

**NRC Response to Public Comments  
PRM-50-104; NRC-2012-0046  
Petition for Rulemaking to Expand Emergency Planning Zones**

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**U.S. Nuclear Regulatory Commission**  
Office of Nuclear Reactor Regulation  
Office of Nuclear Security and Incident Response

March 2014  
ADAMS Accession No. ML14042A227



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## List of Acronyms

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act of 1954, as amended
ASME	American Society of Mechanical Engineers
BEIR	Biological effects of ionizing radiation
BWR	Boiling water reactor
DHS	Department of Homeland Security
EAL	Emergency action level
EP	Emergency planning
EPA	Environmental Protection Agency
EPZ	Emergency planning zone
ETE	Evacuation time estimate
FEMA	Federal Emergency Management Agency
FRN	<i>Federal Register</i> notice
ICRP	International Commission on Radiological Protection
NIMS	National Incident Management System
NRC	U.S. Nuclear Regulatory Commission
NTTF	Near-Term Task Force
PAGs	Protective action guides
PI	Performance indicators
PRA	Probabilistic Risk Assessment
PRM	Petition for rulemaking
ROP	Reactor oversight process
SGTR	Steam generator tube rupture
SOARCA	State-of-the-Art Reactor Consequence Analyses
SRM	Staff requirements memorandum
SSC	Structures, systems, and components
TEDE	Total effective dose equivalent
TEPCO	Tokyo Electric Power Company
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation

# Introduction

This document presents the U.S. Nuclear Regulatory Commission's (NRC) responses to comments received on a petition for rulemaking (PRM) requesting the expansion of emergency planning zones (EPZ) around nuclear power plants. The notice of receipt and request for comment was issued in the *Federal Register* on April 30, 2012 (77 FR 25375). The public comment period closed on July 16, 2012. The petition was docketed by the NRC on February 17, 2012, and assigned Docket No. PRM-50-104. The NRC received a total of 5,993 submissions<sup>1</sup> in response to its April 30, 2012, *Federal Register* notice (FRN). This total included 5,702 form letters and 291 unique submissions. Table 1 shows the name, affiliation, submission ID number, and the NRC's Agencywide Documents Access and Management System (ADAMS) Accession Number for each unique submission received on the petition for rulemaking. ADAMS is accessible through the NRC's public Web site under the NRC Library at <http://www.nrc.gov/reading-rm/adams.html>.

To identify comments requiring consideration and response, the NRC reviewed every submission. The NRC identified substantive statements related to the petition for rulemaking in each submission and recorded the statements as comments.

Each comment was assigned a unique comment ID consisting of two numbers separated by a hyphen. The number before the hyphen is the submission ID. The number after the hyphen is the sequential comment within that submission. For example, [165-003] refers to the third comment in submission ID number 165 submitted by Earl Fordham of the Conference of Radiation Control Program Directors.

Similar comments were grouped together and assigned to one of the issues listed below. This comment response document includes a summary of each comment or group of comments in italicized text followed by the comment IDs in brackets. The NRC prepared responses for each comment or group of comments. The comment summaries and NRC responses are organized and presented in this document by the following issues:

- General support for the petition
- General opposition to the petition
- Expand EPZs because, in the event of a nuclear accident, the need for protective actions beyond 10 miles and 50 miles is highly likely
- Expand EPZs because the basis for the 10-mile EPZ is flawed
- Expand EPZs because the NRC urged U.S. citizens within 50 miles of the Fukushima Dai-ichi Nuclear Power Plant to evacuate
- There has been little change to emergency planning regulations in 30 years
- Expand EPZs because ad hoc expansion beyond 10 miles will not be adequate
- Expand EPZs because current planning is inadequate for increased populations around many U.S. nuclear power plants
- Expand EPZs because the U.S. reactor fleet is aging and more vulnerable to the occurrence of accidents
- Expand EPZs because risk from spent fuel pools is too high

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<sup>1</sup> This document distinguishes between submissions and comments. A submission is a single document (like a letter or e-mail) that contains one or more comments.

- Emergency planning regulations must be strengthened because there are significant concerns related to pressure suppression containments
- Expand EPZs because expansion is supported by the current improved understanding of the health effects of radiation
- Expand EPZs because radiation does not stop at an EPZ boundary
- Expand EPZs because current regulations do not provide adequate protection. Amending the regulations as requested in the petition would more likely provide adequate protection
- Require EP exercises to include a regionally-relevant initiating or concurrent natural disaster because natural disasters can challenge nuclear safety systems
- Require EP exercises to include a regionally-relevant initiating or concurrent natural disaster because natural disasters may affect communications during emergency response
- Do not expand EPZs because the benefits do not outweigh the costs
- Sheltering in place is not a viable alternative to evacuation planning
- I do not support nuclear power. I prefer shutting down or phasing out nuclear power plants
- I prefer other sources of energy over nuclear power
- Comments with general criticisms of the NRC or Federal government
- Price-Anderson liability limits are inadequate
- Dollar per person-rem is too low and must be revised
- NRC should require funding for independent radiation detection equipment
- NRC should improve potassium iodide availability and distribution
- The United States should hold realistic drills and actually shut down the electrical grid because of the risk of solar flares
- NRC should require licensees to take new seismic information into consideration and upgrade the plants accordingly
- NRC should allow the use of thorium as a fuel
- An international foundation should be created to deal with health, decommissioning, and economic issues associated with nuclear power plants
- Miscellaneous out-of-scope comments

For the reasons stated in the FRN (ADAMS Accession Number ML14042A222), the NRC has decided to deny the petition.

**Table 1: List of Unique Submissions on PRM-50-104**

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
001	Kevin Leppmann		ML12145A538
002	Dominique French	Nuclear Information and Resource Service	ML12146A384
003	Stephan Donovan		ML12145A539
004	Nanette Wizov		ML12145A540
005	John Papandrea		ML12145A541
006	Rick Harlan		ML12145A542
007	Raymond Nuesch		ML12145A543
008	Garry Weisman		ML12145A587
009	Darynne Jessler		ML12145A545
010	Jan Clarridge		ML12145A546
011	Carol Savary		ML12145A547
012	Mary Wheat		ML12145A548
013	Isabel Cohen		ML12145A549
014	Pash Galbavy		ML12145A550
015	Jan Craaig		ML12145A558
016	Gordon Howard		ML12145A559
017	Deanna Homer		ML12145A560
018	Rusty Simpson		ML12145A561
019	Tom Gillies		ML12145A563
020	Karen Jones		ML12145A564
021	Donna Roman		ML12145A565
022	Steve Snyder		ML12145A566
023	Stan Serafin		ML12145A567
024	Maitland Alexander		ML12145A568
025	Kathy Cornely		ML12145A710
026	Cristofer Justin		ML12145A711
027	Joanne Miller		ML12145A712
028	Dan Mortenson		ML12145A713
029	Margaret Aquilar		ML12145A714
030	Sherry Meddick		ML12145A715
031	Jordan Van Voast		ML12145A716
032	Robert Cerello		ML12145A717
033	Noelle Bridgman-Wile		ML12145A718

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
034	Melinda McComb		ML12145A719
035	Katharine Tussing		ML12145A720
036	Brenda Troup		ML12145A721
037	Alexandra Gordon		ML12145A722
038	Debi Mohan		ML12145A724
039	Judith Smith		ML12145A725
040	Sandra Mardigian		ML12145A726
041	Thomas Meacham		ML12145A727
042	L. Carpenter		ML12145A728
043	June Forbes		ML12145A729
044	Craig Fiels	Sustainable Economic Solutions	ML12145A730
045	Joan Poss		ML12145A779
046	Rose Kinane		ML12145A780
047	Michael Briney		ML12145A781
048	Robert Rosenfield		ML12145A782
049	L. Bagley		ML12145A783
050	Joe Giambrone		ML12145A784
051	Beret Amundson		ML12145A785
052	Heidi Wilson		ML12145A786
053	Lloyd Loring		ML12145A787
054	Gayle Janzen		ML12145A746
055	Don Saito		ML12145A747
056	Allison Ostrer		ML12145A748
057	Ivan Dodson		ML12145A749
058	Norrie Robbins		ML12145A750
059	Doris Fulton		ML12145A751
060	Gary Lee		ML12145A752
061	Les Ego		ML12145A753
062	Maxine Wolfset		ML12145A754
063	Virginia Davis		ML12145A756
064	Sally Shaw		ML12145A757
065	Trevor Self		ML12145A758
066	Nancy Hiestand		ML12152A230
067	Nancy Watts		ML12145A759
068	Sherrill Futrell		ML12145A760

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
069	Ken Gunther		ML12145A762
070	Mary Madigan		ML12145A763
071	A Pabian		ML12145A764
072	Lise Broer		ML12145A765
073	Lynda Pauling		ML12145A766
074	Don Leichtling		ML12145A653
075	Daniel McCann-Sayles		ML12145A654
076	Mary McGilligan		ML12145A655
077	Robert Orzel		ML12145A656
078	Steven Crandell		ML12145A657
079	Harry Kershner		ML12145A658
080	M Ross Adams		ML12145A659
081	Morgan Randall		ML12145A660
082	Ellen Lebowitz		ML12145A661
083	Jim Diamond		ML12145A662
084	Margaret Eves		ML12145A663
085	Cheryl Gross		ML12145A676
086	Elisabeth Bilien		ML12145A677
087	John Kesich		ML12145A678
088	KC Nelson		ML12145A679
089	Stephen Benson		ML12145A680
090	Sharon Steuer		ML12145A681
091	Amy Lake		ML12145A682
092	Therese MacKenzie		ML12145A683
093	David Givers		ML12145A684
094	Milton Hanzel		ML12145A685
095	Marianne Edain		ML12145A686
096	Henry Peters		ML12145A687
097	Deb and Arne Arnason		ML12146A030
098	Carolyn Hawk		ML12146A031
099	Dolores Taller		ML12146A032
100	Jenise Porter		ML12146A033
101	Probyn Gregory		ML12146A034
102	Laura Ohanian		ML12146A035

