out its responsibility under the AEA, the NRC establishes regulatory standards for onsite and offsite radiological emergency planning. In the case of EP regulations for non-power reactors, fuel cycle facilities, and independent spent fuel storage facilities, there are no regulatory requirements for dedicated offsite radiological emergency plans as part of the NRC license. Accordingly, NRC guidance for such facilities states that FEMA findings and determinations are not needed to support NRC licensing decisions. Similarly, for SMRs and ONTs, if the NRC determines that reasonable assurance of the adequacy of offsite radiological EP is not required for facilities where plume

exposure pathway EPZs do not extend beyond the site boundary, then FEMA findings and determinations regarding reasonable assurance would not be needed.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-8: One commenter expressed concern that the NRC has approved only one SMR design, and no SMR facility will become operational until November 2022. As a result, the NRC will not be able to fully assess SMR designs at that time for another 2 years. The commenter said that companies proposing to operate SMR facilities have no history in licensing, constructing, operating, or maintaining nuclear reactors. The commenter asserted that there are aspects of operating the first SMR that will not be known until it is operational, and that it is subsequently irresponsible of the NRC to limit the plume exposure pathway EPZ and reduce emergency planning requirements. The commenter further stated that the NRC has not adequately evaluated the risks of reducing emergency response planning for these new reactor designs. One commenter said that it is reckless of the NRC to ease public safety rules before an SMR design is approved. The commenter wrote that this action is unwarranted and said that the NRC has acknowledged the wide-ranging, unanswered concerns regarding the safety of SMR technology. (SRA-4, UW2-19, UW2-31)

NRC Response*:* The NRC disagrees with the comments. Despite the lack of operating experience with SMRs and ONTs, the NRC can proceed with this technology-inclusive rule. A technology-inclusive rule means that the rule does not depend on the design of the facility. The NRC accomplishes this by providing a risk-informed, performance-based, consequence-oriented framework, as explained in the NRC Responses to Comments B-1.2, B-3.1, and B-7.1. Nevertheless, as explained in the NRC Response to Comment N-6, any SMR or ONT applicant will need to demonstrate that its facility's design will meet the NRC's safety standards. The applicant also will need to demonstrate that its emergency plan meets the NRC's EP requirements. Further, if the applicant proposes to comply with this final rule, then the applicant must show that its emergency plan fits within the framework of 10 CFR 50.160.

This rule does not assume that a licensee complying with the final rule will have a site boundary plume exposure pathway EPZ. The size of the plume exposure pathway EPZ will depend on several factors, as explained in the NRC Response to Comment D-1.3.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-9: Two commenters requested clarification of the NRC's definition of SMRs based on their MW(e) generating capacity. One commenter wrote that the proposed rule defines an SMR as equal to or less than 1,000 MW(e) per module while the more common definition is less than or equal to 300 MW(e). The commenter expressed concern that this definition would make the proposed rule applicable to SMRs as well as medium-sized or future de-rated reactors. The commenter requested clarification of why and for what purpose the definition was changed. Another commenter wrote that under the proposed rule's definition, a 12-module SMR facility could have a total output of 3,600 MW(e) (12,000 MW(t)) which is a significant electrical output. The commenter wrote that the definition of SMR should limit each facility to 1,000 MW(t) total for all modules. (PBRP-1, UW2-49)

NRC Response*:* The NRC disagrees with the comments. In the proposed rule, the NRC's definition of an SMR is a power reactor that produces heat energy up to 1,000 MW(t), not MW(e). Because electrical power generating capacity is not a criterion the NRC uses to determine EP requirements, the rule's definition focuses on thermal power rating. The NRC

Response to Comment C-1.4 explains how the final rule requires consideration of each module at a single SMR.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-10: Two commenters stated that the proposed rulemaking can benefit electric systems and provide communities with clean, reliable electricity. One commenter stated that advanced reactors can support remote communities and mining operations that need emissions-free, dispatchable electricity. (NIA-4, ANS-2)

NRC Response*:* The NRC agrees, in part, with the comments. The NRC agrees that it should proceed with the rulemaking. However, the promotion of nuclear power, for any reason, is not one of the purposes of this rulemaking nor is it permissible under the NRC's statutory authority.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-11: One commenter urged the NRC to consider Tribes and Tribal lands before and during the rulemaking process. The commenter suggested that the NRC visit Tribal land to develop a better understanding of the local community along with the importance of the land and resources. The commenter further stated that the NRC should identify Tribes and ancestral lands that will experience substantial direct effects from agency actions. The commenter stated that the NRC has a commitment to facilitate Tribal involvement and government-to-government consultation. (NETWG-4, NETWG-5)

NRC Response*:* The NRC agrees, in part, with the comments. NRC engagement with Tribal communities impacted by the agency's activities is critical. However, this final rule is voluntary, and the NRC does not know which, if any, applicants will use the alternative EP framework of this final rule and whether any Tribes would be affected. The NRC conducted public outreach as described in the NRC Response to Comment N-12, plus the NRC staff gave a presentation on the proposed rule to the Bureau of Indian Affairs' Emergency Management Division and Tribal emergency response managers on August 2, 2018 (ADAMS Accession No. ML18292A488); sent a State and Tribal Communications letter to all Federally recognized Tribes, dated October 22, 2018, to provide notice of the upcoming public availability of the draft proposed rule (ADAMS Accession No. ML18284A124 (package)); sent a letter to all Federally recognized Tribes, dated May 21, 2020, to provide notice of the NRC's publication of the proposed rule and request for comments (ADAMS Accession No. ML20066K668 (package)); and gave a presentation to the Nuclear Energy Tribal Working Group on September 1, 2020, on the proposed rule. Going forward, the NRC will engage in outreach and consultation with the Tribes on EP during individual licensing proceedings in accordance with the agency's Tribal Policy Statement and Tribal Protocol Manual.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-12: One commenter expressed concern that SMRs and ONTs may be placed in communities that have no knowledge of the proposed rulemaking and no knowledge or experience with reactor operations. The commenter said that these citizens and communities are stakeholders that have not been consulted and are unaware that the rulemaking may affect them. Additionally, the commenter wrote that EP requirements should be changed only in the context of the application process with citizen participation. The commenter further said that the proposed rulemaking will limit, if not eliminate, community participation in decisions related to offsite planning for radiological emergencies. The commenter asserted that the proposed rule

eliminates the community's right to informed consent, along with the community's right to protect itself from SMRs and ONTs. (UW2-20, UW2-27, UW2-28)

***NRC Response**:* The NRC disagrees with the comments. The NRC's EP regulations are written for use by all applicable licensees. Generic rulemaking is an efficient and open process to address matters that apply to a given category of licensees generically, and it provides opportunities for public input from all interested parties regardless of location. In addition to the opportunities for the public to participate in the generic establishment of the EP regulations, the review of an application for a specific facility includes a hearing process that provides an opportunity for public participation to members of the community where that facility is located. Members of the public have the opportunity to request a hearing on the proposed emergency plan for that facility. The NRC also provides opportunities for public engagement in communities where facilities are proposed to be located through draft environmental impact statement public scoping meetings and government-to-government meetings.

The NRC has held multiple public meetings as opportunities for members of the public to learn about and ask questions about the rulemaking. The NRC staff held a public meeting on August 22, 2016, to request feedback from interested stakeholders on a potential performance-based approach for EP for SMRs and ONTs. The NRC published a draft regulatory basis for the rulemaking on April 13, 2017, with a 75-day public comment period and held an additional public meeting on May 10, 2017, to provide an overview of the draft regulatory basis. The NRC published the proposed rule with a 75-day public comment period with an additional 60-day extension of the comment period. The NRC staff also held a public meeting on June 24, 2020, to review the proposed rule. Openness is among the NRC's organizational values and Principles of Good Regulation, and it is the NRC's general policy to share information with the public in a transparent manner.

As described in the NRC Response to Comment A-2.3, the level of EP will be the same under the final rule as it is under the current framework in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50, thereby affording the same level of protection of the public health and safety as the current regulatory framework. As described in the NRC Response to Comment B-7.2, communities can develop and maintain radiological response capabilities without an NRC requirement for an offsite plume exposure pathway EPZ. Therefore, this rulemaking does not eliminate "a community's right to protect themselves from SMRs and ONTs." In the AEA, Congress authorized the NRC to regulate the civilian use of radioactive materials. The AEA requires the NRC to provide adequate protection of the public health and safety for communities around nuclear power plants through its regulation of these facilities. The NRC has the statutory authority to establish standards for both onsite and offsite radiological emergency response plans and to make licensing decisions regarding the overall adequacy of EP for a nuclear power plant site. This rulemaking is conducted within this authority.

Regarding the comment's suggestion to change the EP requirements in the context of an application process, the NRC does not make generic changes to regulations in the context of reviewing a specific application. Using such an approach in this case would potentially change the EP requirements with every SMR and ONT license application, perhaps repeatedly, and would make licensing proceedings unreasonably inefficient and complex. The rulemaking process is more appropriate for making generic changes, and it is open to the entire public. The licensing process is more appropriate for evaluating the EP approach taken at a specific site, and members of the local communities have opportunities to participate in that process.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment N-13: One commenter stated that the United States has experienced a number of recent extreme emergencies (wildfires, hurricanes, and COVID-19) and that the lack of EP caused significant harm to public health, public safety, and the environment. (UW2-33)

NRC Response*:* The NRC agrees, in part, with the comment. The United States experiences emergencies on some level on a regular basis, and a lack of preparedness can have serious consequences. However, the NRC is not required to assume that an offsite radiological release will happen but also does not assume that the probability of an offsite release is zero. EP is risk informed rather than risk based. Therefore, emergency planning is independent of accident probability. The risk-informed and consequence-oriented framework of 10 CFR 50.160 considers the potential consequences from a spectrum of accidents, including those that could result in an offsite radiological release and those that could not. The outcome is a graded approach to EP based on site-specific analyses.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-14: One commenter stated that investing all resources in renewable technologies, as some critics of nuclear energy have suggested, puts too much faith in technologies that have known drawbacks and no guaranteed path forward. The commenter asserts that nuclear energy is not without its own challenges, but it has the potential to be one of the cleanest energy sources out of the currently available technologies. The commenter stated that creating performance-based regulations, if done properly, will maintain the safety margins of nuclear power and supply an abundant amount of clean energy to the country. The commenter further wrote that the cleanest form of energy production (nuclear, wind, solar, or battery) will ultimately prevail. (RB-5)

NRC Response*:* The NRC agrees, in part, with these comments. The NRC agrees that a performance-based framework can maintain safety margins (i.e., provide reasonable assurance of adequate protection of the public health and safety). However, the promotion of nuclear power, for any reason, is not one of the purposes of this rulemaking nor is it permissible under the NRC's statutory authority.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-15: A form letter campaign expressed concern that, by easing the regulatory burden and streamlining licensing procedures, the NRC is relinquishing its responsibility to protect the public under the AEA to industry financial interests. The commenter asserted that the public can have no confidence in the proposed rule and it should be rejected. (FL1-10)

NRC Response*:* The NRC disagrees with the comment. The use and regulation of small reactors and other advanced reactor designs and technology have been active topics of discussion between the NRC and a variety of stakeholders for more than 30 years. The NRC worked with stakeholders to develop the framework for the implementation of performance-based EP regulations and is not prioritizing the financial interests of the nuclear industry. Additionally, in January 2019, the President signed NEIMA into law, which requires that the NRC establish a risk-informed, technology-inclusive regulatory framework to license and oversee advanced nuclear technologies. EP requirements are a part of this framework. Furthermore, as described in the NRC Response to Comment A-2.3, the level of EP will be the same under the final rule as it is under the current framework in 10 CFR 50.47(b) and

Appendix E to 10 CFR Part 50, thereby affording the same level of protection of the public health and safety as the current regulatory framework.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-16: One commenter asserted that reducing or eliminating offsite plume exposure pathway EPZs for SMRs and other nuclear technologies is contradicted by retaining Price-Anderson Act (PAA) liability protection for SMR facilities. The commenter stated that this constitutes an admission that the offsite risks from a nuclear accident still require liability protection for the nuclear industry. The commenter said that if the risk of a significant accident posed by SMRs is truly reduced, then they should not be protected by the liability shelter of the PAA. The commenter wrote that the continued need for PAA coverage of SMR facilities indicates the NRC should not go forward with the proposed rule. (BN-7)

NRC Response*:* Whether applicants and licensees that comply with this final rule will need the same offsite insurance protection as the currently operating nuclear power reactor licensees is beyond the scope of this rulemaking, which establishes an alternative EP framework for SMRs and ONTs. As the NRC staff explained in the enclosure, "Non-Light Water Reactor Implementation Action Plan Progress Summary and Future Plans," to SECY-21-0010, "Advanced Reactor Program Status," dated February 1, 2021 (ADAMS Accession No. ML20345A239 (package)), "[C]hanges to guidance or through rulemaking may be needed to develop a financial protection framework for advanced reactors, including the licensing of multi-module or multi-unit designs and facilities."

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-17: The commenter asked if new and existing reactors rated at less than or equal to 1,000 MW(e) would be able to obtain EP licensing or relicensing under the proposed rule. (PBRP-2)

NRC Response*:* The final rule applies to existing and future SMR and ONT facilities. In the final rule, 10 CFR 50.2 defines an SMR as a power reactor, which may be of modular design as defined in 10 CFR 52.1, licensed under 10 CFR 50.21 or 10 CFR 50.22 to produce heat energy up to 1,000 MW(t) per module. Because 1,000 MW(t) is equivalent to 300 MW(e), whether a facility rated at less than or equal to 1,000 MW(e) could use the EP framework of the final rule would depend on whether the MW(e) rating of the facility is less than or equal to 300 MW(e) per module.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-18: The commenter recommended that the NRC revise or remove the following statement, "Emergency preparedness is risk-informed rather than risk-based, and therefore emergency planning is independent of accident probability." The commenter said that risk-informed is not equivalent to independent of accident probability, as accident probability still comprises some basis in a risk-informed approach. (NSA-7)

NRC Response*:* The NRC disagrees with the comment. The context of the statement, "Emergency preparedness is risk-informed rather than risk-based, and therefore emergency planning is independent of accident probability," in the FRN is in reference to the EP planning basis and not to the spectrum of accidents that would be, tempered by accident probability, used as an input to the plume exposure pathway EPZ size determination.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-19: One commenter suggested that the proposed rulemaking should add a definition for the term "power reactor." The commenter said that the rulemaking uses the term on multiple instances and that providing a definition would promote clarity. (NSA-26)

NRC Response: The NRC disagrees with the comment. This rulemaking establishes an alternative EP framework for SMRs and ONTs such as non-LWRs and certain NPUFs. The final rule establishes definitions in 10 CFR 50.2 for each type of affected facility under the rulemaking. Therefore, establishing a definition of "power reactor" is beyond the scope of the rulemaking.

