



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

February 27, 2014

SECRETARY

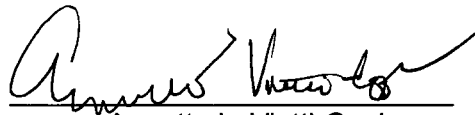
COMMISSION VOTING RECORD

DECISION ITEM: SECY-13-0135

TITLE: DENIAL OF PETITION FOR RULEMAKING REQUESTING  
AMENDMENTS REGARDING EMERGENCY PLANNING  
ZONE SIZE (PRM-50-104)

The Commission (with all Commissioners agreeing) approved the subject paper as recorded in the Staff Requirements Memorandum (SRM) of February 27, 2014.

This Record contains a summary of voting on this matter together with the individual vote sheets, views and comments of the Commission.



\_\_\_\_\_  
Annette L. Vietti-Cook  
Secretary of the Commission

Attachments:

1. Voting Summary
2. Commissioner Vote Sheets

cc: Chairman Macfarlane  
Commissioner Svinicki  
Commissioner Apostolakis  
Commissioner Magwood  
Commissioner Ostendorff  
OGC  
EDO  
PDR

SECY NOTE: THIS VOTING RECORD TO BE RELEASED TO THE PUBLIC 5 WORKING  
DAYS AFTER DISPATCH OF THE LETTERS

VOTING SUMMARY - SECY-13-0135

RECORDED VOTES

	APRVD	DISAPRVD	ABSTAIN	PARTICIP	NOT COMMENTS	DATE
CHRM. MACFARLANE	X				X	2/7/14
COMR. SVINICKI	X				X	2/20/14
COMR. APOSTOLAKIS	X				X	2/12/14
COMR. MAGWOOD	X				X	1/30/14
COMR. OSTENDORFF	X					1/8/14

**NOTATION VOTE**

**RESPONSE SHEET**

**TO:** Annette Vietti-Cook, Secretary

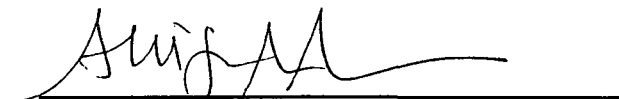
**FROM:** Chairman Allison M. Macfarlane

**SUBJECT:** SECY-13-0135 – DENIAL OF PETITION FOR  
RULEMAKING REQUESTING AMENDMENTS  
REGARDING EMERGENCY PLANNING ZONE SIZE  
(PRM-50-104)

Approved  Disapproved  Abstain

Not Participating

**COMMENTS:** Below  Attached  None



**SIGNATURE**

2/7/14

**DATE**

Entered on "STARS" Yes  No

Comments accompanying Chairman Macfarlane's vote on  
SECY-13-0135 – DENIAL OF PETITION FOR RULEMAKING REQUESTING  
AMENDMENTS REGARDING EMERGENCY PLANNING ZONE SIZE (PRM-50-104)

I approve the staff's recommendation to publish a Federal Register Notice denying PRM-50-104, subject to the attached revisions. Similar revisions, attached, should be made to the "NRC Response to Public Comments (PRM-50-104; NRC-2012-0046), Petition for Rulemaking to Expand Emergency Planning Zones." I agree with the staff that the petitioner did not provide a sufficient basis for revising the existing regulations in Part 50 of Title 10 of the *Code of Federal Regulations*.

The petitioner makes numerous references to the Fukushima Dai-chi accident, stressing the importance of operating experience in policy development. I fully agree, and I await the results of initiatives resulting from emergency preparedness-related recommendations in the Near-Term Task Force report, as well as ongoing work by the United Nations and the Japanese government. We must, to the extent practicable, collect sufficient applicable data to inform potential regulatory changes in areas such as emergency preparedness. Our ability to continue to ensure adequate protection of public health and safety requires our best efforts in this regard.

I note the concern raised by some non-governmental organizations and members of the public – and, in part, by this petitioner – that the geographical location and size of the population surrounding some power reactor sites could make the evacuation of the population beyond the current 10-mile EPZs extremely arduous. While I do not believe that expanding the EPZs, as the petitioner suggests, is the answer, it is important for the NRC to continue to consider site-specific issues when making regulatory decisions.

disasters that may affect both accident progression and evacuation conduct.” The petitioner asserted that “the requested amendments are essential for the protection of public health and safety in light of the real-world experience of the Chernobyl and Fukushima disasters, which were more severe and affected a much larger geographical area than provided for in NRC regulations.”

The petitioner stated that “[t]he NRC should amend 10 C.F.R. 50.47(c)(2) to create a three-tiered emergency planning zone....” The petitioner’s three-tiered EPZ included a 25-mile plume exposure pathway EPZ, 50-mile emergency response zone, and 100-mile ingestion exposure pathway zone. The following paragraphs provide the petitioner’s proposed revisions to 10 CFR 50.47(c)(2).

#### *25-Mile Plume Exposure Pathway EPZ*

The petitioner proposed the following revision to 10 CFR 50.47(c)(2) with regards to the plume exposure pathway EPZ:

A Plume Exposure Pathway zone shall consist of an area about 25 miles (40 km) in radius. Within this zone, detailed plans must be developed to provide prompt and effective evacuation and other appropriate protective measures, including conducting of biannual full-scale emergency evacuation drills. Sirens will be installed within this zone to alert the population of the need for evacuation. Transportation for elderly, prison and school populations shall be provided within this zone. Emergency shelters shall be located outside of the 25-mile zone.

The petitioner asserted that the expansion of the plume exposure pathway EPZ from a 10-mile radius to a 25-mile radius “would provide no new requirements other than expansion of the EPZ.”

#### *50-Mile Emergency Response Zone*

The petitioner proposed the following revision to 10 CFR 50.47(c)(2) with regards to establish an “emergency response zone”:

The [emergency response zone] shall be about 50 miles in radius. Within this 50 mile zone, the licensee must identify evacuation routes for all residents within this zone and annually provide information to all residents within this zone about these routes and which they are supposed to take in the event of an emergency. The licensee must make basic pre-arrangements for potential transport of disabled/hospital/prison populations. Emergency centers for the public currently located less than 25 miles out shall be relocated to 25 miles or further out. Information shall be made available to the public within this zone through television, internet and radio alerts, text message notices, and other appropriate means of public communication.

The petitioner noted that this revision “would require measures be carried out between the new 25 mile Plume Exposure Pathway EPZ and a new Emergency Response Zone of about a 50 mile radius.” The petitioner stated that the plume exposure pathway EPZ emergency evacuation requirements and biannual exercises are not required in the emergency response zone. The petitioner further stated “this new zone would provide a modest level of pre-planning that would enable rapid expansion of the 25 mile zone when necessary. Information regarding evacuation such as identification of evacuation routes and locations of emergency shelters in the event of a large-scale disaster would be identified and would be provided to members of the public annually, and a limited number of other pre-arrangements would be made.”

#### *100-Mile Ingestion Exposure Pathway Zone*

The petitioner proposed the following revision to 10 CFR 50.47(c)(2) with regards to the ingestion pathway EPZ:

The ingestion pathway EPZ shall be about 100 miles in radius. In the event of a radioactive release, the deposition of radionuclides on crops, other vegetation, bodies of surface water and ground surfaces can occur. Measures will be implemented to protect the public from eating and drinking food and water that may be contaminated. Information shall be made available to the public within this zone through television and radio alerts, text message notices, and other appropriate means of public communication.

The petitioner stated that “[t]he current Ingestion Exposure Pathway Zone exists to protect food, water and anything intended for human consumption within 50 miles of a nuclear power plant.” The petitioner further stated “[g]iven that radiation can, and does, have far-

reaching effects on food on a large radius, the Ingestion Pathway EPZ should be expanded.”

### *Drills and Exercises*

The petitioner proposed amending 10 CFR 50.47(b)(14) with regards to drills and exercises by adding:

Within the emergency evacuation zone full scale drills and exercises will be conducted on a biannual basis. Every other exercise and drill shall include a scenario involving an initiating or concurrent regionally-appropriate natural disaster.

## **II. Public Comments on the Petition**

The NRC received a total of 5,993 comment submissions, 5,953 in support of the petition and 40 opposing it. There were 5,942 submissions from individuals of whom 5,940 supported the petition and 2 opposed it. Of the 5,942 submissions from individuals, 5,702 were form letters. Of the 5,702 form letters, 2,421 expressed support for the petition and 3,281 requested co-petitioner status. One of the form letters requesting co-petitioner status had 1,839 signatures. Ten submissions were from environmental, nuclear, or energy oriented citizen activist groups. All 10 supported the petition. Two submissions were received from organizations associated with the nuclear power industry. Both submissions opposed the petition. Thirty-six submissions were received from State or local government emergency management agencies or radiation control organizations. All 36 submissions opposed the petition. Three submissions were received from local governments. All 3 supported the petition.

The NRC has prepared a comment response document to demonstrate how all comments were considered and to respond to the issues identified in the comments. The NRC's comment response document is available in ADAMS under Accession No. ML13109A523.

and State and local authorities. The Federal Emergency Management Agency (FEMA) evaluates the offsite response in these exercises to ensure the State and local responders (i.e., offsite response organizations (ORO)) are capable of timely protective action decisionmaking and implementation. Public meetings are held at the conclusion of biennial exercises to discuss the adequacy of response with stakeholders. This oversight process includes additional inspection activities and reporting of performance indicator data for onsite EP that provide the NRC with oversight of EP programs between biennial exercises.

The NRC has studied the efficacy of evacuations implemented by OROs within the United States (NUREG/CR-6864, "Identification and Analysis of Factors Affecting Emergency Evacuations," dated January 2005 (ADAMS Accession Nos. ML050250245 and ML050250219) and NUREG/CR-6981, "Assessment of Emergency Response Planning and Implementation for Large Scale Evacuations," dated October 31, 2008 (ADAMS Accession No. ML082960499)).

~~The NRC examined more than 250 large public evacuations and concluded that all of them were successful in saving lives (except for the response to Hurricane Rita in 2005). The evacuations studied had resulted from technical hazards, malevolent acts, and natural disasters. A few of these evacuations took place within nuclear power plant EPZs; most were successfully accomplished without the aid of NRC regulatory oversight. During the study period, a large and successful evacuation took place approximately every 3 weeks. Many of these evacuations moved people much farther than the 10 miles of an EPZ. For example, evacuations in support of hurricane response involve the dislocation of large numbers of people and travel distances of several miles. A key finding of the latter study was that existing emergency planning requirements for nuclear power plants substantially anticipate and address issues identified in the large-scale evacuations researched. The review of NRC and FEMA emergency preparedness regulatory, programmatic and guidance documentation also demonstrated that existing criteria, plans, and procedures were already in place to address most of the issues that were experienced in the large-scale evacuations studied. The~~



assessment of emergency response planning and implementation for large-scale evacuations affirmed that most of the lessons learned in the evacuations studied herein were anticipated by NRC and FEMA and were already addressed in existing planning and procedures within the NRC and FEMA framework. Therefore, information available to the NRC supports the conclusion that OROs are well able to protect the public they are responsible for without additional regulatory requirements from the NRC with the existing regulatory framework.