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
103	Lorna Farnum		ML12146A036
104	Carol Van Strum		ML12146A037
105	James Koss		ML12146A038
106	Ned Rollins		ML12146A039
107	Barbara Coulson		ML12146A040
108	Diana Rogers		ML12146A041
109	Carolyn Adessa		ML12146A042
110	Sue Flint		ML12146A043
111	Dorrit Ragosine		ML12146A044
112	John Reynolds		ML12146A045
113	Anna Pick		ML12146A046
114	Margaret Hyland		ML12146A047
115	Kristie Conrad		ML12150A055
116	Carolyn Moon		ML12150A057
117	Jacqueline Wasilewski		ML12150A058
118	Kathleen Armstrong		ML12150A059
119	Nick Bartol		ML12150A060
120	Wells Eddleman		ML12150A062
121	Bruce Pringle		ML12150A063
122	Anna Baker		ML12150A064
123	Phillip Rutledge		ML12150A065
124	Maya Be		ML12150A066
125	Katy Wortel		ML12150A068
126	Maradel Gale		ML12150A069
127	Gary Jones		ML12150A070
128	Michael Strawn		ML12150A071
129	Yvonne Huacuja		ML12150A072
130	Brooke Schoepf		ML12146A186
131	Ross McCluney		ML12146A188
132	Mary Ellen Strote		ML12146A189
133	Edward Mainland		ML12146A190
134	Richard Kranzdorf		ML12146A191
135	D. Narveson		ML12146A192
136	Virginia Bower		ML12146A193

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
137	Nkenga Payne	City of South Miami	ML12146A194
138	Margaret Nagel		ML12146A195
139	Glen Anderson		ML12146A196
140	Diane Desenberg		ML12146A197
141	Rebecca Ramsay		ML12146A198
142	Dominique French	Nuclear Information and Resource Service	ML12150A232
143	Daphne Stevens		ML12156A362
144	Marvin Lewis		ML12156A058
145	Jin Emerson-Cobb		ML12159A060
146	Judith Canepa		ML12164A376
147	Heidi Siegfried		ML12164A377
148	Jill Ransom		ML12166A069
149	Ken Gale		ML12166A070
150	Steve Treegoob		ML12166A071
151	Lynn Biddle		ML12166A072
152	Roger Smith		ML12166A073
153	Maya Be		ML12166A074
154	Cathy Rowan		ML12166A075
155	Liberty Goodwin		ML12166A076
156	Susan Kramer		ML12166A077
157	John Nichols		ML12166A307
158	Barbara Tiner	Town of Leverett, MA	ML12181A308
159	George Klein	Sierra Club, Lower Hudson Group	ML12181A310
160	Vince Kalsen	Monroe County Emergency Management	ML12193A511
161	Michael Cline	Virginia Dept of Emergency Management	ML12194A008
162	Karen Fuller	Tompkins County Legislature	ML12195A266
163	Niel Batista		ML12195A265
164	Jonathan Schwarz	Nebraska Emergency Management Agency	ML12200A176
165	Earl Fordham	Conference of Radiation Control Program Directors	ML12200A162
166	Stephen Garvin	Dorchester County Emergency Management Agency	ML12200A163
167	Michael Jay		ML12200A164
168	Mark Reader		ML12200A165
169	Bruce Pringle		ML12200A166
170	Lisa Kasenow		ML12200A167

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
171	Anthony Hall		ML12200A168
172	Felix Rosenthal		ML12200A169
173	Lydia Gralla		ML12200A170
174	John Bromer		ML12200A171
175	Amy Ferrara		ML12200A172
176	David O'Leary		ML12200A173
177	Tara Bloyd		ML12200A174
178	Leonard Wheeler		ML12200A257
179	H. Douglas Hoell	NC Dept of Public Safety - Emergency Management	ML12200A258
180	Peter Samal		ML12200A259
181	Mara Schoner		ML12200A260
182	Nancy Watts		ML12200A261
183	Delaine Spilsbury		ML12200A262
184	Steven Seftel		ML12200A263
185	Sunny Miller		ML12200A264
186	Lissa Weinmann		ML12200A265
187	Marco Rudin		ML12200A333
188	Doug Brown		ML12200A334
189	Lynn Crandall		ML12200A335
190	Michael Griffen	Maryland Dept of Environment	ML12200A336
191	Richard Kranzdorf		ML12200A337
192	John Calandrelli		ML12200A338
193	William Collins		ML12200A339
194	Valerie Robbin		ML12200A340
195	Jan Clarridge		ML12200A341
196	Anthony Pietrangelo	Nuclear Energy Institute	ML12200A342
197	Anne Bingham		ML12200A343
198	Tim Brainerd		ML12200A288
199	Joe Weatherby		ML12200A289
200	Leonard Goodisman		ML12200A290
201	Paul Wotherspoon	Florida Division of Emergency Management	ML12200A291
202	Steve Patton		ML12200A292
203	Jeanne Raymond		ML12200A293
204	Tana Silva		ML12200A294

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
205	Tara Hands		ML12200A296
206	Linda Griggs		ML12200A297
207	Lewis Patrie		ML12200A298
208	Oleh Sydor		ML12200A304
209	Craig Daniels		ML12200A305
210	Benedict Patrick		ML12200A306
211	Nancy Shaefer-Havens		ML12200A307
212	Charlene Woodcock		ML12200A308
213	Troy Hamzy		ML12200A309
214	Peter & Marilyn Deraney		ML12200A310
215	Mark Robinowitz		ML12200A311
216	Frank Snapp		ML12200A312
217	Robert Tohe		ML12200A314
218	Sydney Vilen		ML12200A316
219	Rachel Herbener		ML12200A319
220	David Lobbig		ML12200A320
221	Priscilla Bradley		ML12200A321
222	Robert Heron		ML12200A322
223	Pete McNally	Polk County Emergency Management	ML12202A036
224	Steve Simpson	Manatee County Emergency Management	ML12200A409
225	Joe Eckstein	Citrus County Emergency Management	ML12200A410
226	Chuck Lanza	Broward Emergency Management Division	ML12200A411
227	Ken Deshaies		ML12200A412
228	Charles Craig	Volusia County Emergency Management	ML12200A413
229	Kimberly Prosser	Brevard County Office of Emergency Management	ML12200A414
230	Doug Christ	DeSoto County Emergency Management	ML12200A415
231	Bretlee Jordan	Citrus County Radiological Emergency Preparedness	ML12200A416
232	Richard Zyvoloski	Collier County Emergency Management	ML12200A417
233	Carol Russell		ML12201A041
234	Mike Geier	Palm Beach County Div. of Emergency Management	ML12201A042
235	Gerald Smith	Lake County Division of Emergency Management	ML12201A043
236	Cindy Bennett		ML12201A044
237	Alton Scott	Lafayette County Emergency Management	ML12201A045

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
238	Bob Wesch	Citrus County Emergency Management	ML12201A005
239	Pamela Rowe	Citrus County Radiological Emergency Preparedness	ML12201A006
240	Carol Letson		ML12201A007
241	Richard Mathews		ML12201A008
242	Quinn Montana		ML12201A009
243	Linda Green		ML12201A010
244	Sally Shaw		ML12201A011
245	Gary Shaw		ML12201A012
246	Mary Madigan		ML12201A013
247	Randy McDaniel	Okaloosa County Office of Emergency Management	ML12201A014
248	Loren Olson		ML12201A015
249	Lorin Mock	Clay County Department of Public Safety	ML12201A016
250	Karen Stone		ML12201A017
251	Virginia Bennack		ML12201A018
252	Susan Shapiro	Public Health and Sustainable Energy	ML12201A019
253	David Agnew		ML12201A020
254	Carter Kathryn		ML12201A021
255	Elise Knaap		ML12201A022
256	Jeannette Hassberg		ML12201A023
257	Susan Hoch		ML12201A024
258	Meredith Richmond		ML12201A025
259	Gary Jones		ML12201A026
260	Robert Gross		ML12201A027
261	Joan Hennessey		ML12201A028
262	Robert Holt		ML12201A029
263	Anna Baker		ML12201A030
264	Jill Simon		ML12201A031
265	Bob Stuart		ML12201A032
266	Lisa Perilli		ML12201A033
267	Laura Ziegler		ML12201A034
268	Maureen Headington		ML12201A035
269	Sue & Steve Massey		ML12201A036
270	Kevin Lay		ML12201A037
271	Jim Wells		ML12201A038

<b>Submission ID</b>	<b>Commenter Name</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
272	Michael Griffen	Maryland Dept of Environment	ML12201A039
273	Paul Wotherspoon	Florida Division of Emergency Management	ML12201A047
274	Jim Kammel		ML12201A048
275	Jacqueline Vaughan	Calvert County Dept of Public Safety	ML12201A049
276	Kurt Myers	St. Lucie County Public Safety & Communications	ML12201A050
277	Paul Keller	Pinellas County Emergency Management	ML12201A051
278	Charles Craig	Volusia County Emergency Management	ML12201A052
279	Richard Mothena	NextEra Energy, Inc	ML12201A081
280	David Donnelly	Alachua County Emergency Management	ML12201A053
281	Daniel Hahn	Santa Rosa County Emergency Management	ML12201A054
282	David Casto	Sumter County Emergency Management	ML12201A055
283	John Wilson	Lee County Emergency Management	ML12201A056
284	Irene Toner	Monroe County Emergency Management	ML12201A057
285	Alistair MacMartin	Water, Roots and Branches Affinity Group and Town of Wendell, MA	ML12205A004
286	Janet Chomiszak	Delaware Emergency Management Agency	ML12215A014
287	Gertrude Haughney	Carmelite Communion, Inc.	ML12256B027
288	Catherine Howard	Sisters of St. Dominic	ML12278A054
289	Cecelia Lavan	Blauvelt Dominican Social Justice Committee	ML12283A260
290	Joan Agro	Women's Committee Blauvelt & Sparkill Dominicans	ML12300A469
291	Omani Gilliam		ML13015A141