In addition, the term "power reactor" is defined in 10 CFR 171.5 as a nuclear reactor designed to produce electrical or heat energy and licensed by the Commission under the authority of Section 103 or Subsection 104b of the AEA and pursuant to the provisions of 10 CFR 50.21(b) or 10 CFR 50.22. The term "power reactor" also is defined in 10 CFR 100.3 as a nuclear reactor of a type described in 10 CFR 50.21(b) or 10 CFR 50.22 designed to produce electrical or heat energy.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-20: One commenter asserted that there are gaps that need to be addressed in the proposed rule, specifically final design information, source term information, operational plans for fuel cycles, collocation considerations and guidance, and a spectrum of design accidents. The commenter wrote that these gaps will need to be addressed during a licensing review but should not impact the development of the rule. (CLA-13)

NRC Response: The NRC agrees, in part, with the comment. The NRC disagrees that the rule has gaps that need to be addressed. Design-specific information that the commenter identifies would be addressed and evaluated through the application and licensing process. The NRC agrees there is no impact on the rule itself.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-21: In response to comments arguing that SMRs and ONTs lack operational history, one commenter stated that it is within the NRC's mandate and character to assess the potential source term, potential accident scenarios, and ultimate safety of any new nuclear technologies. The commenter suggested that the NRC has the capability and responsibility to do this for existing technologies and those with little or no operational history. The commenter noted that source terms for SMRs are determined analytically and conservatively based on the characteristics of the technology. The commenter said that the NRC's exercise of this responsibility will protect the public and ensure the safety of nuclear facilities. (NNSA2-5)

NRC Response: The NRC agrees with the comment. As explained in the NRC Response to Comment D-1.15, this rulemaking is within the scope of the NRC's authority and, as described in the NRC Response to Comment D-3.11, capabilities.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-22: One commenter stated that any decisions regarding exemptions to current EP rules should be a part of an applicant's COL or construction permit application and review process, and not evaluated with a predetermined set of exemptions. (UW2-37)

NRC Response: The NRC agrees, in part, with the comment. Licensing SMRs and ONTs within the current regulations, developed for LLWRs, would require approval of exemption requests. These would be part of an applicant's COL or OL application if the applicant selected the EP requirements in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. However, this approach could lead to inconsistencies and undue burden for applicants, licensees, and the NRC. Instead, this final rule provides an alternative EP framework—not a predetermined set of exemptions from the current regulations—that will eliminate the need for requests for exemptions.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment N-23: One commenter said that the NRC has not developed a specific regulatory framework for SMRs and ONTs. The commenter referred to the Oklo application and DG-1353 as examples of not having a firm regulatory framework for these types of facilities. (UW2-41)

NRC Response: The NRC disagrees with the comment. The NRC has a regulatory framework for licensing all reactor types, including SMRs and ONTs, and exemptions can be sought from this licensing framework. This final rule establishes an alternative EP framework for SMRs and ONTs. As a result, the rule would promote regulatory stability, predictability, and clarity, and reduce requests for exemptions from EP requirements. As required by NEIMA, the NRC is developing other regulations to provide a licensing framework for SMRs and ONTs.

Accordingly, the NRC did not change the rule language in response to this comment.

O. Outside the Scope of the Rulemaking

Comment O-1: Commenters requested changes to the NRC's requirements, guidance, and supporting analysis so protective actions have a net positive impact or "do more good than harm." One commenter said that protective actions for the public in the event of an emergency could result in far more deaths than would have occurred due to radiation exposure with no protective actions taken. The commenter wrote that a fundamental consideration of radiation protection according to the National Council on Radiation Protection and Measurements and International Commission on Radiological Protection is justification, which is defined as "Any decision that alters the radiation exposure situation should do more good than harm." Similarly, another commenter wrote that excessive emergency responses can have a greater risk than the initial accident, arguing that transportation during an evacuation or evacuating an oversized plume exposure pathway EPZ carries risk. One commenter cited the example of the Shoreham Nuclear Power Plant, arguing that regulations required excessive planning for evacuations that prevented it from opening, even though the chances of an incident were small. One commenter provided an extensive critique of the NRC's use of PAGs and other EP guidelines, such as the "keyhole" design of current LWR plume exposure pathway EPZ requirements. (TMY-1, TMY-2, MU-2, MU-5, MU-6, MU-8, MU-9, MU-11, MU-12, MU-14, AS-2)

NRC Response: These comments and proposed changes concern not only SMRs and ONTs but also the currently operating power reactors. For this reason, these comments are outside the scope of this rulemaking. However, the NRC received a petition for rulemaking seeking a change to the NRC's EP regulations and guidance to ensure that protective actions do more

good than harm (ADAMS Accession No. ML20176A313). The NRC docketed that petition and assigned it Docket Number PRM-50-123 (Docket ID NRC-2020-0155). The NRC will address these comments in the PRM-50-123 proceeding.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment O-2: One commenter asserted that they are a targeted entity and listed several Department of Defense commands that have been executed. The commenter requested that their children be returned and given safe haven and travel. (CPX-1)

NRC Response*:* The comment is outside of the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-3: One commenter stated that Federal agencies have not responded to concerns about EP and its connection to nuclear facilities and materials. The commenter also questioned why the DOE has been allowed to promulgate what the commenter characterized as "unsound and unsustainable" policies. The commenter said they have an audit from 1981 that has not been addressed by the agency. The commenter also wrote that they have not heard back from the NRC about "abuse of derivative scenarios in attempting to financialize policy issues." Finally, the commenter said that the policy of sabotaging facilities and entities that require high-level oversight is completely unacceptable. (CCR-1)

NRC Response*:* The NRC urges the commenter to report radiological safety concerns using the "Report a Safety or Security Concern" link at the top of the NRC's home page (www.nrc.gov). The comment is outside of the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-4: One commenter provided a quote by President Trump, saying the President resembled a TV show from the 1950s. (AN3-1)

NRC Response*:* This comment is outside the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-5: One commenter wrote that the proposed offsite planning requirements are based on a voluntary proposal developed by a joint NRC-EPA Task Force issued December 1978, and following the Three Mile Island incident, FEMA assumed responsibility for all offsite nuclear emergency planning and response. The commenter added that during the 2012 Prairie Island Radiological EP exercise, FEMA evaluators were pressured to "downgrade or dismiss" compliance issues and "Since then, the FEMA REP [radiological emergency preparedness] program has progressively declined." (KR-1, KR-2)

NRC Response*:* These comments either suggest no changes to the proposed rule or are outside of the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment O-6: Two commenters wrote that only after consultation and agreement from State and local authorities should changes to emergency plans for existing licensees be considered. (IDPH-6, CRCPD-12)

NRC Response*:* This rulemaking did not contemplate changes to emergency plans for existing licensees. Therefore, this comment is outside of the scope of this rulemaking. Furthermore, if the NRC were to provide a performance-based, consequence-oriented approach to EP for these licensees, then the NRC would conduct rulemaking, as suggested in the proposed rule FRN.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment O-7: One commenter noted that radiological EP exercises were postponed in response to the COVID-19 pandemic. The commenter concluded that the FEMA REP program is not regarded as essential, but it should be. (KR-3)

NRC Response*:* The status of the FEMA REP Program is outside the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-8: One commenter recommended that the NRC let an applicant build a facility 1 mile from populations and test the proposed recommendations, and then "solidify a new regulatory framework based on KwH [kilowatt hours] of generation." (DJ-2)

NRC Response*:* Where an applicant proposes to build a facility is outside the scope of this rulemaking. Also, as explained in the NRC Response to Comment A-2.2, the NRC has regulatory requirements to build and test new reactor facilities. The NRC provided information on this subject in Appendix A, "Process for Determining Testing Needs," to "A Regulatory Review Roadmap for Non-Light Water Reactors," issued December 2017 (ADAMS Accession No. ML17312B567). The NRC is considering additional guidance for applicants planning to submit applications to license advanced reactors closer to population centers. The NRC staff provided the Commission with such a proposal in SECY-20-0045, "Population-Related Siting Considerations for Advanced Reactors," dated May 8, 2020 (ADAMS Accession No. ML19262H055 (package)).

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-9: One commenter wrote that excessive evacuation rules forced the Shoreham Nuclear Power Plant to close, even though the chance of an accident was extremely small. (TQ-2)

NRC Response*:* The use of evacuations as a protective measure is outside the scope of this rulemaking. See the NRC Response to Comment O-1 for more information on this topic.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-10: One commenter wrote that SMRs present new risks with regard to security and would generate more waste without a long-term solution for storage. (DGY-2, DGY-3)

NRC Response*:* Security and disposal of nuclear waste are outside the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-11: One commenter wrote that the proposed rule should include an analysis of the risks of a potential incident compared to the impact SMRs would have on climate change. (TW-1)

NRC Response*:* Risks associated with accidents and benefits of SMRs to climate change are outside the scope of this rulemaking. These issues are licensing related, not EP related.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-12: One commenter requested that the NRC develop evidence-based regulations that best inform decisionmaking and do not overstate radiological risk. The commenter explained that exaggerated risk of radiation exposure does not protect the public and can "encourage decisions that are harmful to both people and the environment." (HF-8)

NRC Response*:* Perceived radiological threats are outside the scope of the rulemaking. See the NRC Response to Comment O-1 for more information on this topic.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-13: One commenter requested that the NRC add language to the final rule that requires applicants and licensees to evaluate the offsite releases associated with adversary destruction of target sets and determine the most severe and/or bounding offsite release scenario for adversary actions. The commenter explained that this addition would "ensure that the entire operation of an advanced nuclear reactor is taken into consideration in a performance-based model." Also, the commenter stated that this addition would provide "a performance-based feedback into the Site's protective strategy," and match criteria included in the proposed rulemaking for Alternative Physical Security Requirement for Advanced Reactors published in April 2020, which would provide flexibility in reducing physical security requirements. Finally, the commenter said that this additional language would close "the circle for the purposes of forming the protective strategy," because the safety analysis forms the bases for target sets to prevent the releases hypothesized to inform the plume exposure pathway EPZ. (CC-2, CC-3, CC-4, CC-5, CC-6)

NRC Response*:* The NRC ~~dis~~agrees, in part, with the comments. For the purposes of this final rule, the spectrum of accidents used to develop the basis for emergency planning includes the entire collection of event sequences considered in the design and licensing basis of the facility, including those related to security. ~~Performance-based feedback related to target sets informing the plume exposure pathway EPZ and offsite release scenario from adversary actions related to the site's security protective strategy is outside the scope of this rule.~~

Accordingly, the NRC provided additional clarification in the SOC ~~did not change the rule language in response to these comments~~.

Comment O-14: One commenter expressed concern over the safety of sodium-cooled fast reactors (SFRs). The commenter said that sodium is an inferior coolant relative to molten salts and that it is chemically dangerous. The commenter wrote that when hydrogen is generated by a sodium reaction with liquid water or steam, the hydrogen may accumulate and can detonate under certain conditions. The commenter stated that in a hydrogen explosive accident that breaches reactor containment, radioactive coolant can be released into the environment. The

commenter further said that the safety of SFR reactors such as the Integral Fast Reactor, Terrapower Traveling Wave Reactor, the Russian BN-800, and the GE S-Prism is not evidence enough that SFRs are a viable option. The commenter asserted that the general history of SFRs shows that their lifespans have been cut short by accidents. The commenter further wrote that it is difficult to evaluate the safety of SFRs as evaluators must scale figures from the French Superphenix to other designs. (RT-1, RT-2, RT-3)

***NRC Response**:* The comments suggest no changes to the proposed rule. This rulemaking establishes an alternative, technology-inclusive EP framework for the regulation of SMRs and ONTs. Individual reactor technologies or designs are outside the scope of this rulemaking. Accordingly, the NRC did not change the rule language in response to these comments.

Comment O-15: One commenter and a form letter campaign expressed concern over nuclear licensee liability in the event of an accident. One commenter noted that under PAA, nuclear industry liability is limited to $13 billion and that victims are left to seek damages from the government, meaning taxpayers are footing the bill for industry failings. The commenter said that licensees must create and maintain emergency plans that enable citizens to quickly evacuate when safety measures fail and probability estimates prove incorrect. Another commenter wrote that as the PAA is set to expire in 2025, the NRC should add a provision that includes an insurance requirement for offsite liability to mirror the PAA if the PAA is not renewed or extended. The commenter said that adding an offsite liability provision would redirect the burden of an accident from communities to the nuclear industry. (SBT-5, FL1-6)

***NRC Response**:* The NRC disagrees with the comments. Requiring additional offsite insurance protection is beyond the scope of this rulemaking, which establishes an alternative EP framework for SMRs and ONTs. The NRC's regulations related to financial protection requirements and indemnity agreements are located in 10 CFR Part 140. Additionally, while the PAA currently limits liability coverage to approximately $13 billion, Congress has explicitly committed to take necessary action to protect the public from the consequences of a disaster that would exceed coverage limits.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment O-16: One commenter and a form letter campaign wrote that advanced reactors with a fast spectrum are effective at producing clean electricity and reducing radioactive waste. The commenters further stated that these reactors are essential to closing the fuel cycle and converting spent fuel into more energy. (NR-5, FL2-4)

***NRC Response**:* The comments suggest no changes to the proposed rule. This rulemaking establishes an alternative, technology-inclusive EP framework for the regulation of SMRs and ONTs. Individual reactor technologies or designs are outside the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment O-17: One commenter provided an overview of the benefits of small reactors. For example, the commenter stated that the benefits include job creation, more affordable energy, reliable power as a backup to solar and wind energy, and production of desalinated water, among others. (AD-1)

***NRC Response**:* This comment suggests no changes to the proposed rule. This rulemaking establishes an alternative, technology-inclusive EP framework for the regulation of SMRs and ONTs. Individual reactor technologies or designs are outside the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-18: One commenter expressed concern over NRC assumptions regarding SMR nuclear waste. The commenter said that the NRC's assumptions regarding SMR waste streams are hypothetical and unsupported. The commenter stressed that the NRC should not reduce EP requirements based on these speculative assertions. The commenter cited research suggesting that the proposed NuScale reactor design would result in a 60-percent increase in spent fuel generated, and the volume of long-lived low- and intermediate-level nuclear waste generated is significantly larger than each unit of electricity relative to a standard LLWR. The commenter suggested that the NRC should evaluate SMR waste streams before they are licensed by the proposed rule. (SRA-10, SRA-11)

***NRC Response**:* This rulemaking establishes an alternative EP framework for SMRs and ONTs. Nuclear waste and spent fuel storage are outside the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to these comments.

Comment O-19: One commenter provided links to cooling systems and gravity distillation dehumidification systems. (EC-1)

***NRC Response**:* The comment suggests no changes to the proposed rule. The designs provided by the commenter are not within the scope of this rulemaking. Further, the NRC's alternative EP framework does not encompass design characteristics of nuclear power plants. Because this rulemaking would establish a technology-inclusive EP framework, individual reactor technologies or designs are outside the scope of this rulemaking.

Accordingly, the NRC did not change the rule language in response to this comment.

Comment O-20: One commenter stated that the linear no-threshold (LNT) argument used by critics of nuclear energy is unsubstantiated and is being disproved by modern research. The commenter further wrote that to base any protective rule on LNT is wrong and that the method cannot be used to estimate the biological effects of ionizing radiation. (GHX-4)

***NRC Response**:* The comment suggests no changes to the proposed rule. The use of LNT information is outside the scope of this rule.

Accordingly, the NRC did not change the rule language in response to this comment.

Appendix A: Form Letter Submissions

The U.S. Nuclear Regulatory Commission (NRC) received two sets of form letters on the proposed rule for emergency preparedness for small modular reactors and other new technology. Overall, there were 1,999 individual form letter submissions. Form Letter 1, which opposed the proposed rule, contained 1,976 submissions, and Form Letter 2, which supported the proposed rule, contained 23 submissions. For each set of form letter submissions, the NRC selected a master copy to bracket into individual comment excerpts, and then binned the excerpts to one of the 17 comment categories. The NRC's response to each form letter comment excerpt can be found by identifying the annotated submission abbreviation in the parenthetical list at the end of each comment summary. The table below contains the submission name of each form letter received, as well as the Agencywide Documents Access and Management System (ADAMS) accession number and the form letter submission abbreviation. In cases where the NRC received multiple submissions from the same name, the NRC added a number in parentheses next to the name in the table below. In some cases, the NRC received up to four (4) submissions from the same name.