The required planning within the plume exposure pathway EPZ is found in 10 CFR 50.47 and appendix E to 10 CFR part 50. This planning is designed to provide effective response to a radiological emergency that has the potential to develop rapidly. The need for protective actions beyond the 10-mile EPZ would generally develop more slowly. Protective actions to provide adequate protection beyond the plume exposure pathway EPZ can be implemented using ORO normal and robust response processes (as demonstrated by the previously mentioned studies). Moreover, the NRC emergency classification scheme required by 10 CFR 50.47(b)(4) is anticipatory, and thus is designed for offsite protective action to begin before a radiological release. This would cause protective actions to begin rapidly within the 10-mile EPZ and provide time for consideration of actions beyond this EPZ should the accident progression indicate the need. Although accidents that include rapid releases are very unlikely, as demonstrated by the accidents at Three Mile Island Nuclear Station, Unit 2 (Three Mile Island) and Fukushima Dai-ichi, protective action guidance has been provided to address such scenarios (Supplement 3 to NUREG-0654, "Guidance for Protective Action Strategies," dated November 20, 2011 (ADAMS Accession No. ML113010596)).

The NRC disagrees with the petition's contention that the accident at Fukushima Dai-ichi is a basis for expansion of the EPZ. The development of protective action recommendations by the Japanese Government, including expansion of evacuations out to 20 km (12 miles) from the plant, supported effective and timely evacuation to minimize the impact of the radiological releases on public health and safety. Subsequent decisions by the Japanese Government to

Commission endorsed NUREG-0396, including an assumption that the planning conducted for 10 miles would provide a substantial basis for expansion of protective actions beyond the EPZ should it ever be necessary. All U.S. nuclear power plants currently have approved emergency plans that include EPZs in compliance with the regulations found in 10 CFR 50.47(c)(2).

The accidents considered in developing guidance and subsequent requirements for the EPZ included rapidly progressing severe accidents that were more threatening to public health than the Fukushima Dai-ichi accident. The WASH-1400 (NUREG-75/014), "Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," dated October 1975 (ADAMS Accession No. ML072350618), estimated that a severe accident could progress to a large radiological release in as little as 2 hours (in the boiling water reactor (BWR) case). Such accidents were considered unlikely, but emergency preparedness is a defense-in-depth measure required due to the potential of severe but unlikely accidents. The accident at Fukushima Dai-ichi developed much more slowly than the rapidly developing accidents that form the basis for the current size of the EPZ. In Japan, adequate time was available to evacuate the public at risk and to expand beyond the planning zone as necessary before large radiological releases occurred. The study used to develop the EPZ is more conservative than the Fukushima Dai-ichi accident with regards to the time available to evacuate within the EPZ and beyond.

The NRC has conducted more recent studies that are useful for evaluating the adequacy of the plume exposure pathway EPZ. In NUREG/CR-6864, the NRC examined large evacuations in the United States between 1990 and 2003 to gain a fuller understanding of the dynamics involved in those types of events. This project found that large-scale evacuations of greater than 1,000 people ~~occurred during the study period~~from 1997 to 2003 occurred approximately every ~~3~~two weeks in the United States. The study concluded that these evacuations proceeded efficiently and effectively in terms of evacuee health and safety, security, and issues related to coordination, decisionmaking, and emergency response. The

study showed that State and local authorities have a robust capability to effectively evacuate the public in response to life-threatening emergencies. Many of the evacuations studied were implemented in an ad hoc manner by competent local officials without the need for Federal assistance or pre-conceived lines on a map.

In NUREG-1935, "State-of-the-Art Reactor Consequence Analyses (SOARCA) Report," dated November 30, 2012 (ADAMS Accession Nos. ML12332A057 and ML12332A058), hypothetical evacuations within EPZs and beyond were evaluated in response to a series of selected accident scenarios for two U.S. nuclear power plants: the Peach Bottom Atomic Power Station in Pennsylvania (Peach Bottom) and the Surry Power Station in Virginia (Surry). Peach Bottom is generally representative of U.S. operating reactors using the General Electric BWR design with a Mark I containment. Surry is generally representative of U.S. operating reactors using the Westinghouse pressurized water reactor (PWR) design with a large, dry (subatmospheric) containment.

The SOARCA project evaluated plant improvements and changes not reflected in earlier NRC publications. The project included system improvements, improvements in training and emergency procedures, offsite emergency response, and security-related improvements, as well as plant changes such as power uprates and higher core burnup. The project used state-of-the-art computer modeling with the MELCOR code for accident progression analyses and the MELCOR Accident Consequence Code System, Version 2 (MACCS2), for offsite consequence analyses.

There were several BWR accident scenarios analyzed in SOARCA, but most of the analyses did not involve a 20-mile evacuation. One analysis was performed modeling immediate 16- and 20-mile evacuations. It showed no significant difference in risk to individuals when compared to analysis using the 10-mile EPZ. The weather patterns for the SOARCA analyses were neither advantageous nor disadvantageous in terms of risk to individuals. This was done to support the best estimate of the risk to the public. If worst-case weather or worst-

## **NRC Response to Issue 5**

The NRC disagrees with the petitioner's assertions on this issue. As specified in 10 CFR 50.47(c)(2), two EPZs are established around each nuclear power plant. The technical basis for the EPZs is provided in NUREG-0396, EPA-250/1-78-016, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," dated December 1978 (ADAMS Accession No. ML051390356). The first zone, the plume exposure pathway EPZ, establishes an area of approximately 10 miles in radius. Within the plume exposure pathway EPZ, detailed planning is required for the recommendation and implementation of protective actions such as sheltering in place or evacuation. The ingestion pathway EPZ has a radius of approximately 50 miles from the plant. Within this EPZ, detailed planning is required to address the potential need to interdict foodstuffs to prevent human exposure from ingestion of contaminated food and surface water. The NRC remains confident that the emergency preparedness programs in support of nuclear power plants provide an adequate level of protection of the public health and safety and that appropriate protective actions can and will be taken in the event of a radiological event at an existing nuclear power plant.

As stated previously, the NRC has studied evacuations within the United States (NUREG/CR-6864) and found that State and local governments are capable of protecting public health and safety through implementation of protective actions up to and including evacuations using both preplanned and ad hoc protective action decisionmaking.

Several large-scale evacuations were studied in NUREG/CR-6981, many of which were conducted in an ad hoc manner. The assessment of emergency response planning and implementation for large-scale evacuations affirmed that most of the lessons learned in the evacuations studied herein were anticipated by NRC and FEMA and were already addressed in existing planning and procedures within the NRC and FEMA framework. All of the

~~approximately 250 evacuations studied were successful without NRC regulatory requirements (the exception of Hurricane Rita was previously noted).~~

Emergency preparedness within the EPZ is required to provide immediate response capability. This response would address those people most at risk (i.e., those closest to the nuclear power plant). Immediate protection of the EPZ population allows additional time for implementation of ad hoc actions beyond the EPZ. As stated in NUREG-0396:

[I]t was the consensus of the [NRC-EPA] Task Force that emergency plans could be based upon a generic distance out to which predetermined actions would provide dose savings for any such accidents. Beyond this generic distance it was concluded that actions could be taken on an ad hoc basis using the same considerations that went into the initial action determinations.

Additionally, emergency actions could be successfully carried out beyond the 10-mile EPZ for the following reasons:

- The 10-mile emergency planning basis establishes an infrastructure similar to that used by other offsite response organizations, such as police and fire departments. The infrastructure consists of emergency organizations, communications capabilities, training, and equipment that can be used in the event of an accident at a facility.
- Coordination is enhanced by the practice of having offsite response organizations, which include local, State, and Federal responders, participate in training exercises with the licensee. The studies cited previously noted a valuable contributor to effective evacuation implementation was participation in training and drills.
- The emergency notification equipment required by the NRC (10 CFR 50.47(b)(5)) for prompt notification of the public within the EPZ reaches beyond the plume exposure EPZ, and current communications technology enhances this process.

In addition, State and local response agencies have improved their incident response plans and guidance following the events of September 11, 2001. The U.S. Department of Homeland Security (DHS) has issued guidance for Federal, State, and local response to emergencies which includes the National Response Framework, NIMS, and ICS. These

regulatory objective of the Maintenance Rule, found in 10 CFR 50.65, is to require licensee monitoring of the overall continuing effectiveness of its maintenance programs to ensure the following:

- Safety-related structures, systems, and components (SSC) and certain SSCs that are not safety-related are capable of performing their intended functions.
- For equipment that is not safety-related, failures will not occur that prevent the fulfillment of safety-related functions.
- Failures resulting in scrams and unnecessary actuations of safety-related systems are minimized.

The NRC provides reasonable assurance of adequate protection of public health and safety, in part, through the NRC's Reactor Oversight Process (ROP), in which the NRC ensures that an acceptable level of licensee performance is maintained. The ROP involves inspecting licensees, reviewing performance indicators (PI), evaluating PIs, assessing licensee performance, and taking appropriate regulatory actions to ensure compliance with the NRC's regulations. The ROP continuously assesses licensee performance using performance-based risk-informed baseline inspections and performance indicators reported by licensees. The ROP inspections seek to evaluate licensee performance by identifying degraded conditions and the deficient licensee performance that led to those degraded conditions. When risk-significant aging management performance issues are identified, the NRC will perform additional supplemental inspections to verify that appropriate corrective actions are taken to address recurrence of the issues and restore compliance with aging management programs. Less risk-significant licensee performance issues would typically be entered into the licensee's corrective action program and corrected by the licensee. In addition to inspection under the ROP, the NRC evaluates operating experience and trends regarding those issues important to safety, such as those associated with aging SSCs. Negative trends and significant inspection

which requested changes to the areas for the plume exposure EPZ and ingestion exposure pathway EPZ and to the emergency exercise requirements. No changes were proposed to the EPA PAGs themselves.

Many commenters agreed with the opinion expressed in the petition that the improved understanding of the health effects of radiation support expanding the EPZs.

### **NRC Response to Issue 10**

The NRC disagrees that these studies warrant expansion of the EPZs. The NRC agrees that it is appropriate to continually review these and other studies of radiation effects to ensure continued adequate protection of public health and safety. The NRC staff reviewed the BEIR VII report and provided an information paper, 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), to the Commission regarding the potential implications of the report for NRC regulations. The NRC staff concluded that "none of the findings in the BEIR VII report warrant initiating immediate change to NRC regulations or Federal Guidance." In the BEIR VII report, the National Academies concluded 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. The Commission's regulations regarding radiation protection are based on this linear, no-threshold assumption. As stated in SECY-12-0064, "Recommendations for Policy and Technical Direction to Revise Radiation Protection Regulations and Guidance," dated April 25, 2012 (ADAMS Accession No. ML121020108), the NRC staff found that the International Commission on Radiological Protection (ICRP) concluded that a linear, no-threshold approach remained a prudent basis for practical purposes of radiation protection. The same conclusion has been drawn by the National Academy of Sciences in the BEIR VII report, the ~~United Nations Scientific Committee on the Effects of Atomic~~

Radiation UNSCEAR, and the National Council on Radiation Protection and Measurements report.