# 1. General Issues

## 1.1 General support for the petition

**Comment:** *Many comments expressed general support for the petition.* [002-001, 005-006, 006-001, 009-006, 010-002, 012-001, 014-001, 014-002, 015-001, 018-001, 019-001, 022-001, 026-001, 030-001, 030-006, 030-008, 031-001, 033-001, 035-001, 036-002, 038-001, 039-001, 040-001, 041-006, 042-008, 043-001, 044-003, 044-005, 046-001, 047-002, 050-012, 051-001, 051-009, 052-001, 053-002, 053-003, 054-001, 054-009, 056-009, 057-009, 058-001, 059-005, 060-006, 061-009, 062-001, 063-009, 064-003, 065-001, 065-009, 066-009, 067-009, 068-005, 069-009, 070-009, 071-009, 073-003, 074-001, 074-009, 075-001, 075-002, 075-010, 076-009, 077-009, 078-001, 078-003, 078-004, 079-002, 080-001, 080-009, 082-008, 083-005, 084-003, 085-007, 086-001, 086-004, 087-009, 088-001, 088-009, 090-009, 091-001, 092-003, 093-001, 093-007, 094-009, 095-009, 096-009, 097-009, 098-009, 099-004, 100-001, 101-008, 102-001, 102-009, 103-009, 104-009, 105-001, 105-009, 107-010, 108-009, 109-014, 110-001, 110-010, 111-009, 112-001, 113-003, 114-001, 114-009, 117-010, 119-001, 119-009, 120-009, 121-006, 123-002, 123-003, 123-006, 124-009, 126-008, 127-012, 128-008, 129-001, 130-009, 131-008, 132-002, 133-008, 134-009, 135-008, 136-008, 137-001, 137-006, 137-012, 137-015, 138-009, 139-010, 140-003, 141-001, 142-004, 143-009, 144-009, 145-005, 145-007, 146-001, 146-009, 147-001, 147-009, 148-003, 149-001, 149-009, 150-009, 151-003, 152-003, 153-001, 153-009, 154-009, 155-009, 156-001, 157-001, 157-009, 158-001, 158-006, 158-014, 159-006, 159-010, 162-005, 162-012, 168-001, 169-006, 171-009, 172-009, 173-001, 173-005, 174-009, 176-008, 177-008, 178-009, 180-009, 181-008, 182-004, 184-009, 185-009, 186-001, 186-012, 188-009, 189-008, 191-001, 191-009, 192-009, 193-002, 194-003, 194-004, 195-001, 195-009, 197-009, 198-008, 199-009, 200-001, 200-009, 202-009, 203-009, 204-002, 205-005, 206-009, 207-008, 208-009, 212-008, 213-009, 214-009, 215-001, 216-009, 217-009, 218-001, 218-011, 219-009, 221-002, 222-009, 227-009, 233-010, 240-007, 241-001, 241-006, 241-014, 242-009, 243-002, 244-009, 245-009, 246-009, 248-001, 248-009, 250-002, 252-001, 252-015, 253-009, 254-001, 254-009, 255-009, 256-008, 258-008, 259-009, 260-009, 261-009, 262-008, 263-001, 264-008, 265-009, 266-004, 267-009, 268-009, 269-007, 285-007, 285-015, 287-006, 287-010, 288-006, 288-010, 289-006, 289-010, 290-006, 290-010, 291-001]

**NRC Response:** The NRC has considered the petition and public comments as described in the FRN and this document. For the reasons stated in the FRN, the NRC has decided to deny the petition.

## 1.2 General opposition to the petition

**Comment:** *Several comments expressed general opposition to the petition.* [161-001, 161-002, 161-003, 163-005, 163-006, 164-004, 164-008, 164-009, 164-010, 164-013, 164-015, 164-018, 164-019, 165-001, 179-001, 179-004, 179-005, 190-001, 196-001, 196-004, 196-012, 196-025, 201-001, 201-002, 201-004, 201-006, 223-001, 224-001, 225-001, 226-001, 228-001, 229-001, 230-001, 231-001, 232-001, 234-001, 235-001, 237-001, 238-001, 239-001, 247-001, 249-001, 272-001, 273-001, 274-001, 274-003, 274-004, 275-001, 275-003, 276-002, 277-001, 278-001, 279-001, 280-001, 281-001, 283-001, 284-001]

**NRC Response:** The NRC has considered the petition and public comments as described in the FRN and this document. For the reasons stated in the FRN, the NRC has decided to deny the petition.

## 2. Issues within the Scope of the Petition for Rulemaking

### 2.1 *Expand EPZs because, in the event of a nuclear accident, the need for protective actions beyond 10 miles and 50 miles is highly likely*

Real-world nuclear accidents (e.g., Chernobyl and Fukushima) required broader evacuations and food interdiction efforts

**Comment:** *The real-world evidence from the Fukushima Dai-ichi and Chernobyl accidents demonstrates that the 10 mile EPZ is too small.* [003-001, 005-001, 007-001, 009-001, 011-001, 024-001, 029-001, 037-001, 041-001, 044-001, 047-001, 050-005, 051-002, 054-002, 056-002, 057-002, 061-002, 065-002, 066-002, 067-002, 068-001, 069-001, 070-002, 071-002, 073-001, 074-002, 075-003, 076-002, 077-002, 080-002, 082-001, 087-002, 088-002, 090-002, 094-002, 095-002, 096-002, 097-002, 098-002, 099-001, 101-001, 102-002, 103-002, 104-002, 105-002, 107-003, 108-002, 110-003, 111-002, 112-002, 114-002, 117-003, 118-001, 119-002, 120-002, 121-001, 124-002, 126-001, 127-005, 128-001, 130-002, 131-001, 133-001, 134-002, 135-001, 136-001, 138-002, 139-003, 140-001, 143-002, 144-002, 146-002, 147-002, 149-002, 150-002, 153-002, 154-002, 155-002, 157-002, 169-001, 171-002, 172-002, 173-002, 174-002, 176-001, 177-001, 178-002, 180-002, 181-001, 184-002, 186-005, 188-002, 189-001, 191-002, 192-002, 193-001, 194-001, 195-002, 197-002, 198-001, 199-002, 200-002, 202-002, 203-002, 205-001, 206-002, 207-001, 208-002, 212-001, 213-002, 214-002, 216-002, 217-002, 218-004, 219-002, 221-003, 222-002, 227-002, 233-003, 240-001, 241-007, 242-002, 244-003, 245-002, 246-002, 248-002, 252-007, 253-001, 254-002, 255-002, 256-001, 258-001, 259-002, 260-002, 261-002, 264-001, 265-002, 267-002, 268-002, 269-001]

**NRC Response:** The NRC disagrees with this comment. The current EPZs provide a comprehensive emergency planning (EP) framework that would allow for expansion of the response efforts beyond the designated distances should the events warrant such an expansion.

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. The NRC routinely inspects nuclear power plant licensee EP programs to ensure compliance with regulations and biennially inspects a demonstration exercise that integrates the response of offsite and onsite organizations, including the licensee

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)). 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 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 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)).

The NRC disagrees with the commenters' 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 to the radiological releases on public health and safety. Subsequent decisions by the Japanese Government to evacuate selected areas based on potential long-term exposures are also similar to the U.S. strategy to expand protective actions during an event when conditions warrant an expansion.

The NRC is studying the accident to identify improvement areas applicable to the United States. Following the earthquake and tsunami at Fukushima Dai-ichi in March 2011, the NRC

established a senior-level task force referred to as the Near-Term Task Force (NTTF). The NTTF conducted a systematic and methodical review of the NRC's regulations and processes to determine if the agency should make safety improvements in light of the events in Japan. The NTTF issued its report (the NTTF report) on July 12, 2011, "Recommendations for Enhancing Reactor Safety in the 21st Century, The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident" (ADAMS Accession No. ML11861807). On July 19, 2011, the NTTF presented its findings to the five Commissioners (the Commission) of the NRC and proposed improvements in multiple areas including emergency preparedness. The NTTF considered the existing planning structure, including the 10-mile plume exposure pathway and 50-mile ingestion pathway emergency planning zones, and found no basis to recommend a change to the size of the EPZs.

However, as information emerged about the events surrounding the protective actions implemented following the accident at Fukushima Dai-ichi, the NRC staff determined that the insights from the accident response should be evaluated to identify potential enhancements to NRC regulations and guidance. In SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 (ADAMS Accession No. ML11272A111), the NRC staff recommended that evaluating the basis of the EPZ size warranted further consideration. In response to the Commission's Staff Requirements Memorandum (SRM) for SECY-11-0137, the NRC staff produced SECY-12-0095, "Tier 3 Program Plans and 6-Month Update in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami," dated July 13, 2012 (ADAMS Accession No. ML12208A210), in which the NRC staff determined that the existing basis for the EPZ size remains valid (including for multi-unit events).

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, the NRC plans a long-term action involving EPZs. The NRC staff will use insights from the current full-scope site Level 3 Probabilistic Risk Assessment (PRA) project as well as information obtained from the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) assessment to inform the evaluation of the potential impacts that a multi-unit event may have on an EPZ. The UNSCEAR is preparing a scientific report to assess the radiation doses and associated effects on health and the environment. Also, the Fukushima Prefecture launched the Fukushima Health Management Survey to investigate long-term low-dose radiation exposure caused by the accident. The survey attempts to estimate radiation exposure from the accident and more detailed dose assessments by recreating the whereabouts of every Fukushima prefecture resident for the four month period beginning with the March 11<sup>th</sup> nuclear accident. The stated primary purposes of this survey are to monitor the long-term health of residents, promote their future well-being, and confirm whether long-term low-dose radiation exposure has health effects. If these research activities indicate that changes need to be made to the existing EP regulations, the NRC will commence a rulemaking effort to make those changes.

**Comment:** *After the accidents at Fukushima Dai-ichi and Chernobyl, food interdiction was necessary beyond 50 miles and in some cases hundreds of miles from the sites.* [042-005, 050-009, 051-006, 054-006, 056-006, 057-006, 059-004, 060-004, 061-006, 063-008, 065-006, 066-006, 067-006, 069-006, 070-006, 071-006, 074-006, 075-007, 076-006, 077-006, 080-006, 082-005, 083-003, 084-001, 085-004, 087-006, 088-006, 090-006, 093-005, 094-006, 095-006, 096-006, 097-006, 098-006, 101-005, 102-006, 103-006, 104-006, 105-006, 107-001, 107-007, 108-006, 109-005, 109-009, 110-007, 111-006, 112-005, 114-006, 117-007, 119-006, 120-006,

121-005, 124-006, 126-005, 127-009, 128-005, 130-006, 131-005, 133-005, 134-006, 135-005, 136-005, 137-004, 137-005, 138-006, 139-007, 142-001, 142-003, 143-006, 144-006, 145-004, 146-006, 147-006, 149-006, 150-006, 152-002, 153-006, 154-006, 155-001, 155-006, 157-006, 158-004, 158-005, 162-003, 169-004, 171-006, 172-006, 174-006, 176-003, 177-005, 178-006, 180-006, 181-005, 184-006, 185-006, 186-008, 188-006, 189-005, 191-006, 192-006, 195-006, 197-006, 198-005, 199-006, 200-006, 202-006, 203-006, 205-004, 206-006, 207-005, 208-006, 212-005, 213-006, 214-006, 216-006, 217-006, 218-008, 219-006, 221-007, 222-006, 227-006, 233-007, 240-004, 241-011, 242-006, 244-006, 245-006, 246-006, 248-006, 252-010, 253-005, 254-006, 255-006, 256-005, 258-005, 259-006, 260-006, 261-006, 262-005, 264-005, 265-006, 267-006, 268-006, 269-005, 285-005, 285-006]

**NRC Response:** The NRC agrees that actions to interdict food beyond 50 miles were determined to be necessary by the appropriate authorities after these accidents. The NRC's emergency planning framework allows for expansion beyond the emergency planning zones if this should become necessary. For further discussion of how the regulations provide for a comprehensive emergency planning framework, see the response to comments 003-001, et al. in section 2.1.