Submission Name	ADAMS Accession No.	Submission Abbreviation
Stephen Gliva	ML20192A067	FL1
Alexander Whittle	ML20192A067	FL1
Kevin Vaught	ML20192A067	FL1
Tom Earnist	ML20192A067	FL1
Randall Esperas	ML20192A067	FL1
Joan Budd	ML20192A067	FL1
William Edelman	ML20192A067	FL1
Russell Ziegler	ML20192A067	FL1
Valerie Guinan	ML20192A067	FL1
I. Engle	ML20192A067	FL1
Michael Lombardi	ML20192A067	FL1
William DuSold	ML20192A067	FL1
Kathryn Christian	ML20192A067	FL1
Gary Gall	ML20192A067	FL1
Ellen Halbert	ML20192A067	FL1
Marya Zanders	ML20192A067	FL1
Sam Sheldon	ML20192A067	FL1
Joan Smith	ML20192A067	FL1
Donna Blue	ML20192A067	FL1
Lisa Mell	ML20192A067	FL1
Dawn Albanese	ML20192A067	FL1
Patrick Maloney	ML20192A067	FL1
Virginia Davis	ML20192A067	FL1
Rich Siegel	ML20192A067	FL1
Mina Connor	ML20192A067	FL1
Chris Beal	ML20192A067	FL1
Bryan Bennett	ML20192A067	FL1
Cynthia McNamara	ML20192A067	FL1
Bryna Pizzo	ML20192A067	FL1
Charles Davis	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Don Hawkins	ML20192A067	FL1
lj Okadlek	ML20192A067	FL1
Lynne Teplin	ML20192A067	FL1
Carolyn Pettis	ML20192A067	FL1
Ann Coffey	ML20192A067	FL1
Esther Boyd	ML20192A067	FL1
Steven Miller	ML20192A067	FL1
Frances Larson	ML20192A067	FL1
Kenneth Ruby	ML20192A067	FL1
Ronnie Perry	ML20192A067	FL1
Kat Stephens	ML20192A067	FL1
Mona Kandeler	ML20192A067	FL1
Julie Skelton	ML20192A067	FL1
Bonnie Murphy	ML20192A067	FL1
Dr. Virginia Jones	ML20192A067	FL1
Erin Garcia	ML20192A067	FL1
Ken Loehlein	ML20192A067	FL1
Paul Allard	ML20192A067	FL1
Paige Harrison	ML20192A067	FL1
George Stradtman	ML20192A067	FL1
Ron Rattner	ML20192A067	FL1
Timothy Schacht	ML20192A067	FL1
Marta Schmidt	ML20192A067	FL1
Dorothy Brooks	ML20192A067	FL1
Paula Frighetti	ML20192A067	FL1
Brenton Barnes	ML20192A067	FL1
Sandra Cole	ML20192A067	FL1
Nancy Morris	ML20192A067	FL1
Don Thompson	ML20192A067	FL1
David Hayes	ML20192A067	FL1
Janice Foss	ML20192A067	FL1
Norm Conrad	ML20192A067	FL1
Tia Pearson	ML20192A067	FL1
Arun Toke	ML20192A067	FL1
Denise Giroux	ML20192A067	FL1
Leslie Lomas (1)	ML20192A067	FL1
Lisa Appleton	ML20192A067	FL1
Leslie Lomas (2)	ML20192A067	FL1
Nancy Moore	ML20192A067	FL1
Leslie Lomas (3)	ML20192A067	FL1
Harvey Fernbach MD MPH	ML20192A067	FL1
Leslie Lomas (4)	ML20192A067	FL1
Janice Niblack	ML20192A067	FL1
Barbara Burnett	ML20192A067	FL1
Laurette Culbert	ML20192A067	FL1
Kelly Allison	ML20192A067	FL1
Eric Lemberg	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Carolyn Ludwig	ML20192A067	FL1
Carol Taylor	ML20192A067	FL1
Peter Kahigian	ML20192A067	FL1
Carol Fletcher	ML20192A067	FL1
Bruce Scharf	ML20192A067	FL1
Roberta E. Newman	ML20192A067	FL1
Jean Gore	ML20192A067	FL1
Edward Norkus	ML20192A067	FL1
Frances Goff	ML20192A067	FL1
Julie Squire	ML20192A067	FL1
Lee Hutchings	ML20192A067	FL1
Cara Melbye	ML20192A067	FL1
Monica M. Gallicho	ML20192A067	FL1
Laura Silverman	ML20192A067	FL1
Pamela Shaw	ML20192A067	FL1
Daniel Kurz	ML20192A067	FL1
Margery Winter	ML20192A067	FL1
Steve Overton	ML20192A067	FL1
Michael Sarabia	ML20192A067	FL1
Lorraine D. Johnson	ML20192A067	FL1
Nancy Ellingham	ML20192A067	FL1
Maria Asteinza	ML20192A067	FL1
Mary White	ML20192A067	FL1
Diane Vandiver	ML20192A067	FL1
Naomi Zuckerman	ML20192A067	FL1
Brian Ainsley	ML20192A067	FL1
Suzi Young	ML20192A067	FL1
Matthew Franck	ML20192A067	FL1
Jennifer Scott	ML20192A067	FL1
Patricia Wynn	ML20192A067	FL1
Maj(R) Douglas Gendron	ML20192A067	FL1
Larry Morningstar	ML20192A067	FL1
Lynne Harkins	ML20192A067	FL1
Steve Rusk	ML20192A067	FL1
Robert Edwards	ML20192A067	FL1
John Petroni	ML20192A067	FL1
Joy Baker	ML20192A067	FL1
Karsten Mueller	ML20192A067	FL1
Sandra Naidich	ML20192A067	FL1
Masaaki Takeuchi	ML20192A067	FL1
Susan Proietta	ML20192A067	FL1
Jill Davine	ML20192A067	FL1
Michael Daveiga (1)	ML20192A067	FL1
Bill Ridgeway	ML20192A067	FL1
Celeste Davis	ML20192A067	FL1
Lillian Nordin	ML20192A067	FL1
Bo Svensson	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Beth Estelle	ML20192A067	FL1
Doyle Rood	ML20192A067	FL1
Georgii Billiris	ML20192A067	FL1
David LaVerne	ML20192A067	FL1
Joseph Shulman	ML20192A067	FL1
Lynn C. Lang	ML20192A067	FL1
Michael Daveiga (2)	ML20192A067	FL1
Sandra Geist	ML20192A067	FL1
Alex Fierro-Clarke	ML20192A067	FL1
Lucie Mayer	ML20192A067	FL1
Carol Sills	ML20192A067	FL1
Robert Oberdorf	ML20192A067	FL1
Stephen Schoo	ML20192A067	FL1
Holly Kukkonen	ML20192A067	FL1
L N	ML20192A067	FL1
Rocio Lario	ML20192A067	FL1
Doug Yamamoto	ML20192A067	FL1
Charley Bowman	ML20192A067	FL1
Gabrielle Swanberg	ML20192A067	FL1
Andrew & Kathleen Wittenborn	ML20192A067	FL1
Kathy Nickodemus	ML20192A067	FL1
Eric Edwards	ML20192A067	FL1
Peter Broderson	ML20192A067	FL1
Loretta Kerns	ML20192A067	FL1
Shelby L. Hood	ML20192A067	FL1
Greg Espe	ML20192A067	FL1
Nolan Turner	ML20192A067	FL1
Karen Kravcov Malcolm	ML20192A067	FL1
Anna Hennelly	ML20192A067	FL1
John Paladin	ML20192A067	FL1
Caren Thomas	ML20192A067	FL1
Shari Hawk	ML20192A067	FL1
Mari McShane	ML20192A067	FL1
Nancy Boyce	ML20192A067	FL1
Kathy Bradley	ML20192A067	FL1
Randall Webb	ML20192A067	FL1
Jan Hively	ML20192A067	FL1
A. Todd	ML20192A067	FL1
Julie Ford	ML20192A067	FL1
Hal Anthony	ML20192A067	FL1
Thomas Ferrito	ML20192A067	FL1
Jeffery Garcia	ML20192A067	FL1
Evan Sederquest	ML20192A067	FL1
Matt Woolery	ML20192A067	FL1
Kathleen Grossman	ML20192A067	FL1
Carol Nugent	ML20192A067	FL1
Jolynn Loftus	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Robert Jehn	ML20192A067	FL1
Cathy Barton	ML20192A067	FL1
Vivian Dowell	ML20192A067	FL1
Ellen Homsey	ML20192A067	FL1
Kimberly Cresic	ML20192A067	FL1
Ingrid Rochester	ML20192A067	FL1
Kris Head	ML20192A067	FL1
Brad Walker	ML20192A067	FL1
Bernard Berauer	ML20192A067	FL1
Gary Mazzotti	ML20192A067	FL1
Abdullah Goldstein	ML20192A067	FL1
Kym Waugh	ML20192A067	FL1
Jenette D'Alessandro	ML20192A067	FL1
Marguerite Sgrillo	ML20192A067	FL1
Elizabeth Schwartz	ML20192A067	FL1
Michele Reed	ML20192A067	FL1
Barbara Abolafia	ML20192A067	FL1
Mollie Thomas	ML20192A067	FL1
Sophie Diamond	ML20192A067	FL1
Joan H.	ML20192A067	FL1
Laura Leipzig (1)	ML20192A067	FL1
Alena Jorgensen	ML20192A067	FL1
Angie Johnson	ML20192A067	FL1
Anguss Moss	ML20192A067	FL1
Jane Butler	ML20192A067	FL1
Richard Stevenson	ML20192A067	FL1
Anne Harrison	ML20192A067	FL1
Penny Heintz	ML20192A067	FL1
Maggie Davidson	ML20192A067	FL1
Margaret Dunn	ML20192A067	FL1
Sandra M. Zwingelberg	ML20192A067	FL1
Thomas Nieland (1)	ML20192A067	FL1
Thomas Nieland (2)	ML20192A067	FL1
Stephen Mudrick	ML20192A067	FL1
Kurt Speidel	ML20192A067	FL1
Melissa Thirloway	ML20192A067	FL1
Rosemarie Pace	ML20192A067	FL1
Steven Lowenthal	ML20192A067	FL1
Sharon Colyar	ML20192A067	FL1
John R. Thayer	ML20192A067	FL1
Clarice Hearne	ML20192A067	FL1
Jorge De Cecco	ML20192A067	FL1
Cindy Borske	ML20192A067	FL1
Joe Kaleel	ML20192A067	FL1
Harriet McCleary	ML20192A067	FL1
Marcel Liberge	ML20192A067	FL1
Florence Kelly	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Joanne Kundrat	ML20192A067	FL1
George Lewis	ML20192A067	FL1
Jean Stevens	ML20192A067	FL1
Ramona Ponessa	ML20192A067	FL1
Marilyn Rose	ML20192A067	FL1
Ron Parsons	ML20192A067	FL1
Sybil Kohl	ML20192A067	FL1
Eva Curatolo	ML20192A067	FL1
Charlene Woodcock	ML20192A067	FL1
Lanie Cox	ML20192A067	FL1
Lilinoe Smith	ML20192A067	FL1
Carlton Russell	ML20192A067	FL1
Bennie Woodard	ML20192A067	FL1
A. Kasbarian	ML20192A067	FL1
Peter Ayres	ML20192A067	FL1
Stephen Boletchek	ML20192A067	FL1
Tom Howell	ML20192A067	FL1
Katherine O'Sullivan	ML20192A067	FL1
Gerry Milliken	ML20192A067	FL1
Lisa Stone	ML20192A067	FL1
Marian Cruz	ML20192A067	FL1
Joe Sain	ML20192A067	FL1
Charles Byrne	ML20192A067	FL1
Pamela Benton	ML20192A067	FL1
Mary Loomba	ML20192A067	FL1
Deborah Montero	ML20192A067	FL1
Roel Cantú	ML20192A067	FL1
Merja Harju	ML20192A067	FL1
Judith Cohen	ML20192A067	FL1
Mana Iluna	ML20192A067	FL1
Darlene St. Martin	ML20192A067	FL1
Susan Mirsky	ML20192A067	FL1
Michael Parsons	ML20192A067	FL1
Kate Skolnick	ML20192A067	FL1
Ina Rogovin	ML20192A067	FL1
Michael House	ML20192A067	FL1
Molly Johnson	ML20192A067	FL1
Dorotohy Werne	ML20192A067	FL1
Jeff Komisarof	ML20192A067	FL1
Randy Harrison	ML20192A067	FL1
Linda Greene	ML20192A067	FL1
Jean Kuntz	ML20192A067	FL1
Stephan Hewitt	ML20192A067	FL1
Michael F. Kolassa	ML20192A067	FL1
Montie VanNostrand	ML20192A067	FL1
Phyllis Chavez	ML20192A067	FL1
Michael Earney	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Laurel Davis-Delano	ML20192A067	FL1
Arthur Kennedy	ML20192A067	FL1
Calli Madrone	ML20192A067	FL1
Dacia Murphy	ML20192A067	FL1
Dana May	ML20192A067	FL1
Ellen Murphy	ML20192A067	FL1
K. Hafer	ML20192A067	FL1
Anne Lakota	ML20192A067	FL1
Benita J. Campbell	ML20192A067	FL1
Madalyn Benoit	ML20192A067	FL1
Keith D'Alessandro	ML20192A067	FL1
Susan Detato	ML20192A067	FL1
Douglas Sedon	ML20192A067	FL1
Chris Casper	ML20192A067	FL1
Susan Hamilton	ML20192A067	FL1
John Elder	ML20192A067	FL1
Brenda J. Goode	ML20192A067	FL1
Bart Ryan	ML20192A067	FL1
Donald Taylor	ML20192A067	FL1
Sarah Demb	ML20192A067	FL1
Delores Stachura	ML20192A067	FL1
Dorthee	ML20192A067	FL1
Ken Lundgreen	ML20192A067	FL1
James J. Fields	ML20192A067	FL1
Edward Cutler	ML20192A067	FL1
Darrel Follman	ML20192A067	FL1
Carol Moss	ML20192A067	FL1
Shelley Frazier	ML20192A067	FL1
Hartson Doak	ML20192A067	FL1
Donna Bonetti	ML20192A067	FL1
Andra Heide	ML20192A067	FL1
Sharon Lieberman	ML20192A067	FL1
Stephen King	ML20192A067	FL1
Glen Williams	ML20192A067	FL1
Vicki Hughes	ML20192A067	FL1
Marty Brown	ML20192A067	FL1
Dudley and Candace Campbell	ML20192A067	FL1
Johanna Cummings	ML20192A067	FL1
Katherine Montague	ML20192A067	FL1
Ed Ciaccio	ML20192A067	FL1
Nancy Kosnar Hartman	ML20192A067	FL1
Kristine Winnicki	ML20192A067	FL1
Janet Saupp	ML20192A067	FL1
Les Roberts	ML20192A067	FL1
Joel Levine	ML20192A067	FL1
Pat Blackwell-Marchant	ML20192A067	FL1
Juanita Hull	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Paul Palla	ML20192A067	FL1
Huntley Hennessy	ML20192A067	FL1
Peter Coleman	ML20192A067	FL1
Jean-Francois Fauconnier	ML20192A067	FL1
Paul Lennon	ML20192A067	FL1
Matthew Reardon	ML20192A067	FL1
Sandra Franz	ML20192A067	FL1
Elizabeth Scherbak	ML20192A067	FL1
Charles Clements	ML20192A067	FL1
Marvin Rowe	ML20192A067	FL1
Jason Hawkins	ML20192A067	FL1
Arnold Gore	ML20192A067	FL1
Richard Stern	ML20192A067	FL1
Michael Zamm	ML20192A067	FL1
Teresa Johnson	ML20192A067	FL1
Kimberly Seger	ML20192A067	FL1
Madeline Helbraun	ML20192A067	FL1
Dominique Edmondson	ML20192A067	FL1
Hal Forsen	ML20192A067	FL1
Linda Murphy	ML20192A067	FL1
T. F.	ML20192A067	FL1
Connie Lippert	ML20192A067	FL1
Tia Johnson	ML20192A067	FL1
Deirdre Rose	ML20192A067	FL1
Alvera Pritchard	ML20192A067	FL1
Karen Stimson	ML20192A067	FL1
Gregory Tabat	ML20192A067	FL1
Gary Hull	ML20192A067	FL1
Phil Klein	ML20192A067	FL1
Karen Hadden	ML20192A067	FL1
Ryk Diemert (1)	ML20192A067	FL1
Yves Decargouet	ML20192A067	FL1
Deborah L. Hall	ML20192A067	FL1
Bill Holt	ML20192A067	FL1
Doreen McElvany	ML20192A067	FL1
Moe Kafka	ML20192A067	FL1
Victoria Miller	ML20192A067	FL1
John Webb (1)	ML20192A067	FL1
Jane Reiter	ML20192A067	FL1
Stephen Diamond	ML20192A067	FL1
Lawrence McKinley	ML20192A067	FL1
Anne Fishef	ML20192A067	FL1
John Webb (2)	ML20192A067	FL1
Julie Bush	ML20192A067	FL1
Mike Kappus (1)	ML20192A067	FL1
Michael Lahey	ML20192A067	FL1
Chris King (1)	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Chris King (2)	ML20192A067	FL1
Karen Barton	ML20192A067	FL1
Rebecca Tippens	ML20192A067	FL1
Mike Kappus (2)	ML20192A067	FL1
Cheryl Carnahan	ML20192A067	FL1
Mary Froehlich	ML20192A067	FL1
Merry Harsh	ML20192A067	FL1
Tim Hayes	ML20192A067	FL1
Kate Kenner	ML20192A067	FL1
Thomas Warner	ML20192A067	FL1
Michael Potter	ML20192A067	FL1
Joshua Angelus	ML20192A067	FL1
Stephen Brittle	ML20192A067	FL1
Lisa Kellman	ML20192A067	FL1
Michael Worsham	ML20192A067	FL1
Shirley Ackerman	ML20192A067	FL1
Timothy Mullen	ML20192A067	FL1
Wendy Fast	ML20192A067	FL1
Tom Tripp	ML20192A067	FL1
Sharon Logan	ML20192A067	FL1
David Butler (1)	ML20192A067	FL1
Laurie Hope (1)	ML20192A067	FL1
Kevin Rolfes	ML20192A067	FL1
J. Pizzo	ML20192A067	FL1
Jules Moritz	ML20192A067	FL1
Coral Cadman	ML20192A067	FL1
Nancee Noel	ML20192A067	FL1
Susanne Hesse & Doug Dyer	ML20192A067	FL1
Tim Fleischer	ML20192A067	FL1
Donald Harland	ML20192A067	FL1
John Conway	ML20192A067	FL1
Kenneth Bowman	ML20192A067	FL1
William Ryerson	ML20192A067	FL1