The ICRP Publication 103, "The 2007 Recommendations of the International Commission on Radiological Protection" (December 2007), contained the revised recommendations for a system of radiological protection, which reflect an evolution from the previous recommendations contained in ICRP Publication 60 in 1990 and in ICRP Publication 26 in 1977. These publications are available for purchase online through the publisher at <http://www.icrp.org/publications.asp>. The ICRP makes recommendations on such topics as the quantities used in radiological protection, biological effects of radiation, principles of radiation protection, dose limits, and optimization. The ICRP recommendations are generally used to inform radiation protection policy or regulations by pertinent governmental or international agencies, and their development has been discussed with many international and national organizations with an interest in radiological protection. In SECY-12-0064, the NRC staff provided the Commission with a notation vote paper that discusses the history of radiation protection recommendations and regulations and the ICRP's 2007 recommendations and their impact on evaluating radiation risk. The paper also discusses the NRC staff's evaluation of information in the BEIR VII report, referenced by the petitioner. SECY-12-0064 provided the Commission with options on whether to revise the dosimetry basis of appendix I to 10 CFR part 50 design objective and guidance and 10 CFR part 20 based on the ICRP 2007 recommendations. The NRC staff recommended the option of developing the regulatory basis for a revision of certain provisions of 10 CFR part 20 occupational dose limits and initiating the parallel development of the regulatory basis for revision of appendix I to 10 CFR part 50 to align with the update of 10 CFR part 20 and to address the unique set of issues that are not directly connected with 10 CFR part 20.

The Commission issued its SRM for SECY-12-0064 on December 17, 2012 (SRM-SECY-12-0064, "Recommendations for Policy and Technical Direction to Revise



Radiation Protection Regulations and Guidance” (ADAMS Accession No. ML12352A133)). In the SRM, the Commission approved in part the NRC staff’s recommendations for development of the regulatory basis for a revision to 10 CFR part 20 and parallel alignment of appendix I to 10 CFR part 50 with the most recent methodology and terminology for dose assessment. The Commission also directed the NRC staff to continue discussions with stakeholders on alternative approaches to deal with individual protection at or near the current dose limit.

In SECY-05-0202, the NRC staff also discussed the potential influence of gender on radiation sensitivity as an issue that may warrant additional consideration, and stated that the NRC staff will continue to monitor the issue as the ICRP finalizes its new radiation protection recommendations. The 2007 recommendations in ICRP Publication 103 considered gender- and age-related sensitivity to radiation (e.g., in the development of revised age-averaged and sex-averaged tissue weighting factors) and will be one source of information that the NRC staff considers in development of the regulatory basis for rulemaking, as discussed in SECY-12-0064.

The petitioner stated that the emergency response goal is to prevent exposures to 5 rem/year. This is a misinterpretation of the basis for emergency response planning requirements, including the PAGs. It states on page III-3 of NUREG-0396 that for a very large release of radioactive material, the principal emergency response planning basis goal is to prevent serious adverse health effects to individuals. To accomplish this goal, the longer term objective of the PAGs, as stated in Section 4.2.1 of the 1992 EPA PAG Manual (EPA-400-R092-001, “Manual of Protective Action Guides and Protective Actions for Nuclear Incidents,” U.S. Environmental Protection Agency, dated May 1992 (<http://www.epa.gov/radiation/docs/er/400-r-92-001.pdf>)), is that the cumulative dose to an individual over 50 years will not exceed 5 rem. In March 2013, the EPA published a draft revised PAG Manual for interim use and public comment (<http://www.epa.gov/radiation/docs/er/pag-manual-interim-public-comment-4-2-2013.pdf>). In the

and State and local authorities. The Federal Emergency Management Agency (FEMA) evaluates the offsite response in these exercises to ensure the State and local responders (i.e., offsite response organizations or OROs) are capable of timely protective action decisionmaking and implementation. Public meetings are held at the conclusion of biennial exercises to discuss the adequacy of response with stakeholders. This oversight process includes additional inspection activities and reporting of performance indicator data for onsite EP that provide the NRC with oversight of EP programs between biennial exercises.

The NRC has studied the efficacy of evacuations implemented by OROs within the United States (NUREG/CR-6864, "Identification and Analysis of Factors Affecting Emergency Evacuations," dated January 2005 (ADAMS Accession Nos. ML050250245 and ML050250219) and NUREG/CR-6981, "Assessment of Emergency Response Planning and Implementation for Large Scale Evacuation," dated October 31, 2008 (ADAMS Accession No. ML082960499)). ~~The NRC examined more than 250 large public evacuations and concluded that all of them were successful in saving lives (except for the response to Hurricane Rita in 2005). The evacuations studied had resulted from technical hazards, malevolent acts, and natural disasters. A few of these evacuations took place within nuclear power plant EPZs; most were successfully accomplished without the aid of NRC regulatory oversight. During the study period, a large and successful evacuation took place approximately every 3 weeks. Many of these evacuations moved people much farther than the 10 miles of an EPZ. For example, evacuations in support of hurricane response involve the dislocation of large numbers of people and travel distances of several miles. A key finding of the latter study was that existing emergency planning requirements for nuclear power plants substantially anticipate and address issues identified in the large-scale evacuations researched. The review of NRC and FEMA emergency preparedness regulatory, programmatic and guidance documentation also demonstrated that existing criteria, plans, and procedures were already in place to address most of the issues that were experienced in the large-scale evacuations studied. The assessment of emergency response planning and implementation for large-scale evacuations affirmed that most of the lessons learned in the evacuations studied herein were anticipated by NRC and FEMA and were already addressed in existing planning and procedures within the NRC and FEMA framework. Therefore, information available to the NRC supports the conclusion that OROs are well able to protect the public they are responsible for without additional regulatory requirements from the NRC with the existing regulatory framework.~~

The required planning within the plume exposure pathway EPZ is found in 10 CFR 50.47 and Appendix E to 10 CFR Part 50. This planning is designed to provide effective response to a radiological emergency that has the potential to develop rapidly. The need for protective actions beyond the 10-mile EPZ would generally develop more slowly. Protective actions to provide adequate protection beyond the plume exposure pathway EPZ can be implemented using ORO's normal and robust response processes (as demonstrated by the previously mentioned studies). Moreover, the NRC emergency classification scheme required by 10 CFR 50.47(b)(4) is anticipatory, and thus is designed for offsite protective action to begin before a radiological release. This would cause protective actions to begin rapidly within the EPZ and provide time for consideration of actions beyond the EPZ should the accident progression indicate the need. Although accidents that include rapid releases are very unlikely, as demonstrated by the accidents at Three Mile Island Nuclear Station, Unit 2 (Three Mile Island) and the Fukushima Dai-ichi Nuclear Power Plant (Fukushima Dai-ichi), protective action guidance has been provided to address such scenarios (Supplement 3 to NUREG-0654, "Guidance for Protective Action Strategies," dated November 20, 2011 (ADAMS Accession No. ML113010596)).

## **2.2 Expand EPZs because the basis for the 10-mile EPZ is flawed**

Models, simulations, and evaluations of projected scenarios are not a substitute for actual, real-world experience

**Comment:** *The distances for both the plume exposure pathway EPZ and the ingestion exposure pathway EPZ were based on models rather than real-world experience. [162-002] The evidence from Fukushima and Chernobyl shows that radiation releases can be greater than computer models suggest. [060-002, 063-004]*

**NRC Response:** The NRC agrees with the comment that the technical basis for the EPZs is derived from studies instead of “real-world experience,” but the commenter provided no technical issues to substantiate flaws in the technical basis. The original basis and studies that support the current EPZ basis are described below.

The technical basis for the plume exposure pathway EPZ and ingestion exposure pathway EPZ are provided in NUREG-0396. This NUREG-0396 analyzes a spectrum of potential nuclear plant accidents and determines the size of EPZs in which detailed planning would be appropriate for the protection of public health and safety. The 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. After reviewing these alternatives, the 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 U.S. Environmental Protection Agency (EPA) Protective Action Guides (PAG), EPA-400-R-92-001, “Manual of Protective Action Guides and Protective Actions for Nuclear Incidents,” dated May 1992 (<http://www.epa.gov/radiation/docs/er/400-r-92-001.pdf>). This rationale established bounds for the area in which detailed planning would be required as a defense-in-depth measure. In a 1979 policy statement (44 FR 61123; October 23, 1979), the Commission endorsed NUREG-0396, including an assumption that the planning conducted for 10 miles would provide a substantial basis for expansion of protective actions beyond the EPZ should it ever be necessary. All U.S. nuclear power plants currently have approved emergency plans that include EPZs in compliance with the regulations found in 10 CFR 50.47(c)(2).

The accidents considered in developing guidance and subsequent requirements for the EPZs included rapidly progressing severe accidents that were more threatening to public health than the Fukushima Dai-ichi accident. The WASH-1400 (NUREG-75/014), “Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants,” dated October 1975 (ADAMS Accession No. ML072350618), estimated that a severe accident could progress to a large radiological release in as little as 2 hours (in the boiling water reactor (BWR) case). Such accidents were considered unlikely, but emergency preparedness is a defense-in-depth measure required due to the potential of severe but unlikely accidents. The accident at Fukushima Dai-ichi developed much more slowly than the rapidly developing accidents that form the basis for the current size of the EPZ. In Japan, adequate time was available to evacuate the public at risk and to expand beyond the planning zone as necessary before large radiological releases occurred. The study used to develop the EPZs is more conservative than the Fukushima Dai-ichi accident with regards to the time available to evacuate within the EPZ and beyond.

The NRC has conducted more recent studies that are useful for evaluating the adequacy of the plume exposure pathway EPZ. In NUREG/CR-6864, the NRC examined large evacuations in

the United States between 1990 and 2003 to gain a fuller understanding of the dynamics involved in those types of events. This project found that large-scale evacuations of greater than 1,000 people ~~occurred during the study period from 1997 to 2003~~ occurred approximately every ~~3~~ two weeks in the United States. The study concluded that these evacuations proceeded efficiently and effectively in terms of evacuee health and safety, security, and issues related to coordination, decisionmaking, and emergency response. The study showed that State and local authorities have a robust capability to effectively evacuate the public in response to life-threatening emergencies. Many of the evacuations studied were implemented in an ad hoc manner by competent local officials without the need for Federal assistance or pre-conceived lines on a map.

In NUREG-1935, hypothetical evacuations within EPZs and beyond were evaluated in response to a series of selected accident scenarios for two U.S. nuclear power plants: the Peach Bottom Atomic Power Station in Pennsylvania (Peach Bottom) and the Surry Power Station in Virginia (Surry). Peach Bottom is generally representative of U.S. operating reactors using the General Electric BWR design with a Mark I containment. Surry is generally representative of U.S. operating reactors using the Westinghouse pressurized water reactor (PWR) design with a large, dry (subatmospheric) containment.

The SOARCA project evaluated plant improvements and changes not reflected in earlier NRC publications. The project included system improvements, improvements in training and emergency procedures, offsite emergency response, and security-related improvements, as well as plant changes such as power uprates and higher core burnup. The project used state-of-the-art computer modeling with the MELCOR code for accident progression analyses and the MELCOR Accident Consequence Code System, Version 2 (MACCS2), for offsite consequence analyses.

The SOARCA analyses showed no early fatalities due to the slower-developing accidents and lower source terms than in previous analyses and illustrated the effectiveness of emergency preparedness when plans are implemented as written, approved, practiced and inspected. In fact, SOARCA analyzed accidents very similar to those at Fukushima Dai-ichi and estimated a much quicker core melt and containment failure than what happened at the real-world accident. Further, the latent cancer fatalities estimated in SOARCA are based upon a worst-case assumption that all exposure, no matter how small, results in health effects. The majority of the latent cancer fatalities are due to the public being allowed to return to homes that are contaminated at levels below the EPA guidance. In effect, this exposure and postulated health consequences has nothing to do with the evacuation of the public, the size of the EPZ, or the Fukushima Dai-ichi accident.