**Comment:** *A worker at Fukushima disobeyed orders and allowed sea water into the plant. If he hadn't, the disaster would have been worse.* [045-001]

**NRC Response:** The NRC interprets this comment to mean that the commenter believes that operator actions in the event of a severe accident may require different operating procedures from those used during normal operations in order to prevent the accident from progressing. The NRC agrees that different procedures may be used when responding to a severe accident. Toward that end, the NRC issued a regulation in 10 CFR 50.54(hh) that requires each nuclear power plant site to establish equipment to mitigate serious accidents (such as those that might result from a loss of large areas of the plant). The NRC also issued orders (Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012 (ADAMS Accession No. ML12054A736)) requiring additional equipment for mitigation of serious accidents. Further, NRC regulations under 10 CFR 50.54(x) allow operator actions outside normal operating procedures should that be necessary to maintain nuclear safety: "A licensee may take reasonable action that departs from a license condition or a technical specification (contained in a license issued under this part) in an emergency when this action is immediately needed to protect the public health and safety and no action consistent with license conditions and technical specifications that can provide adequate or equivalent protection is immediately apparent." The mitigation equipment and regulatory regimen provide additional assurance that in the United States, public health and safety can be protected during a radiological accident at a nuclear power plant.

**Comment:** *The NRC should learn from Japan by immediately evacuating a 25-mile radius and interdicting food from 25 – 50 miles in the event of an accident.* [017-001]

**NRC Response:** The NRC disagrees with this comment. Evacuation of people not at risk from a radiological release increases their risk due to various factors (stress, traffic accidents, etc.) once they begin the evacuation process. The NRC does not endorse overly conservative protective action recommendations from licensees and would not recommend such to OROs. Supplement 3 to NUREG-0654 provides guidance for the expansion of protective actions that addresses overly conservative evacuation recommendations.

In an NRC study, a sensitivity analysis was performed for immediate evacuation beyond the plume exposure pathway EPZ (NUREG-1935, "State-of-the-Art Reactor Consequence Analyses (SOARCA) Report," dated November 30, 2012 (ADAMS Accession Nos. ML12332A057 and ML12332A058)). It showed no significant reduction in individual risk from expanded evacuation and slightly increased risk to those closest to the plant. This effect is due to the additional traffic on the roads reducing the evacuation speed of those most at risk. Current NRC guidance in Supplement 3 to NUREG-0654 recommends a staged evacuation in which those people closest to the plant are evacuated first, followed by expansion of the evacuation order as the accident dictates. Finally, it should be noted that the NRC and its licensees only recommend protective actions to civil authorities. The decision to take a protective action rests with the responsible OROs and not the NRC or licensee.

However, the NRC agrees with the comment that food interdiction should be considered, and the current regulations include a 0 to 50-mile ingestion pathway zone, in which planning is required to address appropriate actions to protect food within this pathway.

**Comment:** *There were more deaths throughout the United States following the accident at Fukushima.* [045-005]

**NRC Response:** The NRC disagrees with the comment that the Fukushima Dai-ichi accident resulted in deaths in the United States. The commenter did not provide, and the NRC is not aware of, any data to support the comment's assertion.

**Comment:** *Because of the far-reaching effects of Fukushima and Chernobyl, it is no wonder that one out of three people get cancer.* [257-001]

**NRC Response:** The NRC disagrees with the comment. The accident at the Chernobyl Nuclear Power Station (Chernobyl) resulted in an increase in thyroid cancers in children who were exposed at the time of the accident; however, the NRC is not aware of any data to date to support the assertion that the accidents at Fukushima Dai-ichi and Chernobyl are significant contributors to the overall rate of occurrence of cancer in the general population.

**Comment:** *The experiences from Chernobyl and Fukushima Dai-ichi prove that the current EPZs are unrealistic and should be modified as proposed by the petition.* [083-001, 245-001, 285-002]

**NRC Response:** The NRC disagrees with these comments. Although the comments do not provide specific reasons why the cited accidents support a change to the EPZs, the NRC surmises that the need for protective actions beyond the EPZs is the reason. As discussed in the response to comments 003-001, et al. in section 2.1, the EPZ provides a substantial basis for expansion of protective actions beyond the EPZ should that be necessary.

**Comment:** *After Fukushima, it is unthinkable not to plan evacuation routes. Why are more plants of the same type being built?* [097-001]

**NRC Response:** The NRC agrees with the comment that evacuation routes are necessary around nuclear power plants. Every nuclear power plant is supported by offsite response organization emergency plans. For the NRC to determine there is reasonable assurance of adequate protection of public health and safety at a plant and grant an operating license for that plant, the ORO emergency plans must be approved by FEMA. Evacuation routes must be included in these plans (NUREG-0654, Section J, "Protective Response"). Evacuation routes

and implementation of protective action decisionmaking are evaluated by FEMA during biennial exercises.

The NRC is not aware of any nuclear power plants being built in the United States that are similar to the Fukushima Dai-ichi plants (i.e., boiling water reactors with a Mark I or II containment).

**Comment:** *The ongoing events at Fukushima demonstrate that we should be preparing for disasters.* [183-001]

**NRC Response:** The NRC agrees with this comment. Nuclear power plants are required to have emergency plans for radiological emergencies (10 CFR 50.47 and Appendix E to Part 50). For further discussion of emergency preparedness, see the response to comments 003-001, et al. in section 2.1.

#### Opposition to the arguments in the petition

**Comment:** *Chernobyl should not be used as an example to justify revising emergency planning regulations because the design of the Chernobyl facility is not used in the United States.* [160-003, 164-002, 164-003]

**NRC Response:** The NRC agrees with the comments. The design used at Chernobyl is not used by any nuclear power plant in the United States. The NRC examined the accident at Chernobyl for lessons learned (as documented in NUREG-1251, "Implications of the Accident at Chernobyl for Safety Regulation of Commercial Nuclear Power Plants in the United States," dated April 30, 1989 (ADAMS Accession Nos. ML082030501 and ML082030502)) and found that "no immediate changes are needed in the NRC's regulations regarding the design or operation of U.S. commercial nuclear reactors."

**Comment:** *The petition presents no insights into the Chernobyl accident that should cause the NRC to modify the findings from the Chernobyl Task Force or in NUREG-1251, "Implications of the Accident at Chernobyl for Safety Regulation of Commercial Nuclear Power Plants in the United States."* [196-015]

**NRC Response:** The NRC agrees with this comment. However, the NRC regularly reevaluates its emergency planning regulations and makes changes as needed. See section 2.4 below for further discussion of the NRC's updates to its EP regulations.

## **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 regard 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 from 1997 to 2003 occurred approximately every 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 the postulated health consequences have 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.

#### Opposition to the arguments in the petition

**Comment:** *The current EPZs provide a substantial margin of conservatism. This is supported by Fukushima, State-of-the-Art Reactor Consequence Analyses (SOARCA), and an American Society of Mechanical Engineers (ASME) Task Force report. [165-002, 165-005, 196-005]*

**NRC Response:** The NRC agrees with this comment, as explained in the response to comments 162-002, 060-002, and 063-004 in section 2.2 above.

**Comment:** *The EPZs are pragmatic tools intended to provide dose savings and reduce early severe health effects, and they are still appropriate. [163-003, 190-005, 196-009]*

**NRC Response:** The NRC agrees with this comment, as explained in the response to comments 162-002, 060-002, and 063-004 in section 2.2 above.

**Comment:** *The EPZs are based on a consideration of a full spectrum of postulated accidents and accident consequences. [196-010]*

**NRC Response:** The NRC agrees with this comment, as explained in the response to comments 162-002, 060-002, and 063-004 in section 2.2 above.

**Comment:** *The NRC initiated the SOARCA study to develop best estimates of offsite radiation health consequences for severe accidents. [190-007]*

**NRC Response:** No response is necessary.

**Comment:** *NRC efforts can further reduce the probability of a severe core melt accident. [165-004, 165-007]*

**NRC Response:** The NRC agrees in part with this comment. Section 50.54(hh) of the NRC's regulations requires nuclear power plants to establish a mitigation capability that addresses beyond design basis accidents. This requirement may reduce the probability of core melt and, if implemented as approved, would at least mitigate the consequences of a core melt accident. NRC orders (Order EA-12-049) and other actions in response to the recommendations in the NTTF Report may also have the effect of reducing the probability of core melt accidents. However, the NRC is not aware of any peer-reviewed probabilistic risk analyses for specific plants that document a reduction in core damage probability.

**Comment:** *The petition mischaracterizes the EPZ assumptions, SOARCA, Fukushima spent fuel pool damage, and United States nuclear power plant performance. [196-007, 196-022]*

**NRC Response:** No response is necessary.

**Comment:** *The petition's arguments based on Chernobyl or Fukushima are flawed. [163-002, 196-018, 196-019]*

**NRC Response:** The NRC agrees with this comment, as explained in the response to comments in section 2.1 and 2.2 above.