Mary Boone	ML20192A067	FL1
Rachael Pappano	ML20192A067	FL1
Michael C.	ML20192A067	FL1
Steven Daskal (1)	ML20192A067	FL1
Laurel Facey	ML20192A067	FL1
Amy Hutto	ML20192A067	FL1
Mark Boone	ML20192A067	FL1
Susan Saltzman	ML20192A067	FL1
Kristin Huntoon	ML20192A067	FL1
Mary True	ML20192A067	FL1
Bridget Chapman	ML20192A067	FL1
Steven Daskal (2)	ML20192A067	FL1
Kathleen Ruiz	ML20192A067	FL1
Alix Keast	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Melvin Armolt	ML20192A067	FL1
Jaszmene Smith	ML20192A067	FL1
Lana Franchek	ML20192A067	FL1
Jeffrey Dix	ML20192A067	FL1
William Wurtz	ML20192A067	FL1
Timothy Judson	ML20192A067	FL1
Rochelle La Frinere	ML20192A067	FL1
Michelle Kosinski	ML20192A067	FL1
Janet Tauro	ML20192A067	FL1
Nancy Wagner	ML20192A067	FL1
Margaret C. McHugh	ML20192A067	FL1
Kate Cloud	ML20192A067	FL1
Jonathan Memmert	ML20192A067	FL1
Brian Caldwell	ML20192A067	FL1
Judy Knueven	ML20192A067	FL1
Richard Han	ML20192A067	FL1
Lyn Du Mont	ML20192A067	FL1
John Guros	ML20192A067	FL1
Zach Kadar	ML20192A067	FL1
Peter Curia	ML20192A067	FL1
Liz Dyer	ML20192A067	FL1
Lisa Kagan	ML20192A067	FL1
Jym Dyer	ML20192A067	FL1
George Klipfel II	ML20192A067	FL1
Elizabeth Dodd	ML20192A067	FL1
Fran Post	ML20192A067	FL1
Robert Lombardi	ML20192A067	FL1
Roger Hughes	ML20192A067	FL1
Theresa Moriarty McPhail	ML20192A067	FL1
Anne Heaney	ML20192A067	FL1
Kimberly Pettit	ML20192A067	FL1
Tammy Fisher	ML20192A067	FL1
Joel Masser	ML20192A067	FL1
Rev. L. Cline	ML20192A067	FL1
Joel Kay	ML20192A067	FL1
Daniela Rossi	ML20192A067	FL1
Rainbow Di Benedetto	ML20192A067	FL1
Gary Rowland	ML20192A067	FL1
William Gilbert	ML20192A067	FL1
Meredith Needham	ML20192A067	FL1
Sara Lang	ML20192A067	FL1
Jacalyn Dinhofer	ML20192A067	FL1
Yazmin Gonzalez	ML20192A067	FL1
Marty Mason	ML20192A067	FL1
PJ Mcdaniel	ML20192A067	FL1
Dr. Lewis Cuthbert	ML20192A067	FL1
Nicole Taylor	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Robert Fischoff	ML20192A067	FL1
Timothy Larkin	ML20192A067	FL1
Tony Segura	ML20192A067	FL1
Carol Ilic	ML20192A067	FL1
Carol Collins	ML20192A067	FL1
N. Refes	ML20192A067	FL1
Darrel Easter	ML20192A067	FL1
Patricia Loftman	ML20192A067	FL1
Chris Jacobs	ML20192A067	FL1
Samuel Durkin	ML20192A067	FL1
Kevin Kamps	ML20192A067	FL1
Gail Lack	ML20192A067	FL1
Irene Saikevych	ML20192A067	FL1
Bret Smith	ML20192A067	FL1
Jana Perinchief	ML20192A067	FL1
Carol Book	ML20192A067	FL1
Janet Maker (1)	ML20192A067	FL1
Robert McCombs	ML20192A067	FL1
Stephen Sacks	ML20192A067	FL1
Carol Anne Fusco	ML20192A067	FL1
Gloria Picchetti	ML20192A067	FL1
Elisabeth Price	ML20192A067	FL1
Stephen Dickstein	ML20192A067	FL1
Elaina Hatsis	ML20192A067	FL1
P. Willa (1)	ML20192A067	FL1
Peggy Gish	ML20192A067	FL1
Pamela Gibberman	ML20192A067	FL1
Sally Small	ML20192A067	FL1
Steve Schueth	ML20192A067	FL1
Margot Lenhart	ML20192A067	FL1
António Eloy	ML20192A067	FL1
Doris Applebaum	ML20192A067	FL1
Shawn Alexander	ML20192A067	FL1
Richard Tregidgo	ML20192A067	FL1
Lynn Lavezzi	ML20192A067	FL1
Josef Wyss-Lockner	ML20192A067	FL1
Tim Duda	ML20192A067	FL1
Ruth Koblenz	ML20192A067	FL1
Chris Lindberg	ML20192A067	FL1
Mr. & Mrs. Bruce Revesz	ML20192A067	FL1
Bonnie German (1)	ML20192A067	FL1
Bonnie German (2)	ML20192A067	FL1
Barbara Brown	ML20192A067	FL1
Grant Fujii	ML20192A067	FL1
David Burns	ML20192A067	FL1
Mark Soenksen	ML20192A067	FL1
Donald Walsh	ML20192A067	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Patricia Levin	ML20192A079	FL1
Nancy Lyles	ML20192A079	FL1
Kirk Ramble	ML20192A079	FL1
Hersha Evans	ML20192A079	FL1
Brian Smith	ML20192A079	FL1
Katie Scherfig	ML20192A079	FL1
Tim Miller	ML20192A079	FL1
Marnelle Curtis	ML20192A079	FL1
k o	ML20192A079	FL1
Gregory Duncan	ML20192A079	FL1
Bernardo Alayza Mujica	ML20192A079	FL1
A Rossner	ML20192A079	FL1
Patty Bixler	ML20192A079	FL1
Michael Crowden	ML20192A079	FL1
Emily Rugel	ML20192A079	FL1
Pat Hawthorn	ML20192A079	FL1
Michael Odell	ML20192A079	FL1
Dorri Raskin	ML20192A079	FL1
Mark Hayduke Grenard	ML20192A079	FL1
David Lax	ML20192A079	FL1
Terry Crownover	ML20192A079	FL1
Sabrina Eckles	ML20192A079	FL1
Patricia Borchmann	ML20192A079	FL1
Jerrold Allen	ML20192A079	FL1
Linda McKillip	ML20192A079	FL1
Dinah Starr	ML20192A079	FL1
Martha E. Martin	ML20192A079	FL1
Joseph Ponisciak	ML20192A079	FL1
Adrian Bergeron	ML20192A079	FL1
Rolf Friis	ML20192A079	FL1
Shannon Healey	ML20192A079	FL1
Molly Swabb	ML20192A079	FL1
Ann Malyon (1)	ML20192A079	FL1
Liz Erpelding-Garratt	ML20192A079	FL1
Barbara Buck	ML20192A079	FL1
Terrence Goebel	ML20192A079	FL1
Sylvia Lambert	ML20192A079	FL1
Susan Crowle	ML20192A079	FL1
David Stanley	ML20192A079	FL1
Will S	ML20192A079	FL1
Stuart Francis	ML20192A079	FL1
Henry Mobley	ML20192A079	FL1
Doris (Jody) Wilson	ML20192A079	FL1
Mark Blandford	ML20192A079	FL1
Katherine Bryan	ML20192A079	FL1
Ken Freedman	ML20192A079	FL1
Carole Jones	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Christy Giesick	ML20192A079	FL1
Susan Warren	ML20192A079	FL1
Devon Tipp	ML20192A079	FL1
Tika Bordelon	ML20192A079	FL1
Janet McCalister	ML20192A079	FL1
Matthew Schaut	ML20192A079	FL1
Lee Stanfield	ML20192A079	FL1
David Bezansib	ML20192A079	FL1
Sandra Lane	ML20192A079	FL1
Sarah Bauman	ML20192A079	FL1
Harold Watson	ML20192A079	FL1
Kate Harder	ML20192A079	FL1
John Doucette	ML20192A079	FL1
Yen Vu	ML20192A079	FL1
Rachel Lauze	ML20192A079	FL1
Chris Nelson	ML20192A079	FL1
Doug Mayor	ML20192A079	FL1
Robert Cherwink	ML20192A079	FL1
Kevin Schader	ML20192A079	FL1
Mary Keithler	ML20192A079	FL1
Lisa Gherardi	ML20192A079	FL1
Amy Winter	ML20192A079	FL1
William Schlesinger	ML20192A079	FL1
L Nelson	ML20192A079	FL1
Anita Brandariz	ML20192A079	FL1
Jean Schwinberg	ML20192A079	FL1
Maryellen Healy	ML20192A079	FL1
Angela Fazzari	ML20192A079	FL1
Lauren Murdock	ML20192A079	FL1
Joan McGrath	ML20192A079	FL1
Ruben Tamamian	ML20192A079	FL1
Barbara Olson	ML20192A079	FL1
Anthony Castillo	ML20192A079	FL1
Richard Payne	ML20192A079	FL1
Suzy Chaffee	ML20192A079	FL1
Marie Curtis	ML20192A079	FL1
Jon Singleton	ML20192A079	FL1
Bruce von Alten	ML20192A079	FL1
Kathie E Takush	ML20192A079	FL1
Douglas Meyer	ML20192A079	FL1
Daniel Schlagman	ML20192A079	FL1
Jim and Barbara Dale	ML20192A079	FL1
Carla Compton	ML20192A079	FL1
Sandra Cais (1)	ML20192A079	FL1
Liane Conn	ML20192A079	FL1
Anne Huibregtse	ML20192A079	FL1
Gary Thaler	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Carol Wiley	ML20192A079	FL1
Sandra Breakfield	ML20192A079	FL1
Marion Jackson	ML20192A079	FL1
Al Daniel	ML20192A079	FL1
Joan Rosenbaum	ML20192A079	FL1
Janet Handford	ML20192A079	FL1
Sandra Cais (2)	ML20192A079	FL1
Marian Volkman	ML20192A079	FL1
Marilyn Field	ML20192A079	FL1
Meryl Pinque	ML20192A079	FL1
Ned Overton	ML20192A079	FL1
Rik Masterson	ML20192A079	FL1
Vivian S. Valtri Burgess	ML20192A079	FL1
Stephanie C. Fox	ML20192A079	FL1
Annette Pirrone	ML20192A079	FL1
Michelle Trosper	ML20192A079	FL1
Danielle Montague-Judd	ML20192A079	FL1
Kristen Brooks	ML20192A079	FL1
Nancy Iannuzzelli	ML20192A079	FL1
Laura Horowitz	ML20192A079	FL1
Nancy Almeida Crocker	ML20192A079	FL1
Sandra Goettling	ML20192A079	FL1
Susan Broadhead	ML20192A079	FL1
Jenifer & John Massey	ML20192A079	FL1
Gary Sibley	ML20192A079	FL1
Gina Giaccardo	ML20192A079	FL1
Corwin Khoe	ML20192A079	FL1
Cheryl Carney (1)	ML20192A079	FL1
Mike Duffy	ML20192A079	FL1
Cheryl Carney (2)	ML20192A079	FL1
Geoffrey Cook	ML20192A079	FL1
e p	ML20192A079	FL1
John Tovar	ML20192A079	FL1
Charles Eiseman	ML20192A079	FL1
Lacey Hicks	ML20192A079	FL1
Alice McNally	ML20192A079	FL1
Edie Pistolesi	ML20192A079	FL1
Tom Cannon	ML20192A079	FL1
Alan Lawrence	ML20192A079	FL1
Jackie Tryggeseth	ML20192A079	FL1
Faun Parliman	ML20192A079	FL1
Annick Baaud	ML20192A079	FL1
Dick Hogle	ML20192A079	FL1
Penny Cragun	ML20192A079	FL1
Barbara Poland	ML20192A079	FL1
Jonathan Spencer	ML20192A079	FL1
Frank Belcastro	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Marta McCracken	ML20192A079	FL1
Stephanie Low	ML20192A079	FL1
Mary Yunker	ML20192A079	FL1
Nancy Mead	ML20192A079	FL1
Joanne Steele	ML20192A079	FL1
Donna Smith	ML20192A079	FL1
Shirley Jenkins	ML20192A079	FL1
Peter Farris	ML20192A079	FL1
Leslie Derbin	ML20192A079	FL1
Rodney and Terri Jones	ML20192A079	FL1
Steven & Susan Mayes	ML20192A079	FL1
J Beverly	ML20192A079	FL1
Anne Brennan	ML20192A079	FL1
Charlotte Alexandre	ML20192A079	FL1
Elliott Sernel	ML20192A079	FL1
John Golding	ML20192A079	FL1
Emily Rothman	ML20192A079	FL1
Linda Ferland	ML20192A079	FL1
Jeri Altman	ML20192A079	FL1
Laura Lake	ML20192A079	FL1
Anne Veraldi	ML20192A079	FL1
Soretta Rodack	ML20192A079	FL1
Craig Emerick	ML20192A079	FL1
Eric Heystraeten	ML20192A079	FL1
Paul Dolinko	ML20192A079	FL1
Mike LaPorte	ML20192A079	FL1
Patricia Heckart	ML20192A079	FL1
Julie Takatsch	ML20192A079	FL1
David Broadwater	ML20192A079	FL1
Valerie Weiss	ML20192A079	FL1
Timothy Shaw	ML20192A079	FL1
Darcy Bergh	ML20192A079	FL1
Rebecca McDonough	ML20192A079	FL1
Joshua Seff	ML20192A079	FL1
Danielle Hajdufi	ML20192A079	FL1
Caroline Kipling	ML20192A079	FL1
G Caviglia	ML20192A079	FL1
Debbie Thomas	ML20192A079	FL1
Steve Bear	ML20192A079	FL1
Margaret Motley	ML20192A079	FL1
William Christwitz	ML20192A079	FL1
James Kleinert	ML20192A079	FL1
David Monsees	ML20192A079	FL1
Charleen Strelke	ML20192A079	FL1
Sharon Bunch	ML20192A079	FL1
Astrata Barber (1)	ML20192A079	FL1
Carol Mock	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Amaryntha Schalin (1)	ML20192A079	FL1
Thomas Cox	ML20192A079	FL1
Ed Oberweiser	ML20192A079	FL1
Thomas Hernandez	ML20192A079	FL1
David J Harris	ML20192A079	FL1
Catherine Loudis	ML20192A079	FL1
Mark Scibilia-Carver	ML20192A079	FL1
Art Klein	ML20192A079	FL1
Kathy Ruopp	ML20192A079	FL1
Edna Mullen	ML20192A079	FL1
Judith Beaver	ML20192A079	FL1
Howard Hassman	ML20192A079	FL1
Shearle Furnish	ML20192A079	FL1
Lynette Strangstad	ML20192A079	FL1
Kermit Cuff	ML20192A079	FL1
Bettemae Johnson	ML20192A079	FL1
Clifford Phillips	ML20192A079	FL1
Alexander Honigsblum	ML20192A079	FL1
Dana Bordegaray	ML20192A079	FL1
Kay Reinfried	ML20192A079	FL1
Margaret Cooney	ML20192A079	FL1
Dylan Nguyen	ML20192A079	FL1
Marie Alabiso	ML20192A079	FL1
Carla Davis	ML20192A079	FL1
Michael Salzmann	ML20192A079	FL1
Nona Weiner	ML20192A079	FL1
Claire Perricelli	ML20192A079	FL1
Joe Connolly	ML20192A079	FL1
Michel Dyer	ML20192A079	FL1
Donald Johnson	ML20192A079	FL1
Sarah Brownrigg	ML20192A079	FL1
Sue Davies	ML20192A079	FL1
Flora Martinez	ML20192A079	FL1
Alice Bloch	ML20192A079	FL1
Lynne Weiske	ML20192A079	FL1
Max Wilder	ML20192A079	FL1
Lucille Portner	ML20192A079	FL1
Oleh Sydor (1)	ML20192A079	FL1
Kareb Biesanz	ML20192A079	FL1
Seth Snapp	ML20192A079	FL1
Frank Gonzales Jr.	ML20192A079	FL1
Susan Himes-Powers	ML20192A079	FL1
Theodore Brazeau	ML20192A079	FL1
June Cattell	ML20192A079	FL1
Francine Ungaro	ML20192A079	FL1
Brian Florian	ML20192A079	FL1
Victor Paglia	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Ann Mcentee	ML20192A079	FL1
Annie Stevenson-King	ML20192A079	FL1
Mark Hinds	ML20192A079	FL1
James Mulder	ML20192A079	FL1
Reed Fenton	ML20192A079	FL1
Martha Atkinson	ML20192A079	FL1
John Lindberg	ML20192A079	FL1
Michele Barnard	ML20192A079	FL1
Cheryl Kozanitas	ML20192A079	FL1
Janet Bartos	ML20192A079	FL1
Gerald Tichy	ML20192A079	FL1
Carol A Newton	ML20192A079	FL1
Steven Schafer	ML20192A079	FL1
Jean Ross	ML20192A079	FL1
Tami Palacky	ML20192A079	FL1
R. Reyes	ML20192A079	FL1
Ted Kozlowski	ML20192A079	FL1
George E. Milkowski	ML20192A079	FL1
Dan Schneider	ML20192A079	FL1
Susan Kutz	ML20192A079	FL1
Citizen Voter	ML20192A079	FL1
Jan Barshiis	ML20192A079	FL1
Twyla Meyer	ML20192A079	FL1
Daphne Pleasonton	ML20192A079	FL1
Richard Besco	ML20192A079	FL1
Debb Atkinson	ML20192A079	FL1
Diane Di Vittorio (1)	ML20192A079	FL1
Diane Di Vittorio (2)	ML20192A079	FL1
Joe Crymes	ML20192A079	FL1
Kathy Yeomans	ML20192A079	FL1
Ben Brooks	ML20192A079	FL1
Norda Gromoll	ML20192A079	FL1
Marsha Jarvis	ML20192A079	FL1
James Corrigan	ML20192A079	FL1
Mary McMahon	ML20192A079	FL1
Danby Whitmore	ML20192A079	FL1
Mark Rothstein (1)	ML20192A079	FL1
Michael McMahan	ML20192A079	FL1
Rama K Paruchuri	ML20192A079	FL1
Brent Rocks	ML20192A079	FL1
Jeffrey Cohen	ML20192A079	FL1
Karl Koessel	ML20192A079	FL1
Glenda Bissex	ML20192A079	FL1
Pat Poggi	ML20192A079	FL1
Herbert Lord	ML20192A079	FL1
M Langelan	ML20192A079	FL1
Carol Koehler	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Susan Cox	ML20192A079	FL1
Elyette Weinstein	ML20192A079	FL1