**Comment:** *The current EPZs are clearly outdated. [122-001] A revision of the EPZ regulations is long overdue, and accurate planning requires realistic calculations and estimates. [064-004]*

**NRC Response:** The NRC disagrees with these comments. The NRC does not revise regulations based upon their age. Rather, regulations are designed to provide adequate protection of public health and safety given the operation of nuclear power plants. The NRC would be open to consider information that indicates the regulations for EPZs are inadequate. The comments do not provide any such information. Regarding the comment that the NRC should use realistic calculations and estimates, please see the response to comments 162-002, 060-002, and 063-004 in section 2.2 above.

one reason why the NRC requires its licensees to plan for emergencies anywhere in the EPZ. Protective action recommendations are based on current actual meteorological conditions at the site. During the development of exercise scenarios, wind patterns are selected based upon the need to demonstrate ORO capabilities. These capabilities include conducting ad hoc evacuations. As stated in the response to comments 162-002, 060-002, and 063-004 in section 2.2, the NRC has studied evacuations within the United States (NUREG/CR-6864, "Identification and Analysis of Factors Affecting Emergency Evacuations," January 2005) and found that State and local governments are capable of protecting public health and safety through implementation of protective actions up to and including evacuations using both preplanned and ad hoc protective action decisionmaking.

Several large scale evacuations were studied in NUREG/CR-6981, many of which were conducted in an ad hoc manner. The assessment of emergency response planning and implementation for large-scale evacuations affirmed that most of the lessons learned in the evacuations studied herein were anticipated by NRC and FEMA and were already addressed in existing planning and procedures within the NRC and FEMA framework. All of the approximately 250 evacuations studied were successful without NRC regulatory requirements (the exception of Hurricane Rita was previously noted).

Emergency preparedness within the EPZ is required to provide immediate response capability. This response would address those people most at risk (i.e., those closest to the nuclear power plant). Immediate protection of the EPZ population allows additional time for implementation of ad hoc actions beyond the EPZ. As stated in NUREG-0396:

[I]t was the consensus of the [NRC-EPA] Task Force that emergency plans could be based upon a generic distance out to which predetermined actions would provide dose savings for any such accidents. Beyond this generic distance it was concluded that actions could be taken on an ad hoc basis using the same considerations that went into the initial action determinations.

Additionally, emergency actions could be successfully carried out beyond the 10-mile EPZ for the following reasons:

- The 10-mile emergency planning basis establishes an infrastructure consisting of emergency organizations, communications capabilities, training, and equipment similar to that used by the offsite response organizations.
- Biennial inspected exercises and additional drills and exercises provide training for licensee, State, and local response organizations in the decisionmaking and implementation of protective actions in response to simulated radiological emergencies. The studies cited previously noted a valuable contributor to effective evacuation implementation was participation in training and drills.
- The emergency alert and notification equipment required by the NRC (10 CFR 50.47(b)(5)) for prompt warning of the public within the plume exposure pathway EPZ reaches beyond the EPZ, and current communications technology enhances this process.

In addition, State and local response agencies have improved upon their incident response plans and guidance following the events of September 11, 2001. The Department of Homeland Security (DHS) has issued guidance for Federal, State, and local response efforts to emergencies. These programs include FEMA's National Response Framework, National Incident Management System (NIMS), and Incident Command System (ICS). These programs

reactor emergency. All NRC-licensed sites in the United States have EALs in their radiological emergency plans that include protective actions related to aspects of natural disasters.

**Comment:** *The petition calls for biannual full-scale exercises. Delaware does internally-evaluated drills quarterly and Federally-evaluated drills biennially. [286-007]*

**NRC Response:** The NRC acknowledges this comment, and no response is necessary.

**Comment:** *Full-scale exercises will not happen because that would require everyone, including the general population, within the proposed 25-mile EPZ to participate. [164-016, 164-020]*

**NRC Response:** The NRC agrees. Biennial exercises do not involve the public for many reasons. Exercises are performed as part of Federal oversight of emergency preparedness at nuclear power plants. The NRC and FEMA evaluate the capability of the licensee and OROs, respectively, to implement plans and demonstrate protective action decisionmaking. Disruption of the public for the purposes of a federal inspection would not be appropriate because it would unnecessarily put the public at risk, impact the livelihood of citizens, and practice a capability the NRC is confident OROs can perform. The NRC has studied the efficacy of evacuations implemented by OROs within the United States (NUREG/CR-6864, "Identification and Analysis of Factors Affecting Emergency Evacuations," and NUREG/CR-6981, "Assessment of Emergency Response Planning and Implementation for Large Scale Evacuation"). ~~The NRC examined more than 250 large public evacuations and concluded that all of them were successful in saving lives (except for the response to Hurricane Rita in 2005). The evacuations studied resulted from technical hazards, malevolent acts and natural disasters. A few of these evacuations took place within nuclear power plant EPZs, but most were successfully accomplished without the aid of NRC regulatory oversight. During the study period a large and successful evacuation took place approximately every 3 weeks. A key finding of the latter study was that existing emergency planning requirements for nuclear power plants substantially anticipate and address issues identified in the large-scale evacuations researched. The review of NRC and FEMA emergency preparedness regulatory, programmatic and guidance documentation also demonstrated that existing criteria, plans, and procedures were already in place to address most of the issues that were experienced in the large-scale evacuations studied. The assessment of emergency response planning and implementation for large-scale evacuations affirmed that most of the lessons learned in the evacuations studied herein were anticipated by NRC and FEMA and were already addressed in existing planning and procedures within the NRC and FEMA framework. Therefore, information available to the NRC supports the conclusion that OROs are well able to protect the public they are responsible for without additional regulatory requirements from the NRC with the existing regulatory framework.~~

## **2.14 Require EP exercises to include a regionally-relevant initiating or concurrent natural disaster because natural disasters may affect communications during emergency response**

This issue was raised in the petition, but the NRC did not receive any comments related to this issue.

## **2.15 Do not expand EPZs because the benefits do not outweigh the costs**

**NOTATION VOTE**

**RESPONSE SHEET**

**TO:** Annette Vietti-Cook, Secretary  
**FROM:** COMMISSIONER SVINICKI  
**SUBJECT:** SECY-13-0135 – DENIAL OF PETITION FOR  
RULEMAKING REQUESTING AMENDMENTS  
REGARDING EMERGENCY PLANNING ZONE SIZE  
(PRM-50-104)

Approved XX Disapproved \_\_\_\_\_ Abstain \_\_\_\_\_

Not Participating \_\_\_\_\_

COMMENTS: Below XX Attached XX None \_\_\_\_\_

I approve publication of the Federal Register Notice denying PRM-50-104, subject to the attached edits.

I also approve the letter to the petitioner and the supplemental material, subject to the attached edits.

  
\_\_\_\_\_  
SIGNATURE

02/20/14  
\_\_\_\_\_  
DATE

Entered on "STARS" Yes  No \_\_\_\_\_

disasters that may affect both accident progression and evacuation conduct.” The petitioner asserted that “the requested amendments are essential for the protection of public health and safety in light of the real-world experience of the Chernobyl and Fukushima disasters, which were more severe and affected a much larger geographical area than provided for in NRC regulations.”

The petitioner stated that “[t]he NRC should amend 10 C.F.R. 50.47(c)(2) to create a three-tiered emergency planning zone....” The petitioner’s three-tiered EPZ included a 25-mile plume exposure pathway EPZ, 50-mile emergency response zone, and 100-mile ingestion exposure pathway zone. The following paragraphs provide the petitioner’s proposed revisions to 10 CFR 50.47(c)(2).

#### *25-Mile Plume Exposure Pathway EPZ*

The petitioner proposed the following revision to 10 CFR 50.47(c)(2) with regards to the plume exposure pathway EPZ:

A Plume Exposure Pathway zone shall consist of an area about 25 miles (40 km) in radius. Within this zone, detailed plans must be developed to provide prompt and effective evacuation and other appropriate protective measures, including conducting of biannual full-scale emergency evacuation drills. Sirens will be installed within this zone to alert the population of the need for evacuation. Transportation for elderly, prison and school populations shall be provided within this zone. Emergency shelters shall be located outside of the 25-mile zone.

The petitioner asserted that the expansion of the plume exposure pathway EPZ from a 10-mile radius to a 25-mile radius “would provide no new requirements other than expansion of the EPZ.”

#### *50-Mile Emergency Response Zone*

The petitioner proposed the following revision to 10 CFR 50.47(c)(2) with regards to an emergency response zone:



The [emergency response zone] shall be about 50 miles in radius. Within this 50 mile zone, the licensee must identify evacuation routes for all residents within this zone and annually provide information to all residents within this zone about these routes and which they are supposed to take in the event of an emergency. The licensee must make basic pre-arrangements for potential transport of disabled/hospital/prison populations. Emergency centers for the public currently located less than 25 miles out shall be relocated to 25 miles or further out. Information shall be made available to the public within this zone through television, internet and radio alerts, text message notices, and other appropriate means of public communication.

The petitioner noted that this revision "would require measures be carried out between the new 25 mile Plume Exposure Pathway EPZ and a new Emergency Response Zone of about a 50 mile radius." The petitioner stated that the plume exposure pathway EPZ emergency evacuation requirements and biannual exercises are not required in the emergency response zone. The petitioner further stated "this new zone would provide a modest level of pre-planning that would enable rapid expansion of the 25 mile zone when necessary. Information regarding evacuation such as identification of evacuation routes and locations of emergency shelters in the event of a large-scale disaster would be identified and would be provided to members of the public annually, and a limited number of other pre-arrangements would be made."

[fix all occurrences]

#### 100-Mile Ingestion Exposure Pathway Zone

The petitioner proposed the following revision to 10 CFR 50.47(c)(2) with regards to the ingestion pathway EPZ:

The ingestion pathway EPZ shall be about 100 miles in radius. In the event of a radioactive release, the deposition of radionuclides on crops, other vegetation, bodies of surface water and ground surfaces can occur. Measures will be implemented to protect the public from eating and drinking food and water that may be contaminated. Information shall be made available to the public within this zone through television and radio alerts, text message notices, and other appropriate means of public communication.

The petitioner stated that "[t]he current Ingestion Exposure Pathway Zone exists to protect food, water and anything intended for human consumption within 50 miles of a nuclear power plant." The petitioner further stated "[g]iven that radiation can, and does, have far-

worst-case assumption that all exposure, no matter how small, results in health effects. The majority of the latent cancer fatalities are due to the public being allowed to return to homes that are contaminated at levels below the EPA guidance. In effect, this exposure and postulated health consequences <sup>have</sup> ~~has~~ nothing to do with the evacuation of the public, the size of the EPZ, or the Fukushima Dai-ichi accident.

The NRC will monitor the results of the UNSCEAR efforts and their potential implications regarding the U.S. regulatory approach to emergency planning around nuclear power plants, including the EPZ size. In addition, the NRC is conducting a full-scope site Level 3 PRA to gain a better understanding of potential radiological effects of postulated accident sequences including multi-unit sites. The NRC will use information obtained from the UNSCEAR assessment and insights from the full-scope site Level 3 PRA project to inform the evaluation of the potential impacts that a multi-unit event may have on the EPZ.