**Comment:** *The petition provided no new information suggesting the need to change the current planning basis or EPZ size. [190-004]*

**NRC Response:** The NRC agrees with this comment, as explained in the FRN and this document.

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

**Comment:** *Many comments remarked how the NRC recommended that U.S. citizens within 50 miles of Fukushima Dai-ichi evacuate. Five comments highlighted the widespread dispersal of radioactive material from Fukushima along with the call for evacuation of United States citizens within 50 miles. Other comments claimed that the call for evacuation out to 50 miles shows that*

*the current 10-mile EPZ is outdated, inadequate, or unrealistic.* [050-001, 050-006, 051-003, 054-003, 056-003, 057-003, 059-002, 061-003, 063-005, 065-003, 066-003, 067-003, 069-003, 070-003, 071-003, 074-003, 075-004, 076-003, 077-003, 080-003, 082-002, 083-002, 087-003, 088-003, 090-003, 094-003, 095-003, 096-003, 097-003, 098-003, 101-002, 102-003, 103-003, 104-003, 105-003, 107-004, 108-003, 109-006, 110-004, 111-003, 112-003, 113-001, 114-003, 117-004, 119-003, 120-003, 121-002, 124-003, 126-002, 127-006, 128-002, 130-003, 131-002, 133-002, 134-003, 135-002, 136-002, 138-003, 139-004, 143-003, 144-003, 145-003, 146-003, 147-003, 149-003, 150-003, 152-002, 153-003, 154-003, 155-003, 157-003, 159-001, 167-001, 169-002, 171-003, 172-003, 174-003, 177-002, 178-003, 180-003, 181-002, 184-003, 185-003, 188-003, 189-002, 191-003, 192-003, 195-003, 197-003, 198-002, 199-003, 200-003, 202-003, 203-003, 205-002, 206-003, 207-002, 208-003, 212-002, 213-003, 214-003, 216-003, 217-003, 218-005, 219-003, 221-004, 222-003, 227-003, 233-004, 240-002, 241-008, 242-003, 244-004, 245-003, 246-003, 248-003, 252-008, 253-002, 254-003, 255-003, 256-002, 258-002, 259-003, 260-003, 261-003, 264-002, 265-001, 265-003, 267-003, 268-003, 269-002, 287-001, 288-001, 289-001, 290-001]

**NRC Response:** The NRC interprets these comments to mean that the commenters believe that the NRC recommendation after Fukushima Dai-ichi supports the petition's proposed expansion of EPZs in the United States. 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 the then-Chairman of 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 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. These calculations were worst case, hypothetical computer model analyses of consequences of releases from the Fukushima site. The assumptions used in these calculations were discussed in detail in a letter from former NRC Chairman Jaczko to Senator James Webb on June 17, 2011 (ADAMS Accession No. ML11143A033). As a result of these calculations, the lack of information, 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 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 that 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 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.

**Comment:** *After the accidents at Fukushima Dai-ichi and Chernobyl, actual evacuations took place beyond 10 miles.* [003-003, 005-003, 007-003, 009-003, 011-003, 041-003, 137-003, 158-003, 285-004, 162-004, 137-002, 158-002, 285-003]

**NRC Response:** The NRC agrees that actual evacuations beyond 10 miles were determined to be necessary by the appropriate authorities. The NRC's emergency planning framework allows for expansion beyond the emergency planning zones if this should become necessary. The purpose of the emergency planning regulations is to provide dose savings for those individuals who are most at risk in the event of an accident and also to 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 further discussion of how the regulations provide for a comprehensive emergency planning framework, see the response to comments 003-001, et al. in section 2.1.

**Comment:** *The NRC should apply the experience from Fukushima and expand the EPZs in the United States.* [001-001, 085-002, 093-003]

**NRC Response:** The NRC disagrees with this comment and notes that comment 001-001 calls for a larger expansion of the plume exposure pathway EPZ than does the petition. However, comment 001-001 offers no reason for this recommendation. In contrast, the NRC has examined the accident at Fukushima Dai-ichi for lessons learned and established bases for its decisions related to EPZs. As explained in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 (ADAMS Accession No. ML11186A950), senior level NRC managers studied the basis for the current EPZs and did not recommend expansion of the EPZs. As explained in the FRN and this document, the NRC's 50-mile evacuation recommendation was a product of a lack of information, uncertainties about the situation at the site, and a rapidly changing event. Quite the opposite is true in the United States: the NRC has direct access to its licensees' plants and a reliable source of information about each plant's status. In addition, as part of previously-approved research efforts, the NRC plans a long-term action involving EPZs. The NRC staff will use insights from the current full-scope site Level 3 Probabilistic Risk Assessment (PRA) project as well as information obtained from the UNSCEAR assessment to inform the evaluation of the potential impacts that a multi-unit event may have on an EPZ. Because the NRC's role and ability to collect information are much different at its licensees' sites than they were at Fukushima Dai-ichi, the NRC does not agree that the Fukushima Dai-ichi experience justifies expansion of the EPZs.

**Comment:** *One comment highlighted similarities between Fukushima and the Vermont Yankee Nuclear Power Plant (Vermont Yankee) and questioned why, with these similarities and given the 50-mile recommendation after Fukushima, the NRC does not expand EPZs in the United*

States.  
[180-001]

**NRC Response:** The NRC disagrees with this comment. The travel advisory issued by the U.S. Department of State was based on conservative calculations in an environment without clear information about the status or prognosis of an event taking place overseas. As explained in the FRN and this document, these factors would not exist during an emergency at an NRC-licensed plant. Although Vermont Yankee may share some physical similarities with Fukushima Dai-ichi plants, these similarities do not justify expansion of the EPZs.

**Comment:** *There are several major United States cities within 50 miles of reactors with containment designs that are similar to those at Fukushima. Those cities include Chicago, Boston, Philadelphia and Baltimore. Would it be possible to evacuate those cities?* [241-003]

**NRC Response:** Emergency plans for all NRC licensed power plants have been developed, tested, and evaluated as required by regulations. The licensing basis for each of the nuclear power plants near the cities mentioned in the comment does not require an evacuation plan for the nearby listed cities. The comment asks if it is possible to evacuate these large cities. This comment would be better directed at FEMA, the Federal agency responsible for offsite emergency preparedness, as plans may have been developed by large cities to accomplish evacuation. The NRC did study large evacuations, however, in NUREG/CR-6864 and found that large cities have been effectively evacuated. These evacuations include lower Manhattan after the September 11, 2001, terrorist attack and south Florida in response to hurricanes.

#### Opposition to the arguments in the petition

**Comment:** *The NRC order to evacuate the United States citizens within 50 miles of Fukushima has yet to be justified scientifically.* [164-006]

**NRC Response:** The NRC agrees with this comment in part. The basis for the travel advisory was not strictly scientific, but rather precautionary due to a lack of information. The NRC did not issue an “order.”

Following the events at Fukushima Dai-ichi, the U.S. Department of State, in coordination with the then-Chairman of the NRC, the 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 based on the limited information available at that time and the rapidly evolving situation (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 travelers warning and advisories) 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. These calculations were worst case, hypothetical computer model analyses of consequences of releases from the Fukushima site. The assumptions used in these calculations were discussed in detail in a letter from former NRC Chairman Jaczko to Senator James Webb on June 17, 2011. As a result of

these calculations, the lack of information, 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 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 that they should leave.

## **2.4 There has been little change to emergency planning regulations in 30 years**

**Comment:** *Emergency planning in the United States has remained largely static since 1980. These plans are outdated and do not adequately protect the health and safety of the United States citizens.* [186-003]

**NRC Response:** The NRC disagrees with this comment. 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 criteria for the evaluation of utility-prepared emergency plans in situations in which State or local governments decline to participate further in emergency planning (52 FR 42078; November 3, 1987), the requirements for emergency preparedness training activities between biennial full-participation exercises (61 FR 30129; June 14, 1996), and the requirement to consider including potassium iodide as a protective measure for the general public as a supplement to sheltering and evacuation (66 FR 5427; January 19, 2001).

The most recent change was the revision to the emergency preparedness regulations in a final rule, "Enhancements to Emergency Preparedness Regulations," published in the *Federal Register* on November 23, 2011 (76 FR 72560). The areas that were addressed in this amendment included both security-related and non-security-related emergency preparedness issues. A total of 12 regulatory areas were revised: on-shift staffing; emergency action levels for hostile action; emergency response organization (ERO) augmentation and alternate facilities during hostile action; licensee coordination with offsite response organizations during hostile action; protection for onsite personnel; challenging drills and exercises; backup means for alert and notification systems; emergency declaration timeliness; Emergency Operations Facility-performance based approach; evacuation time estimate updating; amended emergency plan change process; and removal of completed one-time requirements. This process took several years to complete and involved numerous public meetings, workshops, and comment periods that involved external stakeholders throughout the process.

In contrast to the statement in the comment that emergency planning regulations have changed little in the last 30 years, the NRC has made numerous revisions to its EP regulatory program during this time period. However, the NRC does not base the need to enhance regulations upon the age of the regulation. The NRC remains open to specific input from stakeholders that identifies inadequate EP regulations. When the NRC staff or stakeholders identify a deficiency

in the regulations that could result in a lack of reasonable assurance of adequate protection of public health and safety, the NRC will consider the need to revise the regulations.

**Comment:** *Four comments characterized the November 2011 revision to emergency planning regulations (76 FR 72560; November 23, 2011) as a relaxation of requirements for drills and evaluations. [125-001, 162-007, 162-008, 204-001]*

**NRC Response:** The NRC disagrees with this comment. The 2011 final rule for enhancements to the emergency preparedness regulations did not relax licensee requirements to conduct drills and exercises. On the contrary, the rulemaking added requirements to licensees' drills and exercises. All nuclear power reactor licensees are required to include a hostile action initiated event during the exercise cycle. The final rule also ensures that exercise scenarios will be sufficiently varied by requiring the use of a wide spectrum of radiological releases and events, to properly train responders to respond to events more realistic than those previously used in training, and to avoid preconditioning the responders to implement actions inappropriate to the level of emergency. Licensees are also required to emphasize coordination in their drills and exercises among onsite and offsite response organizations to strengthen the capabilities of the offsite response organizations to adequately respond to an emergency at the plant that requires offsite response. The final rule clarifies when remedial exercises will be required. For example, if the emergency plan is not satisfactorily tested during the biennial exercise, such that the NRC cannot find, or make a determination of, reasonable assurance that adequate protective measures can be taken in response to an emergency then a remedial exercise is necessary.

During each exercise cycle, licensees are required to vary the content of exercise scenarios to provide emergency response organization (ERO) members the opportunity to demonstrate proficiency in the key skills necessary to respond to several specific scenario elements. This includes hostile action directed at the plant site; no radiological release or an unplanned minimal radiological release that does not require public protective actions; an initial classification of or rapid escalation to a Site Area Emergency or General Emergency; implementation of strategies, procedures, and guidance developed under 10 CFR 50.54(hh)(2); and integration of offsite resources with onsite response.

The final rule language increased the exercise planning cycle from six to eight years to allow more flexibility in varying scenarios while maintaining challenging scenarios.

#### Opposition to the arguments in the petition

**Comment:** *One comment listed several examples of substantive revisions to emergency planning regulations since 1980. [196-013] There have been various modifications to emergency planning regulations and guidance since 1980 including an update to NUREG-0654, numerous Commission papers, Management Directives, and Interim Staff Guidance as well as NRC Advisory Committee meetings. [164-007, 196-006] Two comments discussed relevant modifications to regulations after the terrorist attacks on September 11, 2001. [164-007, 196-006]*

**NRC Response:** The NRC agrees that there have been several substantive revisions to emergency planning regulations since 1980, as described in the response to comment 186-003 in section 2.4. Additional EP guidance, including NSIR/DPR-ISG-01, "Interim Staff Guidance Emergency Planning for Nuclear Power Plants," was published in conjunction with the 2011 EP final rule (December 5, 2011; 76 FR 75771). Four supplements to NUREG-0654/FEMA-REP-1,

Rev. 1, have been issued since 1980 to address specific EP topics. The NRC further notes that the NRC and FEMA are in the early stages of revising NUREG-0654/FEMA-REP-1, Rev. 1, to address various emergency planning and preparedness lessons learned since its initial publication (October 30, 2012; 77 FR 65700).