Mark Koritz	ML20192A079	FL1
Myrna Brittain	ML20192A079	FL1
Robert Hasselbrink	ML20192A079	FL1
Monte Hoskins	ML20192A079	FL1
Holly Cohen	ML20192A079	FL1
Freddie Williams	ML20192A079	FL1
Lisa Witham	ML20192A079	FL1
Sally Mavroides	ML20192A079	FL1
Mark Hogarth	ML20192A079	FL1
Jef Harvey	ML20192A079	FL1
Rachel Wolf	ML20192A079	FL1
Julia Cranmer	ML20192A079	FL1
Andrew Lyall	ML20192A079	FL1
Mary N.	ML20192A079	FL1
Geraldine May	ML20192A079	FL1
Elmo Dunn	ML20192A079	FL1
Irene Gnemi	ML20192A079	FL1
Tracy Foster	ML20192A079	FL1
Mark Rothstein (2)	ML20192A079	FL1
Tracy Feldman	ML20192A079	FL1
Samuel Morningstar	ML20192A079	FL1
Lawrence Cwik	ML20192A079	FL1
Merilie Robertson	ML20192A079	FL1
Marie Wakefield	ML20192A079	FL1
Alan Stein	ML20192A079	FL1
Barbara Langan	ML20192A079	FL1
Martin Iseri	ML20192A079	FL1
Stephen Appell	ML20192A079	FL1
Ed Robertson	ML20192A079	FL1
Jayson Luu	ML20192A079	FL1
Jane Bunun	ML20192A079	FL1
Joan Balfour	ML20192A079	FL1
Leah Hallow	ML20192A079	FL1
Greg Schwartz	ML20192A079	FL1
Carol Joan Patterson	ML20192A079	FL1
Valeri DeCastris	ML20192A079	FL1
Diane DiFante	ML20192A079	FL1
Nick Brannan	ML20192A079	FL1
Lorraine Hartmann	ML20192A079	FL1
Susan Walp	ML20192A079	FL1
Donna Kittrell	ML20192A079	FL1
Kathy Grieves	ML20192A079	FL1
Mehdie Vakili	ML20192A079	FL1
Ronald Drahos	ML20192A079	FL1
Marc Alexander	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Susan Lefler	ML20192A079	FL1
Barbara MacAlpine	ML20192A079	FL1
Jon Hager	ML20192A079	FL1
Elizabeth Enright	ML20192A079	FL1
Monika Jelonnek	ML20192A079	FL1
Norman Illsley	ML20192A079	FL1
Elizabeth Lynch	ML20192A079	FL1
Joseph Corbett	ML20192A079	FL1
Richard Peterson	ML20192A079	FL1
Robert Shepherd	ML20192A079	FL1
Sharon Sickles	ML20192A079	FL1
Robbi Chisholm (1)	ML20192A079	FL1
Deborah DeSimone	ML20192A079	FL1
Aixa Fielder	ML20192A079	FL1
Michael Hoover	ML20192A079	FL1
Andreas Ohland	ML20192A079	FL1
Tim Ryther	ML20192A079	FL1
Michael Essex	ML20192A079	FL1
Miriam Baum	ML20192A079	FL1
Richard Crimbie	ML20192A079	FL1
Elizabeth Ungar	ML20192A079	FL1
Laura Prestridge	ML20192A079	FL1
Alex Zukas	ML20192A079	FL1
Gregory Rosasco	ML20192A079	FL1
Stefanie Kaku	ML20192A079	FL1
T. Mo	ML20192A079	FL1
Jaib Hutzell	ML20192A079	FL1
John Lopresti	ML20192A079	FL1
Carole Henry	ML20192A079	FL1
Jodi Daniels	ML20192A079	FL1
Lasha Wells	ML20192A079	FL1
Robbi Chisholm (2)	ML20192A079	FL1
Hannah Walters	ML20192A079	FL1
John Crombie	ML20192A079	FL1
Hillary Wagner	ML20192A079	FL1
George Bourlotos	ML20192A079	FL1
Julie Ostoich	ML20192A079	FL1
Anita Watkins	ML20192A079	FL1
Marcy Gordon	ML20192A079	FL1
LuMarion Conklin	ML20192A079	FL1
Kurt Cruger	ML20192A079	FL1
A vs	ML20192A079	FL1
David Hand	ML20192A079	FL1
Carol Grimm	ML20192A079	FL1
Thomas Delegal	ML20192A079	FL1
Steve Bloom	ML20192A079	FL1
Elizabeth Watts	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Patricia Nadreau	ML20192A079	FL1
S. E. Williams	ML20192A079	FL1
Lisa Patton	ML20192A079	FL1
Marsha Schaub	ML20192A079	FL1
Gilda Levinson	ML20192A079	FL1
Gina Mori	ML20192A079	FL1
Joel Trupin	ML20192A079	FL1
Peter Gunther	ML20192A079	FL1
Lynette Henderson	ML20192A079	FL1
Donald Hunt	ML20192A079	FL1
Phyllis Arist	ML20192A079	FL1
Robert Brown	ML20192A079	FL1
Jon Anderholm	ML20192A079	FL1
Tammy King	ML20192A079	FL1
Carol Held	ML20192A079	FL1
Michele Chapman (1)	ML20192A079	FL1
Laura Stewart	ML20192A079	FL1
Jon Nadle	ML20192A079	FL1
David Loy	ML20192A079	FL1
Brandon Ballinger	ML20192A079	FL1
Michele Chapman (2)	ML20192A079	FL1
Raymond Nuesch	ML20192A079	FL1
M.Sharon Gambocorto	ML20192A079	FL1
Todd Somodevilla	ML20192A079	FL1
Barbara Giorgio	ML20192A079	FL1
Richard Sparkes	ML20192A079	FL1
Lourdes Best	ML20192A079	FL1
Barbara Jacobsen	ML20192A079	FL1
Lois Lommel	ML20192A079	FL1
Neely Lyles	ML20192A079	FL1
Charles Comer	ML20192A079	FL1
Dolores O'Dowd	ML20192A079	FL1
Garry Star	ML20192A079	FL1
Mike Lyons (1)	ML20192A079	FL1
Michael Eichenholtz	ML20192A079	FL1
Susan F Fleming	ML20192A079	FL1
Mark Gotvald	ML20192A079	FL1
Dennis Hoerner	ML20192A079	FL1
Rilla Heslin (1)	ML20192A079	FL1
Rilla Heslin (2)	ML20192A079	FL1
John A Beavers	ML20192A079	FL1
Robert Reed	ML20192A079	FL1
Charlene Lauzon	ML20192A079	FL1
T. Garmon (1)	ML20192A079	FL1
Jason Steadmon	ML20192A079	FL1
Mike Lyons (2)	ML20192A079	FL1
Sue and John Morris	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Pamylle Greinke	ML20192A079	FL1
Joel Libman	ML20192A079	FL1
Jack Roberts	ML20192A079	FL1
Melissa Bauer	ML20192A079	FL1
Freya Goldstein	ML20192A079	FL1
Suzanne Kneeland	ML20192A079	FL1
David Schachne	ML20192A079	FL1
Nick Gaetano	ML20192A079	FL1
Judi Poulson	ML20192A079	FL1
Nick Bartol	ML20192A079	FL1
Lynda Taylor	ML20192A079	FL1
Susan Thompson	ML20192A079	FL1
Christina Teunissen	ML20192A079	FL1
Dee Spake	ML20192A079	FL1
Hope Carr	ML20192A079	FL1
Yvonne Martinez	ML20192A079	FL1
Annabelle Herbert	ML20192A079	FL1
T. LaRue	ML20192A079	FL1
Mike Wheeler	ML20192A079	FL1
Aron Shevis	ML20192A079	FL1
Wayne Gibb	ML20192A079	FL1
Jeffrey Bains	ML20192A079	FL1
Steve Bush	ML20192A079	FL1
William Claiborn	ML20192A079	FL1
Harriet Chenkin	ML20192A079	FL1
Paul Eisenberg	ML20192A079	FL1
Jim Yarbrough	ML20192A079	FL1
Sandra Couch	ML20192A079	FL1
Celeste Howard	ML20192A079	FL1
Patricia Borri	ML20192A079	FL1
Clayton Cunha Filho	ML20192A079	FL1
Eileen Howard	ML20192A079	FL1
Bill Chockla	ML20192A079	FL1
Michael Byrnes	ML20192A079	FL1
Faith Weidner MD	ML20192A079	FL1
Holger Mathews	ML20192A079	FL1
Barbara Broz	ML20192A079	FL1
David Stetler	ML20192A079	FL1
Amy Henry	ML20192A079	FL1
Urmila Padmanabhan	ML20192A079	FL1
Michael Goebel	ML20192A079	FL1
Jeremy Rossman	ML20192A079	FL1
John Burke	ML20192A079	FL1
Kyle Mayes	ML20192A079	FL1
Pat Cavanaugh	ML20192A079	FL1
Mary Rojeski	ML20192A079	FL1
Marilyn Shepherd	ML20192A079	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Zola Packman	ML20192A079	FL1
Meryl Rogers	ML20192A079	FL1
Elizabeth Butler	ML20192A079	FL1
Dana Bleckinger	ML20192A079	FL1
Shawn Hall	ML20192A079	FL1
A B	ML20192A079	FL1
Roger Olsen	ML20192A079	FL1
Roger Lippman (1)	ML20192A079	FL1
Ana Chou	ML20192A079	FL1
Charles Arnold	ML20192A079	FL1
Felicia Bruce	ML20192A079	FL1
Ronald Smith	ML20192A079	FL1
Carol Devoss	ML20192A079	FL1
Penny LaDeur	ML20192A079	FL1
Nancy Brown (1)	ML20192A079	FL1
Andrea Zajac	ML20192A079	FL1
Niels Henrik Hooge	ML20192A079	FL1
Robert McFarland	ML20192A079	FL1
Marco Pardi	ML20192A079	FL1
Louise Reardon	ML20192A079	FL1
Peter Maly	ML20192A079	FL1
F. Robert Wesley	ML20192A079	FL1
Timothy Owen	ML20192A079	FL1
Belle McMaster	ML20192A079	FL1
Edward Butler	ML20192A079	FL1
Don Thomsen	ML20192A079	FL1
Elizabeth Kelly	ML20192A079	FL1
Gerritt and Elizabeth Baker-Smith	ML20192A079	FL1
James Mulcare	ML20192A079	FL1
Luis Hestres	ML20192A079	FL1
Tamadhur Al-Aqeel	ML20205L565	FL1
Mary Landrum	ML20205L565	FL1
Jeffrey Knopf	ML20205L565	FL1
Gregory Freeman	ML20205L565	FL1
Pat Pollard	ML20205L565	FL1
Diana Heymann	ML20205L565	FL1
Ann Malyon (2)	ML20205L565	FL1
Jerry Wheeler	ML20205L565	FL1
Julia Radwany	ML20205L565	FL1
Francine Schwarzenberger	ML20205L565	FL1
Gerald Stein	ML20205L565	FL1
Peggy Stone	ML20205L565	FL1
Colin Kay	ML20205L565	FL1
Linda Wright	ML20205L565	FL1
Vi Mooberry	ML20205L565	FL1
David Damstrom	ML20205L565	FL1
Suzanne Carlson	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Sandra Sobek	ML20205L565	FL1
Anne Rosati	ML20205L565	FL1
Dev Klein	ML20205L565	FL1
Elizabeth Hickman	ML20205L565	FL1
Nicole Crane	ML20205L565	FL1
Jean Hodgins	ML20205L565	FL1
Ronald Partridge	ML20205L565	FL1
Jonathan Evans	ML20205L565	FL1
Kay Hawklee	ML20205L565	FL1
Helen Johns	ML20205L565	FL1
John Steponaitis	ML20205L565	FL1
Donna Hreha	ML20205L565	FL1
Daviann McClurg	ML20205L565	FL1
Barbara Smith	ML20205L565	FL1
June Adler	ML20205L565	FL1
Alan Ticotsky	ML20205L565	FL1
Melissa Elbrecht	ML20205L565	FL1
Seth Mirsky	ML20205L565	FL1
Mark Daniels	ML20205L565	FL1
S. Peirce	ML20205L565	FL1
Robert Reece	ML20205L565	FL1
Robin Kory	ML20205L565	FL1
Elizabeth Bryant	ML20205L565	FL1
Len Clark	ML20205L565	FL1
Howard Cohen	ML20205L565	FL1
Victoria DeSarno	ML20205L565	FL1
Jim Pounds	ML20205L565	FL1
David Butler (2)	ML20205L565	FL1
Nora Reid-leZotte	ML20205L565	FL1
K. Krupinski	ML20205L565	FL1
K. R. Garland PhD DD (1)	ML20205L565	FL1
K. R. Garland PhD DD (2)	ML20205L565	FL1
Joan Langue	ML20205L565	FL1
Mark Wheeler	ML20205L565	FL1
Marilyn Kaggen	ML20205L565	FL1
Don Preister	ML20205L565	FL1
Roger Lippman (2)	ML20205L565	FL1
Patricia Kendall	ML20205L565	FL1
Steve Shapiro	ML20205L565	FL1
Shari Kelts	ML20205L565	FL1
Nicholas Patton	ML20205L565	FL1
Dorothy Sanchez	ML20205L565	FL1
Doro Reeves	ML20205L565	FL1
Lisa Schwartz	ML20205L565	FL1
Dipl. Des. Kai Heinrich	ML20205L565	FL1
Guy Zahller	ML20205L565	FL1
Stephen Nickels	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Diane Rencher	ML20205L565	FL1
Dori Grasso	ML20205L565	FL1
William Blair	ML20205L565	FL1
Gloria Sennert	ML20205L565	FL1
Rob Kulakofsky	ML20205L565	FL1
Bonita Shea	ML20205L565	FL1
Tracey Bonner	ML20205L565	FL1
Erik Nielsen	ML20205L565	FL1
Michael Mannion	ML20205L565	FL1
Daniel Weiss	ML20205L565	FL1
Kathleen Mireault	ML20205L565	FL1
Jodi Rodar	ML20205L565	FL1
Linda Lane	ML20205L565	FL1
Doree Christensen	ML20205L565	FL1
Kevin Bennett	ML20205L565	FL1
Rebecca Rose	ML20205L565	FL1
Linda Park	ML20205L565	FL1
James Hartley	ML20205L565	FL1
Sr. Sharon Zayac	ML20205L565	FL1
Pamela Nordhof	ML20205L565	FL1
Mari Mennel-Bell	ML20205L565	FL1
Lorraine Moore	ML20205L565	FL1
Myra Toth	ML20205L565	FL1
Lori Jo Siegel	ML20205L565	FL1
Alicia Salazar	ML20205L565	FL1
James Monroe	ML20205L565	FL1
Daniel L. Harris	ML20205L565	FL1
G. John Balogh	ML20205L565	FL1
Sarah Cooke	ML20205L565	FL1
Lesley Pleasant	ML20205L565	FL1
Paula Boardman	ML20205L565	FL1
Loretta Larkin	ML20205L565	FL1
Mary Peterson	ML20205L565	FL1
Gloria Diggle	ML20205L565	FL1
Jane Cates	ML20205L565	FL1
Marjorie Clisson	ML20205L565	FL1
Gerry Archibald	ML20205L565	FL1
Susan Morris	ML20205L565	FL1
Liz Baum	ML20205L565	FL1
Lara Miletta	ML20205L565	FL1
William Hassig	ML20205L565	FL1
Cindy Beckkey	ML20205L565	FL1
Michelle Carter	ML20205L565	FL1
Stan Blecher	ML20205L565	FL1
Patrick Donaldson	ML20205L565	FL1
Ellen Rice	ML20205L565	FL1
Allan Glick	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Molly Brewer	ML20205L565	FL1
John Six	ML20205L565	FL1
John Liss	ML20205L565	FL1
Michael Morgan	ML20205L565	FL1
Leslie Gold	ML20205L565	FL1
Sandy Sage	ML20205L565	FL1
P. A. Paye	ML20205L565	FL1
Allan Walters	ML20205L565	FL1
Elinor Weiss	ML20205L565	FL1
Marji Mendelsohn	ML20205L565	FL1
Geraldine Aird	ML20205L565	FL1
Jean Claude Louhisdon	ML20205L565	FL1
Michael Abler	ML20205L565	FL1
Ross Lockridge	ML20205L565	FL1
Linda Rucci	ML20205L565	FL1
Carolyn Riddle	ML20205L565	FL1
Jennifer Kopczynski	ML20205L565	FL1
Clark Crowe	ML20205L565	FL1
Alice Vedova	ML20205L565	FL1
Christina Babst	ML20205L565	FL1
Margaret Wessels	ML20205L565	FL1
Robin Dash	ML20205L565	FL1
Regene Silver (1)	ML20205L565	FL1
Regene Silver (2)	ML20205L565	FL1
Lynda LaHue (1)	ML20205L565	FL1
Lynda LaHue (2)	ML20205L565	FL1
Kim Bigley	ML20205L565	FL1
Lynda LaHue (3)	ML20205L565	FL1
Marian Ronan	ML20205L565	FL1
Helen Stuehler	ML20205L565	FL1
Leona Klerer	ML20205L565	FL1
Victoria Sepulveda	ML20205L565	FL1
Ruth Lovinsohn (1)	ML20205L565	FL1
Ruth Lovinsohn (2)	ML20205L565	FL1
David Henning	ML20205L565	FL1
Tara Mae	ML20205L565	FL1
Dorothy Johnson	ML20205L565	FL1
David Ellison	ML20205L565	FL1
Carol Gay	ML20205L565	FL1
Robert Kolkebeck	ML20205L565	FL1
Joseph Quirk	ML20205L565	FL1
Elena Rumiantseva	ML20205L565	FL1
A. McGarry	ML20205L565	FL1
K. Bensusen	ML20205L565	FL1
Sharon Wilensky	ML20205L565	FL1
Jerry Smith	ML20205L565	FL1
Gayle Smith	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Tracy Cole	ML20205L565	FL1
David Rice	ML20205L565	FL1
Bob Ramlow	ML20205L565	FL1
Chris Ferrio	ML20205L565	FL1
Arthur Hansen	ML20205L565	FL1
Denise Lytle	ML20205L565	FL1
Ed Fiedler	ML20205L565	FL1
Jesse Hunter	ML20205L565	FL1
Audrey Clement	ML20205L565	FL1
Evelyn Verrill	ML20205L565	FL1
Heather Davis	ML20205L565	FL1
Nancy Caponi	ML20205L565	FL1
Anne Tuddenham	ML20205L565	FL1
Cynthia Molinero	ML20205L565	FL1
Susan Kassouf	ML20205L565	FL1
Karen Suyemoto	ML20205L565	FL1
Duncan Brown	ML20205L565	FL1
Amitav Dash	ML20205L565	FL1
Beverly Harris	ML20205L565	FL1
Larry Daniell	ML20205L565	FL1