**Issue 3. Expand EPZs because the NRC urged U.S. citizens within 50 miles of the Fukushima Dai-ichi Nuclear Power Plant to evacuate.**

The petitioner noted that former NRC Chairman Gregory Jaczko urged Americans within 50 miles of Fukushima Dai-ichi to evacuate and that this recommendation was followed by a similar statement from the U.S. Department of State.

Several commenters stated that the call for evacuation out to 50 miles showed that the current 10-mile EPZ is outdated, inadequate, and not realistic.

One commenter called for the NRC to take into account the realities learned in Japan. The commenter pointed out that there are several major U.S. cities within 50 miles of reactors with containment designs that are similar to those at Fukushima Dai-ichi. Those cities include Chicago, Boston, Philadelphia, and Baltimore. The commenter asked if it would be possible to evacuate those cities.

One State emergency management agency disagreed with the petitioner and stated that the NRC order to evacuate U.S. citizens within 50 miles of Fukushima Dai-ichi has yet to be justified scientifically.

### NRC Response to Issue 3

The NRC does not agree that the EPZ for U.S. nuclear power plants should be expanded based on the travel advisory issued to U.S. citizens in Japan as a result of the events at Fukushima Dai-ichi. Following the events at Fukushima Dai-ichi, the U.S. Department of State, in coordination with <sup>then-Chairman of the</sup> the NRC, the U.S. Department of Energy, and other technical experts in the U.S. Government, issued a travel warning, or advisory, to U.S. citizens within 50 miles of Fukushima Dai-ichi to evacuate the area or take shelter indoors if safe evacuation was not possible. The 50-mile travel advisory was ~~made in the interest of protecting the health and safety of U.S. citizens in Japan~~ based on the limited information available at that time and the rapidly evolving situation (U.S. Department of State Travel Warning, March 17, 2011, <http://japan.usembassy.gov/e/acs/tacs-travel20110317.html>). The U.S. Department of State routinely issues such recommendations (known as Travel Warnings) for many different types of events, including civil unrest, terrorism, natural disasters, and technological accidents.

The decisionmaking environment that existed at the time was one in which the U.S. Government had limited and often conflicting information about the exact conditions of the reactors and spent fuel pools at Fukushima Dai-ichi. In its evaluation of the rapidly changing and unprecedented event, the NRC performed a series of dose calculations. <sup>These calculations were</sup> ~~This was a~~ <sup>worst case, hypothetical computer model analyses of consequences of releases</sup> ~~conservative calculation that considered the rapidly changing course of the events and the very~~ <sup>from the Fukushima site</sup> ~~real possibility that these events were going to continue to degrade~~ The assumptions used in these calculations were discussed in detail in a letter from <sup>Chairman Jaczko</sup> the NRC to Senator James Webb on <sup>Farmer</sup> June 17, 2011 (ADAMS Accession No. ML11143A033). As a result of these calculations, the lack of information available at that time, the progression of events, and the uncertainty

regarding the plans to bring the situation under control, on March 16, 2011, the U.S. Department of State issued a ~~prudent, conservative~~<sup>prudent</sup> travel advisory for American citizens within a 50-mile range of Fukushima Dai-ichi. This was not an evacuation order in the sense of expected protective action decisionmaking within a U.S. nuclear power plant EPZ, but rather a warning to U.S. citizens that the local conditions were uncertain, the government authorities may not be able to assure their safety, ~~and~~<sup>that</sup> they should leave.

Regulatory requirements of 10 CFR part 50, NRC inspection practices, and data channels available to the NRC would provide a robust information stream regarding plant status and radiological releases during a reactor accident in the United States. The NRC maintains two resident inspectors at each plant who have unfettered access to the site. The NRC inspectors have direct access to the plant site including the control room and any and all vital plant areas. Inspectors from other sites and regional offices ~~also~~<sup>also</sup> can be deployed if needed. The NRC requires that direct communication links between the NRC Incident Response Center and each plant be installed, tested, and routinely exercised. These links provide the NRC with up-to-date and reliable information about plant conditions, radioactivity release rates, and meteorological conditions at the plant. The availability of this information, in addition to the information gathered by inspectors, would enable NRC staff to perform an informed, realistic assessment instead of relying on unknowns and worst-case scenarios. In addition, the NRC can order the plant to take actions to mitigate the event if the NRC concludes that the appropriate actions are not being taken by the plant operators.

The NRC concludes that the EPZs surrounding nuclear power plants in the United States should not be expanded based on the travel advisory issued by the U.S. Government. That advisory was based on limited information obtained by the U.S. Government about an event in a foreign nation. As previously explained, the NRC would have access to relevant information during an event at one of its licensees' plants. As a result, the NRC's response to an accident in the United States would not resemble the U.S. Government's response to the

events at Fukushima Dai-ichi, so the fact that the U.S. Government issued a 50-mile travel advisory should not be the basis for expanding the size of EPZs.

**Issue 4. There has been little change to emergency planning regulations in 30 years.**

The petitioner claimed that the emergency planning regulations established by the NRC in 1980 remain essentially the same today. The petitioner stated that “[w]ith the exception of a 2011 rule requiring licensees to use current U.S. census data to prepare evacuation time estimates (ETEs) and update them every 10 years, the NRC has made few significant improvements to its offsite emergency response regulations since they were promulgated in 1980.”

A State emergency management agency and the Nuclear Energy Institute disagreed and stated that there have been several significant changes to emergency planning regulations since 1980, including the consideration of emergency preparedness exercises during the licensing process, the frequency of participation by State and local authorities in emergency preparedness exercises, and other topics. The Nuclear Energy Institute also argued that the 2011 rule was broader than the petitioner implied.

**NRC Response to Issue 4**

The NRC disagrees with the petitioner’s comments. The statement that emergency planning has changed little in the past 30 years conflicts with the fact that the NRC has made numerous revisions to its EP regulatory program over the years; in fact, the NRC’s EP regulations have been revised more than 10 times since 1980. The NRC has continually evaluated and revised, as necessary, the requirements associated with emergency planning, such as the following: the consideration of emergency preparedness exercises as part of the licensing process (50 FR 19323; May 8, 1985), the frequency of State and local agency participation in licensee emergency preparedness exercises (49 FR 27733; July 6, 1984), the

itself, this function provides no information about the type of event or any protective actions that need to be taken. The notification function informs the public about the nature of the event and any protective actions. These functions may be performed by separate means, such as sirens for alerting and EAS broadcasts for notification, or by one method, such as tone alert radios and electronic hailers, that can provide both a warning signal and an instructional message.

~~Although most ANS problems have involved degradation of the alerting capability, both functions are important for protecting public health and safety during an emergency.~~

Nuclear power plant licensees are required by § IV.D.3 of appendix E to 10 CFR part 50 to demonstrate that the ANS capability exists. Alerting and notifying the public is a function assigned to the State and local governments and evaluated by FEMA. The 2011 EP final rule provides the requirement that the ANS include administrative and physical means for a backup method of public alerting and notification. The methods of alerting the public using either the primary or backup means is a process that involves coordination between the onsite and offsite response organizations, and the responsibility for activation of these systems must remain with the appropriate governmental authorities.

#### **Evacuation Time Estimate Updating:**

The implementation of protective actions, including the evacuation of the public from the affected area surrounding a nuclear power plant, can mitigate the consequences of a radiological emergency at the plant. During the licensing process, applicants for a nuclear power reactor operating license under 10 CFR part 50, or for an early site permit (as applicable) or combined license under 10 CFR part 52, are required to provide estimates of the time required to evacuate the public from the various sectors and distances of the plume exposure pathway EPZ. These ETEs are used in the planning process to identify potential challenges to efficient evacuation, such as traffic constraints, and, in the event of an accident, to assist the

exercises with the licensee. The studies cited previously noted a valuable contributor to effective evacuation implementation was participation in training and drills.

- The emergency notification equipment required by the NRC (10 CFR 50.47(b)(5)) for prompt notification of the public within the EPZ reaches beyond the plume exposure EPZ and current communications technology enhances this process.

In addition, State and local response agencies have improved their incident response plans and guidance following the events of September 11, 2001. The U.S. Department of Homeland Security (DHS) has issued guidance for Federal, State, and local response to emergencies which includes the National Response Framework, NIMS, and ICS. These guidance documents present a framework for use during an emergency that is scalable, is flexible, and allows for an adaptable coordinating structure.

The DHS policy and initiatives have provided another basis for implementing protective actions for nuclear power plant emergencies beyond the EPZ should they ever be necessary. State and local response organizations have recognized the possibility that actions may be warranted beyond the established EPZs and these issues have been included in drills and exercises. The development and implementation of NIMS and ICS under the National Response Framework enhances State and local response capabilities through uniform and logical management of response resources to facilitate prompt and effective protective measures for all populations that may be affected. The NIMS and ICS programs are a comprehensive approach to incident management that provides a common operating picture and interoperability for communications and management of events. These programs are scalable, so the response can be expanded or contracted as dictated by the event, such as an expansion of protective actions beyond the EPZ during an event if warranted. This allows for all levels of government response organizations to work together efficiently for responding to emergencies, including an event involving a nuclear power reactor.

show that large populations can be effectively evacuated. A review of the evacuations studied in NUREG/CR-6864 shows that effective evacuations of large numbers of people were routinely accomplished, including:

- Hurricane Floyd, 373,000 people (1999)
- Hurricane Andrew, 650,000 people (1992)
- Hurricane Georges, 1,500,000 people (1998)
- Centennial Olympic Park, 60,000 people (1996)
- World Trade Center, 300,000 people (2001)
- World Trade Center, 150,000 people (1993)
- The East Bay Hills Wildfire, 30,000 people (1991)

The NRC is not aware of data that would indicate that evacuation of larger populations cannot be accomplished in an effective manner. The data shows that OROs can accomplish large evacuations and this process is generally viewed as successful.

**Issue 7. Expand EPZs because the U.S. reactor fleet is aging and more vulnerable to the occurrence of accidents.**

The petition included "increasing age and vulnerability of operating reactors" in a list of several factors that have changed since the existing emergency planning regulations were promulgated to conclude that aging U.S. reactors have a greater risk of an accident and require an expansion of EPZs.

Commenters claimed that aging reactors are more vulnerable to damage from earthquakes, aging concrete, human error, and Alloy 600 embrittlement.

One commenter specifically identified Indian Point Nuclear Generating <sup>Energy Center</sup> Plant, Diablo Canyon Nuclear Power Plant, and Vermont Yankee Nuclear Power Station as reactors that are "more antiquated or dangerously sited."



risk-informed baseline inspections and performance indicators reported by licensees. The ROP inspections seek to evaluate licensee performance by identifying degraded conditions and the deficient licensee performance that led to those degraded conditions. When risk-significant aging management performance issues are identified, the NRC will perform additional supplemental inspections to verify that appropriate corrective actions are taken to address recurrence of the issues and restore compliance with aging management programs. Less risk-significant licensee performance issues would typically be entered into the licensee's corrective action program and corrected by the licensee. In addition to inspection under the ROP, the NRC evaluates operating experience and trends those issues important to safety, such as those associated with aging SSCs. Negative trends and significant inspection findings impacting safety would be addressed through enforcement, backfit, or rulemaking as appropriate.