## ***2.5 Expand EPZs because ad hoc expansion beyond 10 miles will not be adequate***

**Comment:** *A larger EPZ radius is needed because if the winds had shifted after Fukushima then there could have been serious radioactive deposition at distances up to 100 miles away. [152-001] As much as 80 percent of the airborne radiation released at Fukushima blew directly over the Pacific Ocean rather than populated areas, and the NRC cannot rely on favorable wind patterns to protect the American public. [050-007, 051-004, 054-004, 056-004, 057-004, 059-003, 061-004, 063-006, 065-004, 066-004, 067-004, 068-002, 069-004, 070-004, 071-004, 074-004, 075-005, 076-004, 077-004, 080-004, 082-003, 087-004, 088-004, 090-004, 094-004, 095-004, 096-004, 097-004, 098-004, 101-003, 102-004, 103-004, 104-004, 105-004, 107-005, 108-004, 109-007, 110-005, 111-004, 112-004, 114-004, 117-005, 119-004, 120-004, 121-003, 124-004, 126-003, 127-007, 128-003, 130-004, 131-003, 133-003, 134-004, 135-003, 136-003, 138-004, 139-005, 140-002, 143-004, 144-004, 146-004, 147-004, 149-004, 150-004, 153-004, 154-004, 155-004, 157-004, 169-003, 171-004, 172-004, 174-004, 177-003, 178-004, 180-004, 181-003, 184-004, 185-004, 186-006, 188-004, 189-003, 191-004, 192-004, 195-004, 197-004, 198-003, 199-004, 200-004, 202-004, 203-004, 205-003, 206-004, 207-003, 208-004, 212-003, 213-004, 214-004, 216-004, 217-004, 218-006, 219-004, 221-005, 222-004, 227-004, 233-005, 240-003, 241-009, 242-004, 244-005, 245-004, 246-004, 248-004, 252-009, 253-003, 254-004, 255-004, 256-003, 258-003, 259-004, 260-004, 261-004, 264-003, 265-004, 267-004, 268-004, 269-003] A 10-mile evacuation zone on the Texas coast would be worthless because the wind would push the radioactive particles miles away. [116-001]*

**NRC Response:** The NRC agrees in part with the comments. The winds did shift from offshore to onshore and carried a radioactive plume on land to the north of the Fukushima Dai-ichi site.

The NRC disagrees with the comments that the EPZ should be expanded because winds can change direction and carry radioactive materials into and beyond the EPZ. The NRC EP regulations do not rely on favorable wind patterns to protect public health and safety. That is 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 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. 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 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 were anticipated by NRC and FEMA and were already addressed in existing planning and procedures within the NRC and FEMA framework.

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 present a framework for use in 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 response capability 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.

Every nuclear power plant licensee has an approved emergency plan that includes procedures for the necessary interactions with State and local authorities. These emergency plans are drilled and exercised on a regular basis and inspected during a biennial exercise (i.e., every 2 years) and include the integrated response of licensees, State and local responders, and decisionmakers. The licensee is required by 10 CFR 50.47(b)(5) to notify State and local authorities of the emergency status and by 10 CFR 50.47(b)(10) to make protective action recommendations. This requirement includes the need to evacuate areas beyond the EPZ should it be necessary. During biennial exercises, FEMA evaluates the ability of ORO decisionmakers to identify the need for protective actions.

The NRC notes that the requirement for a classification scheme for identification of emergencies in 10 CFR 50.47(b)(4) is anticipatory, which means that emergencies are declared before a radiological release takes place. Licensees must rapidly activate emergency organizations in response to emergency conditions and recommend protective actions in a timely manner. The NRC's regulations at 10 CFR 50.47(b)(9) also require timely assessment of radiological conditions in response to an accident. Additionally, State and local emergency response programs have radiological assessment capabilities independent of licensees' assessment resources. During a nuclear power plant emergency, the NRC expects that radiological assessment information would be obtained by licensees and OROs and made available to the NRC and to State and local response organizations.

The comments do not provide examples of evacuations within the U.S. that were unsuccessful and that would cause the NRC to lose confidence in the ability of State and local authorities to implement protective actions for the public when necessary. The NRC studies show that State and local authorities are quite capable of protecting their citizens.

#### Opposition to the arguments in the petition

**Comment:** *Existing EPZs are large enough to facilitate protective actions over larger areas, if necessary.* [179-003, 190-003, 196-003, 196-011, 196-024]

**NRC Response:** The NRC agrees with this comment. As explained in the FRN and this document, protective actions for the EPZs can be expanded when the circumstances warrant such action.

**Comment:** *Federal policies after September 11<sup>th</sup> and Hurricane Katrina, such as the National Incident Management System and the Incident Command System all-hazards approach, have strengthened the ability to expand the response effort beyond existing EPZs, if necessary.* [165-003, 165-006, 201-003, 201-005, 229-002, 234-002, 276-001, 286-003]

**NRC Response:** The NRC agrees that FEMA has issued the referenced guidance to strengthen emergency response nationwide, as explained in the response to comments 152-001, 050-007, et al. and 116-001 in section 2.5. Additionally, the NRC has noted in studies mentioned above that OROs have robust capability to protect the public through effective evacuation.

**Comment:** *Emergency planning professionals learn from disasters. As a result of the NRC's review of Chernobyl, September 11<sup>th</sup>, and Fukushima, several changes were appropriate and have either already been implemented or are in the process of being implemented.* [163-001]

**NRC Response:** The NRC agrees in part with this comment. Revision to the NRC oversight of nuclear power plant EP has been affected by the September 11, 2001, terrorist events, the 2011 EP final rule (76 FR 72560; November 23, 2011), and the Fukushima Dai-ichi accident (Order EA-12-049). However, no regulatory changes were made in response to Chernobyl. In NUREG-1251, "Implications of the Accident at Chernobyl for Safety Regulation of Commercial Nuclear Power Plants in the United States" the NRC concluded, "No immediate changes are needed in the NRC's regulations regarding the design or operation of U.S. commercial nuclear reactors."

**Comment:** *The petition does not include any mention of the Federal Emergency Management Agency's (FEMA) role in offsite emergency planning guidance and evaluation.* [286-004]

**NRC Response:** The NRC agrees with this comment. The NRC regulates the licensees' onsite emergency planning. FEMA evaluates ORO emergency preparedness capability.

## ***2.6 Expand EPZs because current planning is inadequate for increased populations around many U.S. nuclear power plants***

**Comment:** *Populations living near some of the United States nuclear power plants have increased significantly since the plants were originally licensed, and this is one of the reasons that current evacuation plans are insufficient.* [030-005, 071-001, 072-001, 162-010]

**NRC Response:** The NRC disagrees that current EP planning requirements are inadequate due to increased populations living near nuclear power plants. The comments did not provide any evidence that population is a reason to expand the EPZ. The Commission has previously stated that "[t]hrough its standards and required exercises, the Commission ensures that existing plans are adequate throughout the life of any plant even in the face of changing demographics and other site-related factors" (Denial of Petitions for Rulemaking, PRM-54-02 and PRM-54-03 (71 FR 74852; December 13, 2006)).

In the 2011 EP final rule, the NRC amended 10 CFR 50.47(b)(10) and § IV, "Content of Emergency Plans," of Appendix E to 10 CFR Part 50 to require the periodic review and updating of evacuation time estimates (ETE). The NRC also published guidance (NUREG/CR-7002, "Criteria for Development of Evacuation Time Estimate Studies," dated November 2011 (ADAMS Accession No. ML120320441)) to enhance the quality of ETEs. The population within

EPZs varies broadly from a few thousand to over 270,000 people. However, even sites with large populations can achieve general public evacuation within about 10 hours. The data available from the ETEs 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)
- 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.

**Comment:** *Evacuation travel time estimates rely upon outdated data that significantly underestimates the population growth.* [252-004]

**NRC Response:** The NRC disagrees with this comment. In the 2011 EP final rule for enhancements to the emergency preparedness regulations (76 FR 72560; November 23, 2011), the NRC imposed a requirement that licensees update ETEs after each decennial census and between censuses when the EPZ permanent resident population increases such that it causes ETE values to change by 25 percent or 30 minutes, whichever is less, from the licensee's currently NRC approved or updated ETE (Section IV of Appendix E to 10 CFR Part 50). Additionally, NUREG/CR-7002 states that in the unlikely event that the conditions of an EPZ are changed significantly due to natural phenomena hazards or other reasons, an interim update to the evacuation time estimate is recommended. So, in contrast to the comment, ETEs are based on the most current population data available to licensees.

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

**Comment:** *As the U.S. reactor fleet ages, the risk of an accident increases, and therefore the questions raised in this petition must be considered seriously.* [064-001, 072-005, 215-002] *As reactors age, they are less able to withstand events such as earthquakes.* [048-001, 221-001] *One comment specifically identified Indian Point Energy Center (Indian Point), Diablo Canyon Power Plant (Diablo Canyon), and Vermont Yankee as reactors that are "more antiquated or dangerously sited."* [267-001] *One comment expressed concerns about three aging reactors in New York that are similar to the plants at Fukushima Dai-ichi in some ways.* [206-001]

**NRC Response:** The NRC disagrees that the age of the reactor fleet warrants adopting the amendments proposed in the petition. The commenters did not provide support for their conclusions that aging reactors have a greater risk of an accident. Because the NRC's regulatory framework, as described in the paragraphs that follow, provides reasonable assurance of adequate protection of public health and safety over the lifetime of the reactors, EPZs do not need to be expanded due to the age of the reactors.

Each operating power reactor licensee is required to maintain its facility to ensure that the safety-related functions of preventing and mitigating accidents are not compromised. The

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 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, that could affect the performance of a safety-related function, or that 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 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.