Anne Craig	ML20205L565	FL1
Robin Kladke	ML20205L565	FL1
Melissa Heller-Booth	ML20205L565	FL1
Joan Breiding	ML20205L565	FL1
Devon Hildreth	ML20205L565	FL1
Laurie Hope (2)	ML20205L565	FL1
Jeannie Park	ML20205L565	FL1
Joel Porter	ML20205L565	FL1
Marija Kljuce	ML20205L565	FL1
Vladimir Levchenko	ML20205L565	FL1
Theresa Owens	ML20205L565	FL1
Sharon Frank	ML20205L565	FL1
Jaymee Workman	ML20205L565	FL1
Helen Syen	ML20205L565	FL1
Christine Garofalo	ML20205L565	FL1
Lyn Capurro	ML20205L565	FL1
Heather Servais	ML20205L565	FL1
Robin Perry	ML20205L565	FL1
Cheryl Fergeson	ML20205L565	FL1
Nick Berezansky	ML20205L565	FL1
Arthur Bogie	ML20205L565	FL1
John Velner	ML20205L565	FL1
Dwight Hughes	ML20205L565	FL1
John Moszyk	ML20205L565	FL1
Carolyn Shafer	ML20205L565	FL1
Linda Keir	ML20205L565	FL1
Melba Dlugonski	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
John Zahos	ML20205L565	FL1
Kimberly Wiley	ML20205L565	FL1
Jocelyn DeCrescenzo	ML20205L565	FL1
Neal Ferris	ML20205L565	FL1
Susan Perez	ML20205L565	FL1
Carl May	ML20205L565	FL1
Satya Vayu	ML20205L565	FL1
Fredric Hefter	ML20205L565	FL1
Ken Bossong (1)	ML20205L565	FL1
Marian Cooley	ML20205L565	FL1
Virginia Bottorff	ML20205L565	FL1
Scott Grinthal	ML20205L565	FL1
Karen Peterson	ML20205L565	FL1
Brian Habenicht	ML20205L565	FL1
N. J. Bast	ML20205L565	FL1
Anthony Szilagye	ML20205L565	FL1
Dana Abbott	ML20205L565	FL1
Clara Guerrero	ML20205L565	FL1
Beth Goode	ML20205L565	FL1
Orrin Merritt	ML20205L565	FL1
Priscilla Newcomer	ML20205L565	FL1
Tim Stein	ML20205L565	FL1
Kellie F.	ML20205L565	FL1
Katherine Tomasello	ML20205L565	FL1
Sara Cox	ML20205L565	FL1
Terumi Teraao	ML20205L565	FL1
Thomas Talbot	ML20205L565	FL1
Bonnie McGill	ML20205L565	FL1
Micaela Pronio	ML20205L565	FL1
Kathy Kosinski	ML20205L565	FL1
Florence Harty	ML20205L565	FL1
Christine Walturz	ML20205L565	FL1
Karen Milstein	ML20205L565	FL1
Amy Cusick	ML20205L565	FL1
Carol Przybylak	ML20205L565	FL1
MaryAnna Foskett	ML20205L565	FL1
Robert L. Oman	ML20205L565	FL1
Vincent Rubino	ML20205L565	FL1
Andy Lupenko	ML20205L565	FL1
Rick Geyer	ML20205L565	FL1
Carolyn Wacaser	ML20205L565	FL1
Marleny M.	ML20205L565	FL1
Kathryn Lilley	ML20205L565	FL1
Lee Dublin	ML20205L565	FL1
Sandra Booth	ML20205L565	FL1
Art Hanson	ML20205L565	FL1
Debra Stoleroff (1)	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Dita Škalič	ML20205L565	FL1
Robert Glover	ML20205L565	FL1
Judy Foster	ML20205L565	FL1
Peter Melka	ML20205L565	FL1
Dorothy Kraemer	ML20205L565	FL1
Bonnie Yohe	ML20205L565	FL1
Lynne Draper	ML20205L565	FL1
Maria Millar	ML20205L565	FL1
Sammy Low	ML20205L565	FL1
Jenni Kovich	ML20205L565	FL1
Adina Parsley	ML20205L565	FL1
Doug Fraanklin	ML20205L565	FL1
Steve Hopkins	ML20205L565	FL1
Bernadine Young	ML20205L565	FL1
Sam Holden	ML20205L565	FL1
Dorothy Dobbyn	ML20205L565	FL1
Heath Post	ML20205L565	FL1
Sandra Mardigian	ML20205L565	FL1
Peter Meissner	ML20205L565	FL1
David Trione	ML20205L565	FL1
Carmela Sudano	ML20205L565	FL1
Eric Parker	ML20205L565	FL1
Kathleen Hannan (1)	ML20205L565	FL1
Kathleen Hannan (2)	ML20205L565	FL1
Diana Saxon	ML20205L565	FL1
Deborah Cate	ML20205L565	FL1
Nancy Enkiri	ML20205L565	FL1
Linda Townley	ML20205L565	FL1
Sue Colucci	ML20205L565	FL1
Craig Cline	ML20205L565	FL1
John Culloty	ML20205L565	FL1
Rita Gugliotta	ML20205L565	FL1
Judith Hazelton	ML20205L565	FL1
Ran Zirasri	ML20205L565	FL1
Leigh Steele	ML20205L565	FL1
Mary Counihan	ML20205L565	FL1
Glenn Brownton	ML20205L565	FL1
Laura Hanks	ML20205L565	FL1
Dave Parrish (1)	ML20205L565	FL1
Erica Stanojevic	ML20205L565	FL1
Carolyn Treadway	ML20205L565	FL1
A. G. Sharpe-Torres	ML20205L565	FL1
Cindy Meyers	ML20205L565	FL1
Fred Lavy	ML20205L565	FL1
Susannah Masarie	ML20205L565	FL1
Marcia Halligan	ML20205L565	FL1
Thomas De Pree	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
John Catherine	ML20205L565	FL1
Jamie Guy Ostrowski	ML20205L565	FL1
Joel Leitner	ML20205L565	FL1
Joanne Hesselinmk	ML20205L565	FL1
Tom Hougham	ML20205L565	FL1
Kerry Mortensen	ML20205L565	FL1
Judy Nakadegawa	ML20205L565	FL1
Monica O'Brien	ML20205L565	FL1
Kirk Miller	ML20205L565	FL1
Robert Lieber	ML20205L565	FL1
Paul Lapidus	ML20205L565	FL1
Barbara Brigham	ML20205L565	FL1
Tim King	ML20205L565	FL1
Jack Ray	ML20205L565	FL1
Elizabeth ODear	ML20205L565	FL1
Terrie Williams	ML20205L565	FL1
Charles Pohlod	ML20205L565	FL1
Paul Turner	ML20205L565	FL1
Joan Yater	ML20205L565	FL1
Jill B.	ML20205L565	FL1
Janelle Murphy	ML20205L565	FL1
Regina Logue	ML20205L565	FL1
Holly Huntley	ML20205L565	FL1
Dixie van der Kamp	ML20205L565	FL1
Lisa Ehle	ML20205L565	FL1
Susan Tucker	ML20205L565	FL1
Ann Behrmann	ML20205L565	FL1
Julienne DeMarsh	ML20205L565	FL1
Nancy LaPlaca	ML20205L565	FL1
Raymond & Christine Gicela	ML20205L565	FL1
Ruth Panella	ML20205L565	FL1
Mary S. Gregg	ML20205L565	FL1
Julie Berberi (1)	ML20205L565	FL1
Julie Berberi (2)	ML20205L565	FL1
Vernon Batty	ML20205L565	FL1
Lee Greenawalt (1)	ML20205L565	FL1
Pam Speagle	ML20205L565	FL1
Carl Pribanic	ML20205L565	FL1
Dennis Nelson (1)	ML20205L565	FL1
Merle Showers	ML20205L565	FL1
Bernie Zelazny	ML20205L565	FL1
Gordon Murphy	ML20205L565	FL1
Bruce Cratty	ML20205L565	FL1
Jack Bubenick	ML20205L565	FL1
Carol Kussart	ML20205L565	FL1
Kristi Collins	ML20205L565	FL1
Charles Leiden	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Richard Heinlein	ML20205L565	FL1
Dmitry Landa	ML20205L565	FL1
Dolores Parra	ML20205L565	FL1
Peter Lee	ML20205L565	FL1
Pat Magrath	ML20205L565	FL1
Tracy Mcdonald	ML20205L565	FL1
Axel Vogt	ML20205L565	FL1
Joe Tricase	ML20205L565	FL1
Albert Snow	ML20205L565	FL1
Joseph Dadgari	ML20205L565	FL1
Ellen Atkinson	ML20205L565	FL1
Joan Lobell	ML20205L565	FL1
Mary Sullivan	ML20205L565	FL1
Nick Marling	ML20205L565	FL1
Geri Collecchia	ML20205L565	FL1
Mary Hahn	ML20205L565	FL1
Michael Tomczyszyn	ML20205L565	FL1
Donna Browne	ML20205L565	FL1
Alice Anne Martineau	ML20205L565	FL1
Megan Warren	ML20205L565	FL1
q q	ML20205L565	FL1
Carol Scher	ML20205L565	FL1
Santiago Muñoz Sebastián	ML20205L565	FL1
Camille Gilbert	ML20205L565	FL1
Ken Fogel	ML20205L565	FL1
Sue Halligan	ML20205L565	FL1
Kirk Bails	ML20205L565	FL1
Kathryn Lambros	ML20205L565	FL1
Randy Gerlach	ML20205L565	FL1
Jane Yater	ML20205L565	FL1
Christine Popowski	ML20205L565	FL1
Dennis Hester	ML20205L565	FL1
Dixie Belcher	ML20205L565	FL1
Marianne Flanagan	ML20205L565	FL1
Sandra Woodall	ML20205L565	FL1
Laurie Alexander	ML20205L565	FL1
Brett Tharp	ML20205L565	FL1
Pat Dawson	ML20205L565	FL1
Dr. William “Skip” Dykoski (1)	ML20205L565	FL1
Dr. William “Skip” Dykoski (2)	ML20205L565	FL1
Tania Malven	ML20205L565	FL1
John Dunn	ML20205L565	FL1
Wendy Larson	ML20205L565	FL1
Michael Kast	ML20205L565	FL1
Gloria Krueger	ML20205L565	FL1
Karen D. Felts	ML20205L565	FL1
Croitiene ganMoryn	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Jennifer Cunningham	ML20205L565	FL1
Matt Cornell	ML20205L565	FL1
Larry Lambeth	ML20205L565	FL1
Bruce Rauscher	ML20205L565	FL1
Michelle Pavcovich	ML20205L565	FL1
Pat and Gary Gover	ML20205L565	FL1
Chris Kermiet	ML20205L565	FL1
Kate Goetz	ML20205L565	FL1
Claudia Bosshammer-Bilimek	ML20205L565	FL1
Jon Bazinet	ML20205L565	FL1
William Justis	ML20205L565	FL1
Esther Garvett	ML20205L565	FL1
Tlaloc Tokuda	ML20205L565	FL1
Martha Goldin	ML20205L565	FL1
Nelson Stockdill	ML20205L565	FL1
Carol Gordon	ML20205L565	FL1
Lula Shoberg	ML20205L565	FL1
Cynthia McCarthy	ML20205L565	FL1
Margaret Phelps	ML20205L565	FL1
D. Rincon	ML20205L565	FL1
Roxann Carmean Floyd	ML20205L565	FL1
Sheila Parks	ML20205L565	FL1
Wolfgang Loera	ML20205L565	FL1
Sam King	ML20205L565	FL1
Jesse Calderon	ML20205L565	FL1
Christopher Kustra	ML20205L565	FL1
Donna Ksczanowicz	ML20205L565	FL1
Hillary Ostrow	ML20205L565	FL1
Nancy Brown (2)	ML20205L565	FL1
Robert Handelsman	ML20205L565	FL1
Tyra Pellerin	ML20205L565	FL1
Carol Myers	ML20205L565	FL1
S Nam	ML20205L565	FL1
Natalie Houghton	ML20205L565	FL1
Stewart Casey	ML20205L565	FL1
Cynthia Morrell	ML20205L565	FL1
Sue Malone	ML20205L565	FL1
Ingeborg Glier	ML20205L565	FL1
Eric Decker	ML20205L565	FL1
Gabriel Varkonyi	ML20205L565	FL1
Carolyn Massey (1)	ML20205L565	FL1
Davin Peterson	ML20205L565	FL1
B. Chan	ML20205L565	FL1
Nathan Coles	ML20205L565	FL1
Jennifer Smith	ML20205L565	FL1
Timothy Lippert	ML20205L565	FL1
Joshua Heffron	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Melvin Zimmerman	ML20205L565	FL1
Diane Hart	ML20205L565	FL1
Kimberly Allen	ML20205L565	FL1
Susan Porter	ML20205L565	FL1
J. Allen Feryok	ML20205L565	FL1
Charles Miller	ML20205L565	FL1
Deborah Voves	ML20205L565	FL1
Ronald Cook	ML20205L565	FL1
Virginia Jastromb	ML20205L565	FL1
Gaia Cooksey	ML20205L565	FL1
Joseph Lipsey	ML20205L565	FL1
Beth Huizenga	ML20205L565	FL1
Janice Hoffman	ML20205L565	FL1
Jenna Fallaw	ML20205L565	FL1
Bob Fischella	ML20205L565	FL1
F. Olson	ML20205L565	FL1
Monique Edwards	ML20205L565	FL1
Nancy Currah (1)	ML20205L565	FL1
Joan Pratt	ML20205L565	FL1
Sara Hayes	ML20205L565	FL1
Richard Patenaude	ML20205L565	FL1
Donna Knipp	ML20205L565	FL1
Scott Chase	ML20205L565	FL1
Richard Booth	ML20205L565	FL1
Evan Hartman	ML20205L565	FL1
Linda Prostko	ML20205L565	FL1
Michael Wollman	ML20205L565	FL1
Shanna Crockett	ML20205L565	FL1
Thomas Holubeck	ML20205L565	FL1
Karin Nelson-Rogers	ML20205L565	FL1
Susan Space	ML20205L565	FL1
Gilda Fusilier	ML20205L565	FL1
Helene Rosen (1)	ML20205L565	FL1
Helene Rosen (2)	ML20205L565	FL1
Warren Green	ML20205L565	FL1
Mitchell Maricque	ML20205L565	FL1
Rosalind Bresnahan	ML20205L565	FL1
Carol Weaver	ML20205L565	FL1
Pamela VourosCallahan	ML20205L565	FL1
F. Corr	ML20205L565	FL1
Wes Weaver	ML20205L565	FL1
Tom Csuhta	ML20205L565	FL1
Emily Bryant	ML20205L565	FL1
Chris Monti	ML20205L565	FL1
Karen Berger	ML20205L565	FL1
Roberta Stern	ML20205L565	FL1
Gaynelle Predmore	ML20205L565	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Jumpei Kawakami	ML20205L565	FL1
Dennis Ledden	ML20205L565	FL1
Dennis Schaef	ML20205L565	FL1
Kay Olan	ML20205L565	FL1
P. Willa (2)	ML20205L565	FL1
Aleks Kosowicz	ML20205L565	FL1
Kathy Abby	ML20205L565	FL1
Linda Fielder	ML20205L565	FL1
Pati Tomsits (1)	ML20205L565	FL1
Pati Tomsits (2)	ML20205L565	FL1
Pati Tomsits (3)	ML20205L565	FL1
Robert Koopmans	ML20205L565	FL1
Susan Heath	ML20205L565	FL1
Kay Brainerd (1)	ML20211L855	FL1
Felicia Bander	ML20211L855	FL1
Amy DeSantis	ML20211L855	FL1
Andrew Sutphin	ML20211L855	FL1
Dolores Pino	ML20211L855	FL1
Pamela Osgood	ML20211L855	FL1
Joseph & Sandra Windwalker	ML20211L855	FL1
Lucy Johnson	ML20211L855	FL1
Joan Rieck	ML20211L855	FL1
Connie Hammond	ML20211L855	FL1
Michael Hill	ML20211L855	FL1
Carolyn Croom	ML20211L855	FL1
Gail Sullivan (1)	ML20211L855	FL1
Jonathan Mansell	ML20211L855	FL1
Vicky Viray	ML20211L855	FL1
Gail Sullivan (2)	ML20211L855	FL1
Paul Bramscher	ML20211L855	FL1
Kathryn Atkins	ML20211L855	FL1
Mary Morell (1)	ML20211L855	FL1
Bob Ehmann	ML20211L855	FL1
Anne Ehmann	ML20211L855	FL1
Kevin Brown	ML20211L855	FL1
Elizabeth Lyle	ML20211L855	FL1
Keith Augusto	ML20211L855	FL1
Martha Fait	ML20211L855	FL1
Valery Keramaty	ML20211L855	FL1
Tim Rose	ML20211L855	FL1
Amanda Bradley	ML20211L855	FL1
Allison Kiser	ML20211L855	FL1
Virginia Sendor	ML20211L855	FL1
Kathleen Findlay	ML20211L855	FL1
Walter Hays	ML20211L855	FL1
Ellen Leaman	ML20211L855	FL1
Leigh Hill	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Ruth Lovinsohn (3)	ML20211L855	FL1
Ruth Lovinsohn (4)	ML20211L855	FL1
Robert Kolodny (1)	ML20211L855	FL1
Robert Kolodny (2)	ML20211L855	FL1
Rick Wood	ML20211L855	FL1
Earl Hall	ML20211L855	FL1
Robert Nobrega	ML20211L855	FL1
Sharon Burge	ML20211L855	FL1
Dennis Nelson (2)	ML20211L855	FL1
Terri Reischl	ML20211L855	FL1
Nancy Chismar	ML20211L855	FL1
Jo Roehrig	ML20211L855	FL1
Amit Shoham	ML20211L855	FL1
Genevieve Miller (1)	ML20211L855	FL1
Geooge Jacobson	ML20211L855	FL1
Stephen Blakely	ML20211L855	FL1
Loan Tran	ML20211L855	FL1
Hugh Moore	ML20211L855	FL1
Lee Miller	ML20211L855	FL1
Dirk Rogers	ML20211L855	FL1
Dan & Ann Green	ML20211L855	FL1
Vince L.	ML20211L855	FL1
Catherine Clifton	ML20211L855	FL1
Mike Hlat	ML20211L855	FL1
Helen Cotton	ML20211L855	FL1
Michele Johnson	ML20211L855	FL1
Ms. Lucy M. Almasy	ML20211L855	FL1
Janice Keiserman	ML20211L855	FL1
Sara Eldridge	ML20211L855	FL1
Lisa Roberts	ML20211L855	FL1
Sam Miller	ML20211L855	FL1
Querido Galdo	ML20211L855	FL1
Susan Sporl	ML20211L855	FL1
Jessica Fielden	ML20211L855	FL1
Carolyn Thomas	ML20211L855	FL1
Erin Znidar	ML20211L855	FL1
Janice Kurkoski	ML20211L855	FL1