The license renewal regulatory process requires that for SSCs that are safety-related, <sup>that</sup> ~~one~~ could affect the performance of a safety-related function, <sup>that</sup> are necessary to respond to specific events regulated by the NRC, aging management programs must be in place to manage the effects of aging. The implementation of the aging management programs ensures that SSCs retain the ability to perform their intended functions and that the licensee's current licensing basis, which has been shown to provide an acceptable level of safety, will be maintained in the renewal period.

The NRC's regulations in 10 CFR part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," require that each license renewal application contain technical information and evaluations about the different types of plant aging that might be encountered in the plant and how the licensee will manage or mitigate those aging effects. This information must be sufficiently detailed to permit the NRC to determine whether the effects of aging will be managed such that the plant can be operated during the period of extended operation without undue risk to the health and safety of the public. If the NRC can make this

determination, it will renew the licensee's operating license and continue monitoring the licensee's operational performance throughout the renewal period.

**Issue 8. Expand EPZs because risk from spent fuel pools is too high.**

The petitioner argued that the risk of accidents at spent fuel pools is too high to ignore and, therefore, the plume exposure pathway EPZ must be expanded to adequately protect the public. According to the petitioner, "real-world experience," improved understanding of severe accident risks at nuclear spent fuel pools, and the fact that accidents could cause widespread contamination with highly radioactive materials prove that the 10-mile EPZ is inadequate. The petitioner referred to several papers to raise issues that describe the improved understanding of spent fuel pool severe accidents and their risks, including:

- The NRC has permitted high-density storage in spent fuel pools in the absence of a geologic repository. Under accident conditions, including a loss of water in the pool, cooling of the spent fuel could be difficult or ineffective in the densely packed pool, which could result in a zirconium fire in the pool.

- Spent fuel pools contain a large amount of radioactive material with much more long-lived radioisotopes than in a reactor core. Therefore, spent fuel pool accidents could lead to larger releases of radioactive materials than accidents in a reactor core.

- Spent fuel pools are located outside of containment. Therefore, they are more vulnerable than the reactor to natural disasters and terrorist attacks and have little to prevent a release to the environment.

The petitioner further stated that the Commission previously did not consider the effects of spent fuel pool failure as a source of severe accident consequences, but only considered containment and core failure in the previous denial of three similar petitions for rulemaking (*Citizens Task Force of Chapel Hill, et al.*, 32 NRC 281 (1990)). The petitioner stated that given

the pools may have boiled dry and damaged the fuel. Numerous attempts were made to refill

the spent fuel pools, which diverted resources and attention from other efforts to <sup>respond to the event</sup> maintain water level above the fuel. ~~The events at Fukushima Dai-ichi demonstrated the confusion and~~ Subsequent analysis determined that the water level in the Unit 4 Spent Fuel Pool ~~did not drop below the top of the stored fuel and no significant fuel damage occurred.~~ ~~misapplication of resources that can result from beyond design-basis external events when~~ ~~The lack of information on the condition of spent fuel pools contributed to a poor understanding of possible radiation releases and adversely impacted effective~~ ~~adequate instrumentation is not available.~~ <sup>actions by decision makers.</sup>

In the agency's review of the Fukushima Dai-ichi accident in the NTF report, the NRC staff noted that the low likelihood of such events and the current mitigation capabilities at U.S. nuclear power plants allow the NRC to conclude that a sequence of events such as the Fukushima Dai-ichi accident is unlikely to occur in the United States. These events have not undermined the emergency preparedness assumptions or the basis for the size of the EPZs. Therefore, continued operation and continued licensing activities do not pose an imminent threat to public health and safety.

Current activities being undertaken by the NRC staff for the NTF recommendations resulting from the Fukushima Dai-ichi event are addressing the issue of additional requirements, including developing, implementing, and maintaining guidance and strategies to maintain or restore spent fuel pool cooling in the event of a beyond-design-basis external event such as a natural disaster (Order EA-12-049, "Order Modifying Licenses with <sup>↑</sup> regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012 (ADAMS Accession No. ML12054A736)).

The NRC issued Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (ADAMS Accession No. ML12054A682), which required all power reactor licensees and holders of construction permits, in active or deferred status, to implement measures to ensure that reliable spent fuel pool water level indications can be identified by trained personnel. Specifically, personnel must be capable of identifying: (1) the level that is adequate to support operation of the normal fuel pool cooling system, (2) the level that is adequate to provide substantial radiation shielding for a person

standing on the spent fuel pool operating deck, and (3) the level where fuel remains covered and at which actions to implement make-up water addition should no longer be deferred. As noted in the Order, full implementation must be completed no later than two refueling cycles after the licensee's submittal of an overall integrated plan or December 31, 2016, whichever comes first. Construction permit holders must complete full implementation prior to issuance of an operating license, and combined operating license holders must complete full implementation prior to initial fuel load.

The NRC staff completed a spent fuel pool risk study in 2001 (NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," dated February 28, 2001 (ADAMS Accession No. ML010430066)) in which the risk of spent fuel severe accidents was evaluated and found to be low and well within the Commission's safety goals outlined in its Policy Statement on Safety Goals for the Operation of Nuclear Power Plants (51 FR 28044; August 4, 1986. Correction published on August 21, 1986 (51 FR 30028)). The NRC staff published a report in October 2013 with a similar conclusion that storage of spent fuel in a high-density configuration in spent fuel pools is safe and that the risk of an accident resulting from the beyond-design-basis seismic event analyzed is low ("Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor," dated October 2013 (ADAMS Accession No. ML13256A342)). In addition, the NRC staff is embarking on a full-scope site Level 3 PRA project, which will evaluate the severe accident risks at a currently operating multi-unit reactor site, including the risk from a spent fuel pool accident. The insights from this study may be a useful input to inform or enhance regulatory decisionmaking, potentially including emergency preparedness requirements, as described in SECY-12-0123, "Update on Staff Plans to Apply the Full-Scope Site Level 3 PRA Project Results to the NRC's Regulatory Framework," dated September 13, 2012 (ADAMS Accession No. ML12202B170).

requirements, including the PAGs. It states on page III-3 of NUREG-0396 that for a very large release of radioactive material, the principle<sup>a</sup> emergency response planning basis goal is to prevent serious adverse health effects to individuals. To accomplish this goal, the longer term objective of the PAGs, as stated in Section 4.2.1 of the 1992 EPA PAG Manual

(EPA-400-R092-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," U.S. Environmental Protection Agency, dated May 1992

(<http://www.epa.gov/radiation/docs/er/400-r-92-001.pdf>)), is that the cumulative dose to an individual over 50 years will not exceed 5 rem. In March 2013, the EPA published a draft revised PAG Manual for interim use and public comment

(<http://www.epa.gov/radiation/docs/er/pag-manual-interim-public-comment-4-2-2013.pdf>). In the 2013 EPA PAG Manual, the EPA proposes to remove the intermediate phase PAG of 5 rem over 50 years to avoid confusion with long-term cleanup. The longer-term objective of the PAGs to ensure that doses in any single year after the first will not exceed 0.5 rem remains the same as previously in the 1992 EPA PAG Manual.

It should be noted that a PAG is not a regulatory limit or an acceptable dose, but is instead, "the projected dose to reference man, or other defined individual, from an unplanned release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended" (1992 EPA PAG Manual, Section 1.0). The petitioner questioned the Commission's previous denial of petitions for rulemaking, under dockets PRM-50-31, PRM-50-45, and PRM-50-46, to make changes to the emergency preparedness regulations (55 FR 5603; February 16, 1990). As a basis for its denial, the Commission referred to NUREG-0396, which clarifies that PAGs represent trigger or initiation levels proposed as guidance to be used as the basis for taking action to minimize impact on individuals. In other words, a PAG is "the projected dose...from an unplanned release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended" (1992 EPA PAG Manual, Section 1.0). It states on page III-11 of NUREG-0396:

Appendix B, "Risks to Health from Radiation Doses That May Result from Nuclear Incidents," and Appendix C, "Protective Action Guides for the Early Phase: Supporting Information," of the 1992 EPA PAG Manual describe in detail the EPA's bases and rationale for the PAGs.

The rationale for the 10-mile distance for the plume exposure EPZ and the 50-mile ingestion exposure pathway EPZ is provided in NUREG-0396, which was based on a full spectrum of accident and corresponding consequences, taking probability into consideration. It is stated in NUREG-0396 that emergency response plans should be useful for responding to any accident that would result in offsite doses in excess of the PAGs. The early phase PAG ranges as published at that time were used in the determination of the plume exposure EPZ distance: projected doses per accident of 1 – 5 rem to the whole body and 5 – 25 rem to the thyroid.

The NRC has more recent data on reactor accident consequences and risks in the SOARCA study, <sup>has completed</sup> ~~is finalizing~~ a spent fuel pool accident scoping study, and has embarked on a full-scope site Level 3 PRA project. In SECY-12-0123, the NRC staff specifically states that insights from the Level 3 PRA project could inform the process for evaluating the potential impact that a multi-unit accident (or an accident involving spent fuel) may have on the efficacy of the EPZ in protecting public health and safety. Insights gained from the Level 3 PRA project are expected to include radiological source term characterization to support determination as to whether the EPZ size and response timing remains protective of public health and safety in response to severe accidents.

**Issue 11. Expand EPZs because radiation does not stop at an EPZ boundary.**

Several commenters stated that radioactive contamination would not stop at an EPZ boundary. One commenter stated that airborne radiation plumes from past releases including Chelyabinsk, Seversk, Chernobyl, Three Mile Island, and Fukushima Dai-ichi have not stopped

10 miles from the reactor site. Therefore, 10-mile EPZs need to be enlarged to provide adequate protection of the public health and safety beyond 10 miles from the plant.

### **NRC Response to Issue 11**

The NRC agrees that in the event of a radioactive release the plume might not stop at the 10-mile EPZ boundary. However, the NRC disagrees with the commenter that this requires expansion of the EPZ. As stated previously, the basis for the EPZ is that it provides a substantial basis for the expansion of emergency response beyond the EPZ should that prove to be necessary. The competence of State and local authorities to implement protective measures for the public (as described in NUREG/CR-6864 and NUREG/CR-6981) has also been discussed previously in response to Issues 5 and 6. Additionally, the DHS has provided several documents that guide Federal, State, and local response efforts should they be required for an event at a licensee facility. These documents include FEMA's National Response Framework, NIMS, and ICS, which were established by Homeland Security Presidential Directive/HSPD-5—Management of Domestic Incidents on February 28, 2003. These programs present a framework for use in an emergency that is scalable, is flexible, and allows for an adaptable coordinating structure. The DHS has achieved near universal acceptance of the National Response Framework at the Federal, State, and local levels in the United States. The supporting systems, NIMS and ICS, are implemented daily in response to routine emergencies nationwide, such as response to hazardous material spills and fires.