**Comment:** *Some United States reactors are operating beyond their design life. [013-002, 034-001] The NRC rubberstamps renewed licenses to allow continued operation of old, outdated plants. [103-001, 109-004]*

**NRC Response:** The NRC disagrees with these comments. The license renewal regulatory process accounts for the effects of aging and requires that the current licensing basis, which has been shown to provide an adequate level of safety, is maintained and extended into the renewal period. NRC regulations (10 CFR Part 54) require that the license renewal application contain technical information and evaluations about the different types of plant aging that might be encountered in the specific plant and how the licensee will manage or mitigate those aging effects. This information must be sufficiently detailed to permit the NRC staff 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 health and safety of the public. The license renewal regulatory process ensures that SSCs important to safety are monitored for the effects of aging. This regulatory regimen provides reasonable assurance that the plants can be safely operated. This being the case, the age of an operating nuclear plant is not a reason for expecting more frequent or more significant accidents or for expanding the EPZ.

**Comment:** *Fifty percent of U.S. nuclear power plants are literally falling apart at the seams because of the well documented problem with Alloy 600, otherwise known as metal embrittlement. The inspection solution is not sufficient for nuclear power plants because of the risk of depopulating large areas. With the extreme pressures contained within nuclear power plants, any competent engineer can predict that it is not a question of 'if' but 'when' we will have an uncontrollable, catastrophic failure. [199-001]*

**NRC Response:** The NRC disagrees with the comment's implication that EPZs of NRC-licensed U.S. nuclear power plants should be expanded because NRC inspections at nuclear power plants are not sufficient to protect these plants against the consequences of a postulated, uncontrollable, catastrophic failure due to "metal embrittlement." The NRC acknowledges that there have been past events with cracking in reactor coolant pressure boundary (RCPB) components; however, the NRC has requirements and oversight programs in place to ensure that these components are appropriately inspected and that degradation in these components is readily detected and corrected prior to catastrophic component failure, as discussed in the following paragraphs.

The comment expresses concerns with Inconel Alloy 600 and metal embrittlement. The NRC has determined that the comment cites an age-related degradation mechanism that is not applicable to Inconel components (including Alloy 600) in the RCPB of U.S. nuclear power plants and that the comment's arguments pertain to age-related degradation mechanisms for two different types of components in the RCPB. The age-related degradation mechanism that is applicable to Inconel components (including Alloy 600 components) in the RCPB is primary water stress corrosion cracking (PWSCC) and not loss of fracture toughness that is induced by metal embrittlement.

The NRC acknowledges that there has been past operating experience with PWSCC-induced cracking in Inconel components of the RCPB. However, the NRC's regulations include applicable conservative inspection requirements to ensure that Inconel components in the RCPB are appropriately inspected and that degradation in these components is readily detected and corrected prior to a catastrophic component failure. The NRC's inspection requirements for Inconel RCPB components are given in either: Sections (D), (E), and (F) of 10 CFR 50.55a(g)(6)(ii); Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Section XI), Table IWB-2500-1; or the plant Technical Specifications for inspections of Inconel steam generator tubes in PWR facilities.

The inspection requirements in Sections (D), (E), and (F) of 10 CFR 50.55a(g)(6)(ii) were put in place to address prior experience with PWSCC in Inconel components in PWR facilities. The NRC has always mandated inspections of PWR steam generator tubes through implementation of Technical Specification surveillance requirements for these components. Licensees owning BWRs perform inspections of their Inconel RCPB components through implementation of the applicable inspection requirements for these components in ASME Section XI.

Degradation that is detected through implementation of the applicable inspection requirements by a nuclear power plant licensee is required to be entered into the licensee's corrective action program and reported to the NRC in accordance with NRC reporting requirements, such as those in 10 CFR 50.72, 10 CFR 50.73, or the applicable rules. The NRC conducts routine inspections of licensee activities to implement these inspections in order to ensure that the licensee is appropriately monitoring for potential PWSCC-induced degradation that may be occurring in these types of RCPB components and that any detected degradation is being appropriately reported to the NRC and corrected by the licensee.

The NRC would initiate appropriate enforcement actions under its Reactor Oversight Process for any licensee that failed to implement the required inspections of the Inconel RCPB components. Recent reports by U.S. licensees have demonstrated sufficiently to the NRC that the degradation is being detected prior to a catastrophic failure of the components. Therefore, the NRC finds that it has sufficient inspection requirements and oversight processes in place to make sure that any existing PWSCC-induced degradation will be detected in the Inconel RCPB components and corrected prior to a catastrophic failure of the components.

The comment also mentions metal embrittlement as a concern. The NRC's regulations also include requirements for controlling metal embrittlement in RCPB components that are made from either carbon steel or low alloy steel materials (i.e., RCPB components made from ferritic stainless steel materials). The NRC requires nuclear power plant licensees to perform mandatory engineering analyses of ferritic RCPB components in order to demonstrate that the degree of embrittlement in these components is not problematic such that it would become a threat to the structural integrity of the RCPB. In contrast, metal embrittlement is not an issue for Inconel components in the RCPB because they have a much higher threshold for initiation of neutron-irradiation embrittlement and the neutron exposures of these Inconel components are not sufficiently high enough to induce embrittlement of the Inconel materials used to make the components.

The NRC's regulations for performing the engineering analyses of the ferritic RCPB components are given in Appendix G of 10 CFR Part 50 and, for PWR facilities, in 10 CFR 50.61 or 10 CFR 50.61a. Licensees that cannot meet these requirements are required by the regulations to take appropriate corrective actions and to demonstrate to the approval of the NRC that the integrity of the RCPB will be appropriately maintained during plant operations. Licensees that cannot demonstrate adequate fracture toughness of their RCPB components would not be permitted to operate their plants until they could actually demonstrate that the RCPBs would have adequate fracture toughness. The NRC would initiate appropriate enforcement actions for any licensee that failed to comply with the applicable fracture toughness requirements. Therefore, the NRC finds that it has sufficient requirements and oversight processes in place to make sure that ferritic components in the RCPB will have adequate levels of fracture toughness and are protected from the potential consequences of metal embrittlement.

Additional information about these issues is available on the NRC's public Web site under the "Fact Sheets and Brochures" document collection of the NRC Library at

<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/prv.html> (Reactor Pressure Vessel Issues).

## **2.8 Expand EPZs because risk from spent fuel pools is too high**

**Comment:** *The most urgent thing is to get spent fuel rods out of the spent fuel pools.* [086-002]

**NRC Response:** The NRC disagrees with this comment. With respect to nuclear power plants, the most urgent NRC mission is to maintain overall safety in accordance with the NRC's regulations and 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)). With respect to spent fuel pools, the NRC 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 Operations of Nuclear Power Plants. 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).

**Comment:** *The risk of a fire in a spent fuel pool is increasing due to over-stocked, outside-of-containment, top-floor pools. A spent fuel pool fire would contaminate a larger area than the existing EPZs.* [064-002]

**NRC Response:** The NRC agrees in part with this comment. A spent fuel pool fire could potentially contaminate a large area, and the more fuel that is in the pool, the larger the potential source term. Whether the contamination would extend outside the EPZ is dependent upon the accident conditions. However, such accidents are very unlikely (NUREG-1738) and mitigative measures are in place to address the possibility. After the September 11, 2001, terrorist attacks, the NRC issued Orders to plant operators requiring several measures aimed at mitigating the effects of a large fire, explosion, or accident that damages a spent fuel pool. These measures were intended to deal with the aftermath of a terrorist attack or plane crash; however, they would also be effective in responding to natural phenomena such as tornadoes, earthquakes, or tsunamis. These mitigating measures include:

- Controlling the configuration of fuel assemblies in the pool to enhance the ability to keep the fuel cool and recover from damage to the pool
- Establishing emergency spent fuel cooling capability
- Staging emergency response equipment nearby so that it can be deployed quickly

Subsequently, the NRC issued 10 CFR 50.54(hh)(2), which requires licensees to develop and implement guidance and strategies intended to maintain or restore spent fuel pool cooling capabilities. More recently, the NRC issued Orders (Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (ADAMS Accession No. ML12054A682)) to require spent fuel pool instrumentation that could assist operators in identifying a problem in the pool should it develop. These measures have helped reduce even further the already low risk of a fire in a spent fuel pool. See the response to comment 196-021 below for further discussion of the Orders.

**Comment:** *The condition of the spent fuel pools at Fukushima poses a risk to the west coast of the United States.* [030-003]

**NRC Response:** The NRC disagrees with this comment. Since the earthquake and tsunami at Fukushima Dai-ichi in March 2011, there have been no airborne releases of radioactivity from the spent fuel pools at Fukushima Dai-ichi, and the radioactivity levels in the spent fuel have decayed for more than two years, minimizing further the risk from the spent fuel pools. Also, the Tokyo Electric Power Company (TEPCO) has taken several actions to minimize risk from the Fukushima spent fuel pools, including reinforcement of damaged structures ([http://www.tepco.co.jp/en/nu/fukushima-np/images/handouts\\_110730\\_02-e.pdf](http://www.tepco.co.jp/en/nu/fukushima-np/images/handouts_110730_02-e.pdf)) and periodic inspection of the spent fuel for integrity ([http://www.tepco.co.jp/en/nu/fukushima-np/handouts/2013/images/handouts\\_130529\\_10-e.pdf](http://www.tepco.co.jp/en/nu/fukushima-np/handouts/2013/images/handouts_130529_10-e.pdf)).

In the unlikely event of a radiological release from these spent fuel pools, the amount of radioactivity that would reach the west coast of the United States would be small due to dispersion in the atmosphere during transport across the Pacific Ocean. If low levels of airborne radioactivity did reach the west coast, it would be detected by the U.S. Environmental Protection Agency's (EPA) RadNet radiation monitoring network, which continuously checks the air for increased levels of radiation throughout the United States, including the west coast (<http://www.epa.gov/radnet>). This capability allows for prompt protective action recommendations, if warranted.

In February 2013, the United Nation's World Health Organization issued a comprehensive assessment by international experts on health risks associated with the Fukushima accident that concluded that, for the general population inside and outside of Japan, the predicted risks are low and no observable increases in cancer rates above baseline rates are anticipated ([http://www.who.int/mediacentre/news/releases/2013/fukushima\\_report\\_20130228/en/](http://www.who.int/mediacentre/news/releases/2013/fukushima_report_20130228/en/)).

As explained in response to comment 086-002 in section 2.8, the NRC staff completed a spent fuel pool risk study in 2001 (NUREG-1738) 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. 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)).