Alvaro Luque	ML20211L855	FL1
Scott Sklar	ML20211L855	FL1
Mary Smith	ML20211L855	FL1
Sam Todd	ML20211L855	FL1
Mary Jane Williams	ML20211L855	FL1
Jay Jensen	ML20211L855	FL1
Heather Rabinowitz	ML20211L855	FL1
Paul Kerman	ML20211L855	FL1
Mukund Sharma	ML20211L855	FL1
Catherine Tinney Rome	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Rita DeMaria	ML20211L855	FL1
Sholey Argani	ML20211L855	FL1
Thomas Fukuman	ML20211L855	FL1
Robert Bamford	ML20211L855	FL1
Eugene Majerowicz	ML20211L855	FL1
Heidi Holloran (1)	ML20211L855	FL1
Heidi Holloran (2)	ML20211L855	FL1
Mary Hicklin	ML20211L855	FL1
Megan Roemer	ML20211L855	FL1
James Hipp	ML20211L855	FL1
Courtney Hein	ML20211L855	FL1
John Markham	ML20211L855	FL1
Julie McCarthy	ML20211L855	FL1
Cheryl Eames	ML20211L855	FL1
Allen Elliott	ML20211L855	FL1
Karen Larsen (1)	ML20211L855	FL1
Karen Larsen (2)	ML20211L855	FL1
Steve Walsh	ML20211L855	FL1
James Michael "Mike" Henderson	ML20211L855	FL1
Alan Murakski	ML20211L855	FL1
Victor Nepomnyashchy	ML20211L855	FL1
Liz Murphy	ML20211L855	FL1
Kathy Svendsen	ML20211L855	FL1
Harry Corsover	ML20211L855	FL1
Francisco J. Velez	ML20211L855	FL1
Forest Frasieur	ML20211L855	FL1
Millie Magner	ML20211L855	FL1
Louisa Hamachek	ML20211L855	FL1
Judith Brickman	ML20211L855	FL1
Mary King	ML20211L855	FL1
Lee Greenawalt (2)	ML20211L855	FL1
Theo Giesy	ML20211L855	FL1
Linda Massimo	ML20211L855	FL1
Stephen Molk	ML20211L855	FL1
Trish McPeak-LaRocca	ML20211L855	FL1
Kathryn Lemoine	ML20211L855	FL1
Sue Jackson	ML20211L855	FL1
Susan Armistead	ML20211L855	FL1
Dewey Jackson	ML20211L855	FL1
Elaine Heathcoat	ML20211L855	FL1
Russell Jackson	ML20211L855	FL1
Dominic Melita	ML20211L855	FL1
Nancy Currah (2)	ML20211L855	FL1
Jeff Stone	ML20211L855	FL1
Mark Drye	ML20211L855	FL1
Carolyn Massey (2)	ML20211L855	FL1
Joyce Dixon	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
T. Garmon (2)	ML20211L855	FL1
Neil Resico	ML20211L855	FL1
Kathrine Jones	ML20211L855	FL1
Sue Geurkink	ML20211L855	FL1
Linda Abbott	ML20211L855	FL1
Tina Ann	ML20211L855	FL1
Joanne Groshardt	ML20211L855	FL1
George Riggs	ML20211L855	FL1
Richard Curry	ML20211L855	FL1
Steve Donoso	ML20211L855	FL1
Ryk Diemert (2)	ML20211L855	FL1
Yvette Tapp	ML20211L855	FL1
Harold & Lorraine Panciera	ML20211L855	FL1
Suzanne J. Arnold	ML20211L855	FL1
Jalna Hanmer (1)	ML20211L855	FL1
Rachel Krucoff	ML20211L855	FL1
Emily Willoughby	ML20211L855	FL1
Cammy Colton	ML20211L855	FL1
Mary Wueste	ML20211L855	FL1
Eric Britton	ML20211L855	FL1
Richard Fehr	ML20211L855	FL1
Ellen MacRae	ML20211L855	FL1
Thomas Simon	ML20211L855	FL1
Martin Margolis	ML20211L855	FL1
Mark Farris	ML20211L855	FL1
Natalie Van Leekwijck	ML20211L855	FL1
Brian Skaggs	ML20211L855	FL1
Barry Eshkol Adelman	ML20211L855	FL1
Laura Vera	ML20211L855	FL1
Patricia Long	ML20211L855	FL1
Judy Mouradian	ML20211L855	FL1
Rebecca Procter	ML20211L855	FL1
Fiona Priskich	ML20211L855	FL1
Joann Ramos	ML20211L855	FL1
Janice Wilfing	ML20211L855	FL1
Keth Luke	ML20211L855	FL1
Lydia Garvey	ML20211L855	FL1
Chuck Graver	ML20211L855	FL1
Rob Doucette	ML20211L855	FL1
H. Richard Leuchtag	ML20211L855	FL1
Sheridan Phillips (1)	ML20211L855	FL1
Sheridan Phillips (2)	ML20211L855	FL1
Joann Koch	ML20211L855	FL1
Sasha Jackson	ML20211L855	FL1
Curtis Eckstein	ML20211L855	FL1
Dennis Kreiner	ML20211L855	FL1
David Martin	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Russell Novkov	ML20211L855	FL1
Randy Vannoy	ML20211L855	FL1
Mina Blyly-Strauss	ML20211L855	FL1
Marcia Evers	ML20211L855	FL1
Joyce Follingstad	ML20211L855	FL1
Maria Baum	ML20211L855	FL1
John Kirchner	ML20211L855	FL1
Linda Levin	ML20211L855	FL1
Marion Tidwell	ML20211L855	FL1
Aimee Arceo	ML20211L855	FL1
Boguslaw Kulesza	ML20211L855	FL1
Kenneth Albright	ML20211L855	FL1
Lee Jurman	ML20211L855	FL1
Isabel Cervera	ML20211L855	FL1
Ann Malyon (3)	ML20211L855	FL1
Roy Taylor	ML20211L855	FL1
Bettie Reina	ML20211L855	FL1
Jennifer Rials	ML20211L855	FL1
Meryle A. Korn	ML20211L855	FL1
Wendy Alberg	ML20211L855	FL1
Jalna Hanmer (2)	ML20211L855	FL1
James Perkins	ML20211L855	FL1
Tom Hazelleaf	ML20211L855	FL1
Renee Austin	ML20211L855	FL1
Ron Johnson	ML20211L855	FL1
Sophia Sutton	ML20211L855	FL1
Pamela Nelson	ML20211L855	FL1
Joyce R. Farber (1)	ML20211L855	FL1
Elizabeth Smith	ML20211L855	FL1
Les Forman	ML20211L855	FL1
Chanda Farley	ML20211L855	FL1
Joyce R. Farber (2)	ML20211L855	FL1
Penny Dever-Reynolds	ML20211L855	FL1
Kathryn Rose	ML20211L855	FL1
Robert Marcus	ML20211L855	FL1
Carol Ann Brady, R.N.	ML20211L855	FL1
Michael Gorr	ML20211L855	FL1
Adrienne Hochberg	ML20211L855	FL1
Eva Coffee	ML20211L855	FL1
Paul Wright	ML20211L855	FL1
Linda Torrel	ML20211L855	FL1
Bonnie Howard	ML20211L855	FL1
Gavin Bornholtz	ML20211L855	FL1
Karin Ascot	ML20211L855	FL1
Gail and John Richardson	ML20211L855	FL1
Deborah Sallee	ML20211L855	FL1
Isabel Cordova	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Richard Trela	ML20211L855	FL1
Mira Nakashima	ML20211L855	FL1
Debra Stoleroff (2)	ML20211L855	FL1
Kenneth Mayers	ML20211L855	FL1
Shari Galve	ML20211L855	FL1
J. Holley Taylor	ML20211L855	FL1
Jaremy Lynch	ML20211L855	FL1
Cletus Stein	ML20211L855	FL1
Kathleen Mezoff	ML20211L855	FL1
Eric Jacobs	ML20211L855	FL1
Linda Musmeci Kimball	ML20211L855	FL1
Lucy Calvillo	ML20211L855	FL1
Mark Fitzgerald	ML20211L855	FL1
Robert Schuessler	ML20211L855	FL1
Stephanie Bilenko	ML20211L855	FL1
Ilene Bellerue	ML20211L855	FL1
Gudrun Dennis	ML20211L855	FL1
Anje Waters	ML20211L855	FL1
Nancy Roberts-Moneir	ML20211L855	FL1
Sharon Fortunak	ML20211L855	FL1
Nancy Bodan-Gonser	ML20211L855	FL1
Evan Ravitz	ML20211L855	FL1
Joanne Tenney	ML20211L855	FL1
Carol Jurczewski	ML20211L855	FL1
Laura Leipzig (2)	ML20211L855	FL1
Silvia Hall	ML20211L855	FL1
Susan Kulis	ML20211L855	FL1
Astrata Barber (2)	ML20211L855	FL1
Amaryntha Schalin (2)	ML20211L855	FL1
Lisa Hammermeister	ML20211L855	FL1
Robin Cook	ML20211L855	FL1
Morey Wolfson	ML20211L855	FL1
Teri Raymond	ML20211L855	FL1
Judith Hutchison	ML20211L855	FL1
Mariane Paviasen	ML20211L855	FL1
Glenn Mitroff	ML20211L855	FL1
Leonard Tremmel	ML20211L855	FL1
Abigail Gindele	ML20211L855	FL1
Harvey Dym	ML20211L855	FL1
Carl Arnold	ML20211L855	FL1
John Rath	ML20211L855	FL1
Grant Rich	ML20211L855	FL1
Charlotte Mullen	ML20211L855	FL1
Dave Parrish (2)	ML20211L855	FL1
Janet Geldert	ML20211L855	FL1
Kevin Havener	ML20211L855	FL1
Ronit Corry	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Joseph Goldenberg	ML20211L855	FL1
Charles Happel	ML20211L855	FL1
Gabrielle Kayser	ML20211L855	FL1
Roberta Ahlquist	ML20211L855	FL1
Patrick J. Mitchell	ML20211L855	FL1
Sandra Marr	ML20211L855	FL1
Douglas and Diane Ower	ML20211L855	FL1
Alice Neuhauser	ML20211L855	FL1
Thomas Conroy	ML20211L855	FL1
Eva Linderoth	ML20211L855	FL1
Lee Bartell	ML20211L855	FL1
Heidi Buitron	ML20211L855	FL1
Terrence Bennett	ML20211L855	FL1
Michele Hale	ML20211L855	FL1
Lore Weber	ML20211L855	FL1
R.G. Tuomi	ML20211L855	FL1
Christiane Bernier	ML20211L855	FL1
Richard Koerber	ML20211L855	FL1
Mary Heiser	ML20211L855	FL1
Ernie Loreen	ML20211L855	FL1
Dale Axelrod	ML20211L855	FL1
Lawrence Crowley	ML20211L855	FL1
Sharon Hurley	ML20211L855	FL1
Ken Gibb	ML20211L855	FL1
Lynne Preston	ML20211L855	FL1
Meredith McGuire	ML20211L855	FL1
Mary Long	ML20211L855	FL1
Sherrill Lewis	ML20211L855	FL1
James Sliger	ML20211L855	FL1
Katharine Tussing	ML20211L855	FL1
Laurie Litman	ML20211L855	FL1
Gloria Lewis	ML20211L855	FL1
Jan Mosgofian	ML20211L855	FL1
Gregory Pais	ML20211L855	FL1
Edward Petroski	ML20211L855	FL1
Terry Warkentine	ML20211L855	FL1
Nancy Harlow	ML20211L855	FL1
Lucy Nichols	ML20211L855	FL1
Andrei Harabadji	ML20211L855	FL1
Tom Devine	ML20211L855	FL1
William St. George	ML20211L855	FL1
Marilyn Long	ML20211L855	FL1
Robert Tinsley	ML20211L855	FL1
Martin Russell	ML20211L855	FL1
Kelly DeVine	ML20211L855	FL1
Eve Duddy	ML20211L855	FL1
Elaine Larson	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Nathalie Kuroiwa-Lewis	ML20211L855	FL1
Elizabeth Kelley	ML20211L855	FL1
Stephanie Huntington	ML20211L855	FL1
Bret Myers	ML20211L855	FL1
Emma Goode-DeBlanc	ML20211L855	FL1
Glenn Knoblock	ML20211L855	FL1
Kathy Oppenhuizen (1)	ML20211L855	FL1
John Robert Jackson	ML20211L855	FL1
Robert Quarrick	ML20211L855	FL1
Jean Glassman	ML20211L855	FL1
Thomas A. Pakurar	ML20211L855	FL1
Roberta Marine	ML20211L855	FL1
Judith Butts	ML20211L855	FL1
Ann Breitenbach	ML20211L855	FL1
Ken Bossong (2)	ML20211L855	FL1
Paul Reslink	ML20211L855	FL1
Peggy Fugate	ML20211L855	FL1
Laurie King	ML20211L855	FL1
Bruce Ross	ML20211L855	FL1
Martin Mador	ML20211L855	FL1
Jonny Hahn	ML20211L855	FL1
William Wharton Smith III	ML20211L855	FL1
Lucymarie Ruth	ML20211L855	FL1
Lori Haaland	ML20211L855	FL1
Yvonne Fisher	ML20211L855	FL1
Saab Lofton	ML20211L855	FL1
Gabriela Sweet	ML20211L855	FL1
Matthew Shapiro	ML20211L855	FL1
Karl Novak	ML20211L855	FL1
Karma Lekshe Tsomo	ML20211L855	FL1
Sharon Fasnacht	ML20211L855	FL1
Dennis Nelson (3)	ML20211L855	FL1
Manuel Bermudez	ML20211L855	FL1
Sarah Hayes	ML20211L855	FL1
Jacki Gluck	ML20211L855	FL1
Wayne English	ML20211L855	FL1
Edith Ogella	ML20211L855	FL1
Lloyd Hedger	ML20211L855	FL1
Nan Wollman	ML20211L855	FL1
Victor Becker Lau	ML20211L855	FL1
Dorothy Anderson	ML20211L855	FL1
Zeb Nole	ML20211L855	FL1
Ric Bernat	ML20211L855	FL1
Elaine Palmquist	ML20211L855	FL1
Erline Towner	ML20211L855	FL1
Sylvia Tyree	ML20211L855	FL1
Sally Mann	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Jann Brooks (1)	ML20211L855	FL1
Jann Brooks (2)	ML20211L855	FL1
Kaelan Shannon	ML20211L855	FL1
Michael Daus	ML20211L855	FL1
Carole Huelsberg	ML20211L855	FL1
Larry Gioannini	ML20211L855	FL1
Albert Ulrich	ML20211L855	FL1
John Keiser	ML20211L855	FL1
Nancy Griffith	ML20211L855	FL1
Joyce Case	ML20211L855	FL1
John Thompson	ML20211L855	FL1
B Barbara Parliman	ML20211L855	FL1
Marie Young	ML20211L855	FL1
Elliott Blass	ML20211L855	FL1
Loraine Ferrara	ML20211L855	FL1
Randall Frank	ML20211L855	FL1
Susan Clark	ML20211L855	FL1
Sandra Cais (3)	ML20211L855	FL1
L. Sokei	ML20211L855	FL1
Dawn Florio	ML20211L855	FL1
Karen Verrill	ML20211L855	FL1
Carolyn Summers	ML20211L855	FL1
Pauline Cunningham	ML20211L855	FL1
Robert Fenstermaker	ML20211L855	FL1
Sandra Benzeev	ML20211L855	FL1
Lisa Vaughan	ML20211L855	FL1
Aileen McEvoy	ML20211L855	FL1
Carol Edwards	ML20211L855	FL1
Nicholas Williams	ML20211L855	FL1
Helen Rynaski	ML20211L855	FL1
Joan Liberty	ML20211L855	FL1
Terry Akana	ML20211L855	FL1
A. Gardner	ML20211L855	FL1
Lynn Pekkanen	ML20211L855	FL1
Mary Perner	ML20211L855	FL1
Chip Henneman	ML20211L855	FL1
William McGoldrick	ML20211L855	FL1
Liz Rieman	ML20211L855	FL1
Joy Morgen	ML20211L855	FL1
Mike Sheppard	ML20211L855	FL1
Vernon Brechin	ML20211L855	FL1
Lowell Young (1)	ML20211L855	FL1
Lowell Young (2)	ML20211L855	FL1
William Palmisano	ML20211L855	FL1
Oleh Sydor (2)	ML20211L855	FL1
Diana Horowitz	ML20211L855	FL1
Richard Foreman	ML20211L855	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Jesse Marsden	ML20211L855	FL1
Stuart Weinstock	ML20211L855	FL1
Victoria Fuller	ML20211L855	FL1
P.Jacquelyn Schmidt	ML20211L855	FL1
Peter Guerrero	ML20211L855	FL1
Fergus Marshall	ML20211L855	FL1
David Ball	ML20211L855	FL1
Jonna Johnson	ML20211L855	FL1
Shirley Rice (1)	ML20211L855	FL1
Shirley Rice (2)	ML20211L855	FL1
Robin Jenkins	ML20211L855	FL1
Shay Coleman	ML20211L855	FL1
Stephen Battis	ML20211L855	FL1
Denise Dreher	ML20211L855	FL1
Ron Katz	ML20211L855	FL1
Thomas Dorsey	ML20211L855	FL1
Carolyn Turner	ML20211L855	FL1
Caroline Miller	ML20211L855	FL1
Roderick Jude	ML20211L855	FL1
Kathy Faris	ML20211L855	FL1
Robin Mcfall	ML20211L855	FL1
Stephen Schwartz	ML20211L855	FL1
Jami Pillow	ML20211L855	FL1
Teresa Grady Sayvetz	ML20211L855	FL1
Michael Ahern	ML20211L855	FL1
Mike Coats	ML20211L855	FL1
Donna Pope	ML20211L855	FL1
Don Schwartz	ML20211L855	FL1
Bruce Donnell	ML20211L855	FL1
William Persky	ML20211L855	FL1
Georgia Braithwaite	ML20211L855	FL1
Benjamin Martin	ML20211L855	FL1
BK Young	ML20211L855	FL1
Melissa Lowe	ML20211L855	FL1
Deborah Childers	ML20211L855	FL1
Patricia Constantino	ML20211L855	FL1
Joan Mccoy	ML20211L855	FL1
Janet Maker (2)	ML20211L855	FL1
Kathleen Corbett	ML20211L855	FL1
Linda Wood	ML20211L855	FL1
Elizabeth Williams	ML20225A219	FL1
Kathy Oppenhuizen (2)	ML20225A219	FL1
Mary Morell (2)	ML20225A219	FL1
Kaitlin Fitch	ML20225A219	FL1
John Dervin	ML20225A219	FL1
Carolyn Poinelli (1)	ML20225A219	FL1
Carolyn Poinelli (2)	ML20225A219	FL1