In addition to the DHS guidelines that are used by offsite response organizations, the current requirements for the 10-mile planning basis used by licensees establish an infrastructure consisting of emergency organizations, communications capabilities, training, and equipment that are similar to other normal community emergency organizations, such as police and fire departments that can be used in the event of an accident at the facility. The DHS guidance and

an officially declared evacuation zone. The shadow population is considered in the analysis to account for the potential for this population group to impede the evacuation of those under evacuation orders. It should be recognized that 20 percent was chosen based on data in NUREG/CR-6864 and is an estimate of the potential for shadow evacuation. The shadow evacuation can be minimized through frequent and effective crisis messaging by OROs. Supplement 3 to NUREG-0654 provides guidance to assist OROs with crisis messaging.

The NRC staff has conducted considerable research into evacuations, including the impact of shadow evacuations on evacuation outcomes. As stated in NUREG/CR-6864:

Shadow evacuations, defined as evacuations by persons outside of any officially declared evacuation zone(s), occurred in 18 (36%) of the 50<sup>3</sup> case studies examined. Of those 18 cases involving shadow evacuations, traffic movement was impacted in only five of the cases and there was no impact on congregate care center capacity, according to the individuals interviewed. These five cases were all in Florida and included Hurricane Andrew, Hurricane Floyd (3 cases), and the Mims Fire. In the Mims Fire, Interstate 95 was closed due to poor visibility from the smoke and significantly contributed to the traffic congestion. The hurricanes that had traffic movement problems were exceptionally large, with two cases involving over 600,000 evacuees.

The Governor's Hurricane Task Force has since identified improvements in the areas of decision making, traffic management, congregate care center management, and dissemination of emergency public information, that are expected to improve the efficiency and effectiveness of future large hurricane evacuations, and thus, reduce impacts from shadow evacuations.

Based on this research, the NRC has confidence that shadow evacuations generally have little impact on traffic movement, and concludes that the licensees' current emergency planning bases continue to provide reasonable assurance of protection of the public's health and safety.

The NRC agrees that most evacuations would be considered difficult by those experiencing them but disagrees that evacuations would be impossible. All U.S. nuclear power plants have provided updated ETEs to the NRC per 10 CFR 50.47(b)(10). The NRC staff is not

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<sup>3</sup> These 50 evacuations were selected because they were of sufficient size and complexity to challenge local and regional emergency response capabilities and to provide sufficient detail to identify the factors contributing to evacuation efficiency.



aware of any evacuations that are impossible. A review of the evacuations studied in NUREG/CR-6864 shows that effective evacuations of large numbers of people were routinely accomplished, including:

- Hurricane Floyd, 373,000 people (1999)
- Hurricane Andrew, 650,000 people (1992)
- Hurricane Georges, 1,500,000 people (1998)
- Centennial Olympic Park, 60,000 people (1996)
- World Trade Center, 300,000 people (2001)
- World Trade Center, 150,000 people (1993)
- The East Bay Hills Wildfire, 30,000 people (1991)

The petition provided no substantial information that would indicate evacuations cannot be accomplished in support of a nuclear power plant accident should it be necessary, or that would support its claim that the NRC's emergency planning regulations do not provide adequate protection of the public health and safety.

In SECY-12-0095, the NRC staff stated that the existing EP framework of regulations and guidance to provide reasonable assurance of adequate protection of public health and safety in a radiological emergency. The NRC staff referred to several studies that have informed the NRC evaluation of the adequacy of this approach. These studies, which are discussed in more detail in the response to Issue 2, included NUREG/CR-6864 and NUREG-1935. These studies have informed the NRC's conclusion that the NRC's existing EP framework provides reasonable assurance of adequate protection of public health and safety in the event of a radiological emergency at an existing U.S. power reactor facility.

The Commission concludes that the current size of EPZs helps to provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at an existing nuclear power plant. In addition, as part of previously-approved research efforts associated with Tier 3 program plans, the NRC plans a long-term

11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 (ADAMS Accession No. ML11186A950). SECY-11-0124, "Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report," dated September 9, 2011 (ADAMS Accession No. ML11245A158), and SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," were issued to establish the NRC staff's prioritization of the recommendations. The NRC staff determined that Recommendation 4.2, concerning strategies to mitigate the consequences of accidents similar to those that occurred at Fukushima Dai-ichi, was a high-priority action. Order EA-12-049, "Order Modifying Licenses with regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," was issued to each power reactor licensee and each holder of a construction permit on March 12, 2012. The Order requires a three-phase approach for mitigating beyond-design-basis external events. The initial phase requires the use of installed equipment and resources to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities. The transition phase requires providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely. Specifically, the Order requires the following:

(1) Licensees or construction permit holders shall develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities following a beyond-design-basis external event.

(2) These strategies must be capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink and have adequate capacity to address challenges to core cooling, containment, and spent fuel pool cooling capabilities at all units on a site subject to this Order.

(3) Licensees or construction permit holders must provide reasonable protection for the associated equipment from external events. Such protection must demonstrate that there is adequate capacity to address challenges to core cooling, containment, and spent fuel pool cooling capabilities at all units on a site subject to this Order.

(4) Licensees or construction permit holders must be capable of implementing the strategies in all modes.

(5) Full compliance shall include procedures, guidance, training, and acquisition, staging, or installing of equipment needed for the strategies.

These new requirements provide a greater mitigation capability consistent with the overall defense-in-depth philosophy, and, therefore, <sup>provide a</sup> greater assurance that the challenges posed by beyond-design-basis external events, such as natural disasters, to power reactors do not pose an undue risk to public health and safety.

**Issue 14. Require EP exercises to include a regionally-relevant initiating or concurrent natural disaster because natural disasters may affect communications during emergency response.**

The petitioner stated that natural disasters can greatly complicate the ability to provide sufficient communication to assure that sheltering or other protective actions are taken within a given area.

#### **NRC Response to Issue 14**

The NRC agrees that natural disasters may affect communications during emergency response; however, the NRC disagrees that it is necessary to modify the regulations as proposed by the petitioner because of the existing requirements and emergency planning framework. The majority of nuclear power plant licensees currently incorporate natural or destructive phenomena into their drill and exercise scenarios. This planning helps licensees

Fukushima Dai-ichi Accident" (ADAMS Accession No. ML12056A046). The NRC issued this information request regarding the power supplies for communications systems to determine if additional regulatory action is warranted. This request is based upon NTF Recommendation 9.3, which proposed that facility emergency plans provide for a means to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones and satellite telephones) during a prolonged station blackout. The NRC requested that the following assumptions be made in preparing responses to this request for information: assume that the potential onsite and offsite damage is a result of a large-scale natural event resulting in a loss of all alternating current (ac) power, and assume that the large-scale natural event causes extensive damage to normal and emergency communications systems both onsite and in the area surrounding the site. The NRC recognizes that following a large-scale natural event, ac power may not be available to cell and other communications infrastructures.

The NRC requested that addressees assess their current communications systems and equipment used during an emergency event given the aforementioned assumptions. The NRC also requested that consideration be given to any enhancements that may be appropriate for the emergency plan with respect to the communications requirements of 10 CFR 50.47 and appendix E to 10 CFR part 50, and the guidance in NUREG-0696 in light of the assumptions previously stated. Also, addressees were requested to consider the means necessary to power the new and existing communications equipment during a prolonged station blackout.

Addressees were requested to provide an assessment of the current communications systems and equipment used during an emergency event to identify any enhancements that may be needed to ensure communications are maintained during a large-scale natural event meeting the conditions previously described. The assessment should:

- Identify any planned or potential improvements to existing onsite communications systems and their required normal and/or backup power supplies,

approved research efforts associated with Tier 3 program plans, the NRC plans a long-term action involving EPZs. If, <sup>those</sup> ~~as a result of these research activities,~~ <sup>indicate that changes need to be</sup> ~~the NRC determines that a~~ <sup>made to the existing EP regulations, the NRC will commence a rulemaking</sup> ~~rulemaking action is necessary, it can begin the rulemaking process without a petition for~~ <sup>effort to make those changes.</sup> ~~rulemaking.~~ <sup>rulemaking.</sup> →

Because the Commission has decided that the petition does not present sufficient information to warrant changing the size of EPZs or requiring licensees to include natural disasters in their EP exercises at this time, the NRC cannot consider this PRM in the rulemaking process. Therefore, the NRC is denying the petition under 10 CFR 2.803, "Determination of petition."

#### IV. Availability of Documents

The following table provides information on how to access the documents referenced in this document. For more information on accessing ADAMS, see the ADDRESSES section of this document.

Date	Document	ADAMS Accession Number/ <i>Federal Register Citation</i>
October 1975	Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants (WASH-1400 (NUREG-75/014))	ML072350618
December 1978	Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants (NUREG-0396)	ML051390356
October 23, 1979	Planning Basis for Emergency Responses to Nuclear Power Reactor Accidents	44 FR 61123



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

Michael Mariotte  
6930 Carroll Avenue  
Suite 340  
Takoma Park, MD 20912

Dear Mr. Mariotte:

~~U.S. Nuclear Regulatory~~ (NRC)

I am responding to your letter to me dated February 15, 2012, by which you submitted to the Commission a petition for rulemaking (PRM). Specifically, you requested that the Commission NRC amend its regulations in Part 50 of Title 10 of the *Code of Federal Regulations* to expand existing emergency planning zones, create a new emergency planning zone, and require the incorporation of concurrent natural disasters in the required periodic emergency plan drills. The petition was docketed as PRM-50-104, and the Commission published a notice of receipt and request for public comments in the *Federal Register* on April 30, 2012 (77 FR 25375), and on [www.regulations.gov](http://www.regulations.gov) under Docket ID NRC-2012-0046. The comment period closed on July 16, 2012. The Commission received 5,993 comment submissions in response to the request for comments. The NRC has prepared a comment response document to demonstrate how all comments were considered and to respond to the issues identified in the comments. The NRC's comment response document is available in the U.S. Nuclear Regulatory Commission's Agencywide Documents Access and Management System under Accession No. ML13109A523.

The ~~Commission~~ NRC has considered the petition, and the arguments raised therein, as well as the comments received in response to the petition. For the reasons stated in the enclosed *Federal Register* notice, your petition for rulemaking is denied.

In summary, the ~~Commission~~ NRC has concluded that the current size of the emergency planning zones is appropriate for existing 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. The current emergency planning zones provide for a comprehensive emergency planning framework that would allow expansion of the response efforts beyond the designated distances should events warrant such an expansion.



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

The Honorable Fred Upton  
Chairman, Committee on Energy  
and Commerce  
United States House of Representatives  
Washington, DC 20515

Dear Mr. Chairman:

The U.S. Nuclear Regulatory Commission <sup>(NRC)</sup> is denying a petition for rulemaking submitted by Mr. Michael Mariotte on behalf of the Nuclear Information and Resource Service (the petitioner). The petitioner requested that the ~~Commission~~ <sup>NRC</sup> expand existing emergency planning zones around nuclear power plants, create a new emergency planning zone, and require the incorporation of concurrent natural disasters in the required periodic emergency plan drills. The ~~Commission~~ <sup>NRC</sup> has concluded that the current size of the emergency planning zones is appropriate for existing 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. The current emergency planning zones provide for a comprehensive emergency planning framework that would allow expansion of the response efforts beyond the designated distances should events warrant such an expansion. For more information, see the enclosed *Federal Register* notice that will be published in the *Federal Register* soon.

Sincerely,

Rebecca L. Schmidt, Director  
Office of Congressional Affairs.

Enclosure:  
*Federal Register* Notice

cc: Representative Henry A. Waxman

**NOTATION VOTE**

**RESPONSE SHEET**

**TO:** Annette Vietti-Cook, Secretary  
**FROM:** COMMISSIONER APOSTOLAKIS  
**SUBJECT:** SECY-13-0135 – DENIAL OF PETITION FOR  
RULEMAKING REQUESTING AMENDMENTS  
REGARDING EMERGENCY PLANNING ZONE SIZE  
(PRM-50-104)

Approved  X  Disapproved \_\_\_\_\_ Abstain \_\_\_\_\_

Not Participating \_\_\_\_\_

**COMMENTS:** Below  X  Attached \_\_\_ None \_\_\_

I approve publication of the FRN denying PRM-50-104, subject to the edits to both the FRN and the NRC response to public comments proposed by Commissioner Magwood and Chairman Macfarlane.



George Apostolakis

**SIGNATURE**

February 12, 2014

**DATE**

Entered on "STARS" Yes  x  No \_\_\_\_\_



**NOTATION VOTE**

**RESPONSE SHEET**

**TO:** Annette Vietti-Cook, Secretary  
**FROM:** COMMISSIONER MAGWOOD  
**SUBJECT:** SECY-13-0135 – DENIAL OF PETITION FOR  
RULEMAKING REQUESTING AMENDMENTS  
REGARDING EMERGENCY PLANNING ZONE SIZE  
(PRM-50-104)

Approved  Disapproved \_\_\_\_\_ Abstain \_\_\_\_\_

Not Participating \_\_\_\_\_

COMMENTS: Below  Attached  None \_\_\_\_\_

In addition to the attached comments on the draft *Federal Register* Notice, staff should amend the “NRC Response to Public Comments PRM-50-104; NRC-2012-0046 Petition for Rulemaking to Expand Emergency Planning Zones,” referenced on page 67 of the draft *Federal Register* Notice to reflect the attached edits. The proposed edits provide clarity and more accurately reflect staff conclusions from studies of evacuation response.

  
\_\_\_\_\_  
SIGNATURE

30 January 2014  
\_\_\_\_\_  
DATE

Entered on “STARS” Yes  No \_\_\_\_\_

and State and local authorities. The Federal Emergency Management Agency (FEMA) evaluates the offsite response in these exercises to ensure the State and local responders (i.e., offsite response organizations (ORO)) are capable of timely protective action decisionmaking and implementation. Public meetings are held at the conclusion of biennial exercises to discuss the adequacy of response with stakeholders. This oversight process includes additional inspection activities and reporting of performance indicator data for onsite EP that provide the NRC with oversight of EP programs between biennial exercises.

The NRC has studied the efficacy of evacuations implemented by OROs within the United States (NUREG/CR-6864, "Identification and Analysis of Factors Affecting Emergency Evacuations," dated January 2005 (ADAMS Accession Nos. ML050250245 and ML050250219) and NUREG/CR-6981, "Assessment of Emergency Response Planning and Implementation for Large Scale Evacuations," dated October 31, 2008 (ADAMS Accession No. ML082960499)).

~~The NRC examined more than 250 large public evacuations and concluded that all of them were successful in saving lives (except for the response to Hurricane Rita in 2005). The evacuations studied had resulted from technical hazards, malevolent acts, and natural disasters. A few of these evacuations took place within nuclear power plant EPZs; most were successfully accomplished without the aid of NRC regulatory oversight. During the study period, a large and successful evacuation took place approximately every 3 weeks. Many of these evacuations moved people much farther than the 10 miles of an EPZ. For example, evacuations in support of hurricane response involve the dislocation of large numbers of people and travel distances of several miles. A key finding of the latter study was that existing emergency planning requirements for nuclear power plants substantially anticipate and address issues identified in the large scale evacuations researched. The review of NRC and FEMA emergency preparedness regulatory, programmatic and guidance documentation also demonstrated that existing criteria, plans, and procedures were already in place to address most of the issues that were experienced in the large scale evacuations studied. The~~

assessment of emergency response planning and implementation for large scale evacuations affirmed that most of the lessons learned in the evacuations studied herein were anticipated by NRC and FEMA and were already addressed in existing planning and procedures within the NRC and FEMA framework. Therefore, information available to the NRC supports the conclusion that OROs are well able to protect the public they are responsible for without additional regulatory requirements from the NRC with the existing regulatory framework.

The required planning within the plume exposure pathway EPZ is found in 10 CFR 50.47 and appendix E to 10 CFR part 50. This planning is designed to provide effective response to a radiological emergency that has the potential to develop rapidly. The need for protective actions beyond the 10-mile EPZ would generally develop more slowly. Protective actions to provide adequate protection beyond the plume exposure pathway EPZ can be implemented using ORO normal and robust response processes (as demonstrated by the previously mentioned studies). Moreover, the NRC emergency classification scheme required by 10 CFR 50.47(b)(4) is anticipatory, and thus is designed for offsite protective action to begin before a radiological release. This would cause protective actions to begin rapidly within the 10-mile EPZ and provide time for consideration of actions beyond this EPZ should the accident progression indicate the need. Although accidents that include rapid releases are very unlikely, as demonstrated by the accidents at Three Mile Island Nuclear Station, Unit 2 (Three Mile Island) and Fukushima Dai-ichi, protective action guidance has been provided to address such scenarios (Supplement 3 to NUREG-0654, "Guidance for Protective Action Strategies," dated November 20, 2011 (ADAMS Accession No. ML113010596)).

The NRC disagrees with the petition's contention that the accident at Fukushima Dai-ichi is a basis for expansion of the EPZ. The development of protective action recommendations by the Japanese Government, including expansion of evacuations out to 20 km (12 miles) from the plant, supported effective and timely evacuation to minimize the impact of the radiological releases on public health and safety. Subsequent decisions by the Japanese Government to

Commission endorsed NUREG-0396, including an assumption that the planning conducted for 10 miles would provide a substantial basis for expansion of protective actions beyond the EPZ should it ever be necessary. All U.S. nuclear power plants currently have approved emergency plans that include EPZs in compliance with the regulations found in 10 CFR 50.47(c)(2).

The accidents considered in developing guidance and subsequent requirements for the EPZ included rapidly progressing severe accidents that were more threatening to public health than the Fukushima Dai-ichi accident. The WASH-1400 (NUREG-75/014), "Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," dated October 1975 (ADAMS Accession No. ML072350618), estimated that a severe accident could progress to a large radiological release in as little as 2 hours (in the boiling water reactor (BWR) case). Such accidents were considered unlikely, but emergency preparedness is a defense-in-depth measure required due to the potential of severe but unlikely accidents. The accident at Fukushima Dai-ichi developed much more slowly than the rapidly developing accidents that form the basis for the current size of the EPZ. In Japan, adequate time was available to evacuate the public at risk and to expand beyond the planning zone as necessary before large radiological releases occurred. The study used to develop the EPZ is more conservative than the Fukushima Dai-ichi accident with regards to the time available to evacuate within the EPZ and beyond.

The NRC has conducted more recent studies that are useful for evaluating the adequacy of the plume exposure pathway EPZ. In NUREG/CR-6864, the NRC examined large evacuations in the United States between 1990 and 2003 to gain a fuller understanding of the dynamics involved in those types of events. This project found that large-scale evacuations of greater than 1,000 people ~~occurred during the study period~~ from 1997 to 2003 occurred approximately every ~~3~~ two weeks in the United States. The study concluded that these evacuations proceeded efficiently and effectively in terms of evacuee health and safety, security, and issues related to coordination, decisionmaking, and emergency response. The

## **NRC Response to Issue 5**

The NRC disagrees with the petitioner's assertions on this issue. As specified in 10 CFR 50.47(c)(2), two EPZs are established around each nuclear power plant. The technical basis for the EPZs is provided 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," dated December 1978 (ADAMS Accession No. ML051390356). The first zone, the plume exposure pathway EPZ, establishes an area of approximately 10 miles in radius. Within the plume exposure pathway EPZ, detailed planning is required for the recommendation and implementation of protective actions such as sheltering in place or evacuation. The ingestion pathway EPZ has a radius of approximately 50 miles from the plant. Within this EPZ, detailed planning is required to address the potential need to interdict foodstuffs to prevent human exposure from ingestion of contaminated food and surface water. The NRC remains confident that the emergency preparedness programs in support of nuclear power plants provide an adequate level of protection of the public health and safety and that appropriate protective actions can and will be taken in the event of a radiological event at an existing nuclear power plant.

As stated previously, the NRC has studied evacuations within the United States (NUREG/CR-6864) and found that State and local governments are capable of protecting public health and safety through implementation of protective actions up to and including evacuations using both preplanned and ad hoc protective action decisionmaking.

Several large scale evacuations were studied in NUREG/CR-6981, many of which were conducted in an ad hoc manner. The assessment of emergency response planning and implementation for large scale evacuations affirmed that most of the lessons learned in the evacuations studied herein were anticipated by NRC and FEMA and were already addressed in existing planning and procedures within the NRC and FEMA framework. All of the

~~approximately 250 evacuations studied were successful without NRC regulatory requirements (the exception of Hurricane Rita was previously noted).~~

Emergency preparedness within the EPZ is required to provide immediate response capability. This response would address those people most at risk (i.e., those closest to the nuclear power plant). Immediate protection of the EPZ population allows additional time for implementation of ad hoc actions beyond the EPZ. As stated in NUREG-0396:

[I]t was the consensus of the [NRC-EPA] Task Force that emergency plans could be based upon a generic distance out to which predetermined actions would provide dose savings for any such accidents. Beyond this generic distance it was concluded that actions could be taken on an ad hoc basis using the same considerations that went into the initial action determinations.

Additionally, emergency actions could be successfully carried out beyond the 10-mile EPZ for the following reasons:

- The 10-mile emergency planning basis establishes an infrastructure similar to that used by other offsite response organizations, such as police and fire departments. The infrastructure consists of emergency organizations, communications capabilities, training, and equipment that can be used in the event of an accident at a facility.
- Coordination is enhanced by the practice of having offsite response organizations, which include local, State, and Federal responders, participate in training exercises with the licensee. The studies cited previously noted a valuable contributor to effective evacuation implementation was participation in training and drills.
- The emergency notification equipment required by the NRC (10 CFR 50.47(b)(5)) for prompt notification of the public within the EPZ reaches beyond the plume exposure EPZ, and current communications technology enhances this process.

In addition, State and local response agencies have improved their incident response plans and guidance following the events of September 11, 2001. The U.S. Department of Homeland Security (DHS) has issued guidance for Federal, State, and local response to emergencies which includes the National Response Framework, NIMS, and ICS. These

**NOTATION VOTE**

**RESPONSE SHEET**

**TO:** Annette Vietti-Cook, Secretary  
**FROM:** COMMISSIONER OSTENDORFF  
**SUBJECT:** SECY-13-0135 – DENIAL OF PETITION FOR  
RULEMAKING REQUESTING AMENDMENTS  
REGARDING EMERGENCY PLANNING ZONE SIZE  
(PRM-50-104)

Approved  X  Disapproved \_\_\_\_\_ Abstain \_\_\_\_\_

Not Participating \_\_\_\_\_

COMMENTS: Below \_\_\_ Attached \_\_\_ None  X

W. Ostendorff  
SIGNATURE

1/8/14  
DATE

Entered on "STARS" Yes \_\_\_ No \_\_\_