Submission Name	ADAMS Accession No.	Submission Abbreviation
Sylvia Rodriguez	ML20225A219	FL1
Danny Dyche	ML20225A219	FL1
Susan Cox	ML20240A274	FL1
Jana Shiloh	ML20240A274	FL1
Laura Miner	ML20240A274	FL1
Pia Jensen	ML20240A274	FL1
Susan Yeske	ML20240A274	FL1
Sharon Crocker	ML20272A243	FL1
Kay Brainerd (2)	ML20272A243	FL1
Genevieve Miller (2)	ML20272A243	FL1
Kevin Klenner	ML20272A243	FL1
Michelle Buerger	ML20272A243	FL1
Colleen Bonniwell	ML20272A243	FL1
Kevin Klenner	ML20290A748	FL1
Jeannie Pollak	ML20337A375	FL1
Dr. F. Taylor	ML20192A263	FL1
Mindy Maxwell	ML20204B011	FL1
Jim Head	ML21131A175	FL1
Charlie Croizet	ML20272A286	FL2
Renata Baron	ML20272A286	FL2
Michael Gavin	ML20272A286	FL2
Emma Redfoot	ML20272A286	FL2
Daniel Rosales	ML20272A286	FL2
Wayne Keith	ML20272A286	FL2
Nicholas Houze	ML20272A286	FL2
Michael Mudawar	ML20272A286	FL2
Ashley Hoover	ML20272A286	FL2
Liz Harney	ML20272A286	FL2
Shaffer	ML20272A286	FL2
Tao Flaherty	ML20272A286	FL2
Lynne Van Slyke	ML20272A286	FL2
Bryan Barnard	ML20272A286	FL2
Brian Fischer	ML20272A286	FL2
Mike Kleckner	ML20272A286	FL2
Billy Groom	ML20272A286	FL2
Mickey Davis	ML20272A286	FL2
Ernestine Kuhr	ML20272A286	FL2
Eric Uhrhane	ML20272A286	FL2
Benjamin Leopardo	ML20272A286	FL2
Dr. Erik Walker	ML20272A286	FL2
Tori Riso	ML20272A286	FL2