#### Opposition to the arguments in the petition

**Comment:** *The petition's description of the damage to the Unit 3 spent fuel pool at Fukushima Dai-ichi is inaccurate. Spent fuel pools are robust structures designed to withstand severe*

*external events. The zirconium fire scenario has been studied extensively by the NRC for decades. The NRC has consistently concluded that the risk of such fires is extremely low. The NRC issued an order to further ensure that reliable spent fuel pool water level indications can be identified by trained personnel. [196-021]*

**NRC Response:** The NRC agrees with this comment. As an example of the “real-world experience” of spent fuel pool accidents, page 28 of the petition refers to a video uploaded to YouTube on October 18, 2011, that shows an underwater camera inspection by TEPCO. The petitioner speculated that the spent fuel pool at Fukushima Dai-ichi Unit 3 was essentially destroyed by the explosion of the Unit’s reactor building, based on the video not showing intact fuel rods. Since the posting of that video, TEPCO has performed additional investigations and has confirmed that the spent fuel in the Fukushima Dai-ichi Unit 3 spent fuel pool remains intact and within the racks, as far as what could be seen by the underwater camera. See images from an underwater camera taken on October 11 and 12, 2012, as discussed in a TEPCO press conference on October 15, 2012. A handout from the press conference including the images is available at [http://www.tepco.co.jp/en/nu/fukushima-np/images/handouts\\_121015\\_01-e.pdf](http://www.tepco.co.jp/en/nu/fukushima-np/images/handouts_121015_01-e.pdf).

During the events at Fukushima Dai-ichi, responders did not have reliable instrumentation to determine the water levels in the spent fuel pools. This caused concerns that 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 respond to the event. 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. The lack of information on the condition of spent fuel pools contributed to a poor understanding of possible radiation releases and adversely impacted effective prioritization of emergency response actions by decisionmakers.

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.

The NRC issued Order EA-12-051, “Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” 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.

As explained in response to an earlier comment in this section 2.8, the NRC staff completed a spent fuel pool risk study in 2001 (NUREG-1738) 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.

## **2.9 Emergency planning regulations must be strengthened because there are significant concerns related to pressure suppression containments**

**Comment:** *Several commenters noted that Mark I containments, which are used at Fukushima Dai-ichi Units 1 – 5, are also used at reactors in the United States [045-003, 050-002, 162-001]. Another commenter argued that the Mark I containment is a flawed design, the problem of overpressure in the torus must be addressed, and valves to allow manual release of pressure are not sufficient. [241-002]*

**NRC Response:** The NRC agrees that there were lessons to be learned from the accident at Fukushima Dai-ichi related to pressure suppression containments. These lessons and NRC follow-up actions are summarized below.

The events at Fukushima Dai-ichi highlight the possibility that extreme natural phenomena could challenge the defense-in-depth layers for accident prevention, mitigation, and emergency preparedness. At Fukushima Dai-ichi, a variety of challenges significantly hindered attempts by the responders to preclude core damage and containment failure. The operators were unable to successfully operate the containment venting system early in the event. The inability to reduce containment pressure inhibited efforts to cool the reactor core. If additional backup or alternate sources of power had been available to operate the containment venting system remotely, or if certain valves had been more accessible for manual operation, the operators at Fukushima Dai-ichi may have been able to depressurize the containment earlier. This, in turn, could have allowed operators to implement strategies using low-pressure water sources that may have limited or prevented damage to the reactor core. Thus, the events at Fukushima Dai-ichi demonstrate that reliable hardened vents at BWR facilities with Mark I and Mark II containment designs are important to maintain core and containment cooling.

Based on these lessons learned, the NRC issued Order EA-13-109, “Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions,” dated June 6, 2013 (ADAMS Accession No. ML13143A334), which required all BWR licensees with Mark I and Mark II containment designs to have a reliable, severe accident capable hardened vent to assist in the removal of decay heat and maintain control of containment pressure within acceptable limits following an event that results in the loss of active containment heat removal capability such as an extended loss of electrical power. The hardened vent system must be accessible and functional under a range of plant conditions, including severe accident conditions, extended loss of electrical power, and inadequate containment cooling. As noted in the Order, full implementation must be completed no later than startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first.

## **2.10 Expand EPZs because expansion is supported by the current improved understanding of the health effects of radiation**

**Comment:** *Improved understanding of the health effects of radiation supports expanding the EPZs. Many of the comments on this topic area referred to the National Academies Biological Effects of Ionizing Radiation (BEIR) VII report. [003-002, 005-002, 007-002, 009-002, 011-002, 024-002, 029-002, 036-001, 037-002, 041-002, 042-004, 044-002, 049-002, 050-008, 051-005,*

054-005, 056-005, 057-005, 059-001, 060-003, 061-005, 063-007, 065-005, 066-005, 067-005, 068-003, 069-002, 069-005, 070-005, 071-005, 074-005, 075-006, 076-005, 077-005, 080-005, 082-004, 085-003, 087-005, 088-005, 090-005, 093-004, 094-005, 095-005, 096-005, 097-005, 098-005, 101-004, 102-005, 103-005, 104-005, 105-005, 107-006, 108-005, 109-008, 110-006, 111-005, 114-005, 117-006, 119-005, 120-005, 124-005, 126-004, 127-008, 128-004, 130-005, 131-004, 133-004, 134-005, 135-004, 136-004, 138-005, 139-006, 143-005, 144-005, 145-002, 146-005, 147-005, 149-005, 150-005, 153-005, 154-005, 155-005, 156-003, 157-005, 171-005, 172-005, 174-005, 176-002, 177-004, 178-005, 180-005, 181-004, 184-005, 185-005, 186-007, 188-005, 189-004, 191-005, 192-005, 194-002, 195-005, 197-005, 198-004, 199-005, 200-005, 202-005, 203-005, 206-005, 207-004, 208-005, 212-004, 213-005, 214-005, 216-005, 217-005, 218-002, 218-007, 219-005, 221-006, 222-005, 227-005, 233-006, 241-010, 242-005, 244-002, 245-005, 246-005, 248-005, 252-006, 253-004, 254-005, 255-005, 256-004, 258-004, 259-005, 260-005, 261-005, 262-004, 264-004, 265-005, 267-005, 268-005, 269-004]

**NRC Response:** 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 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, non-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 UNSCEAR, and the National Council on Radiation Protection and Measurements report.

The ICRP published its revised recommendations in ICRP Publication 103, “The 2007 Recommendations of the International Commission on Radiological Protection,” in December 2007. The ICRP 2007 recommendations provided updated quantities used in dose assessment, such as radiation and tissue weighting factors, and also updated the radiation detriment (total harmful effects of exposure to radiation), based on the latest available scientific information of the biology and physics of radiation exposure. As discussed in SECY-12-0064, “Recommendations for Policy and Technical Direction to Revise Radiation Protection Regulations and Guidance,” and the associated staff requirements memorandum dated December 17, 2012, SRM-SECY-12-0064 (ADAMS Accession No. ML12352A133), the NRC is undergoing rulemaking to amend its radiation protection regulations in light of the ICRP 2007 recommendations.

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 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 NRC has more recent data on reactor accident consequences and risk in the SOARCA study, has completed a spent fuel pool accident consequence study, and has embarked on a full-scope site Level 3 PRA project. 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.

## ***2.11 Expand EPZs because radiation does not stop at an EPZ boundary***

**Comment:** *The radioactive contamination and the wind that carries it do not observe boundaries or evacuation borders. [100-002] Specifically, the contamination from the Fukushima Dai-ichi accident was not limited to 10 miles [109-002], and airborne radiation plumes from past releases including Chelyabinsk, Seversk, Chernobyl, and Three Mile Island have not stopped 10 miles from the reactor site. [137-019]*

**NRC Response:** 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 comments 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 has also been discussed previously in sections 2.1, 2.2, 2.5, and 2.6. 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 the process it outlines would support ORO efforts to implement protective actions beyond the plume exposure pathway EPZ if conditions warranted them.

## ***2.12 Expand EPZs because current regulations do not provide adequate protection. Amending the regulations as requested in the petition would more likely provide adequate protection***

**Comment:** *The current emergency planning regulations do not provide adequate protection and are outdated. [004-001, 048-002, 060-001, 063-001, 085-001, 093-002, 100-003, 132-001, 137-007, 137-014, 138-001, 158-007, 158-013, 162-011, 185-001, 220-002, 233-001, 243-001, 244-001, 252-005, 262-001, 262-002, 285-008, 285-014] One of the lessons that should be learned from Fukushima is that the NRC's current emergency planning regulations are inadequate. [040-002, 117-001, 145-001, 172-001]*

**NRC Response:** The NRC disagrees with the comments that current emergency preparedness regulations do not provide adequate protection. On December 13, 1991 (56 FR 64966), the Commission stated that “through its standards and required exercises, the Commission ensures that existing plans are adequate throughout the life of a plant even in the face of changing demographics and other site related factors.” The current regulations in 10 CFR 50.47 require that a finding be made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency before an initial operating license is issued. These measures are required to be outlined in each site’s radiological emergency plan. The site-specific emergency plans must meet the 16 planning standards listed in 10 CFR 50.47(b). Additionally, a holder of a nuclear power reactor operating license under 10 CFR 50.54(q) is required to follow and maintain the effectiveness of an emergency plan that meets the standards in 10 CFR 50.47(b) and the requirements in Appendix E to 10 CFR Part 50. All U.S. nuclear power plants currently have NRC-approved emergency plans that include EPZs in compliance with the regulations in 10 CFR 50.47 and Appendix E to 10 CFR Part 50.

The FEMA approves offsite emergency response plans and evaluates the capability of State and local agencies to implement their plans in a biennial demonstration exercise. The ORO’s evacuation planning and protective action decisionmaking are major components of the FEMA evaluation and are addressed in every biennial exercise. Any finding of deficiency must be addressed by the responsible agency in order to maintain the FEMA finding that there is adequate protection of public health and safety.

The comments provide no substantial information that support the 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 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 section 2.2, 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, the NRC plans a long-term action involving EPZs. The NRC staff will use insights from the current full-scope site Level 3 PRA project as well as information obtained from the UNSCEAR assessment to inform the evaluation of the potential impacts that a multi-unit event may have on an EPZ. If these research activities indicate that changes need to be made to the existing EP regulations, the NRC will commence a rulemaking effort to make those changes.

**Comment:** *While Japan and Germany are closing their nuclear power plants, the United States continues building new ones despite having outdated and inadequate emergency planning regulations.* [109-003]

**NRC Response:** The NRC disagrees in part with the comment. While other countries may be taking various action with respect to nuclear power plants, the NRC mission flows from the Atomic Energy Act of 1954, as amended (AEA). The AEA is the fundamental U.S. law on the civilian uses of nuclear materials. It provides for both the development and the regulation of the uses of nuclear materials and facilities in the United States, declaring the policy that “the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise.” The AEA requires that civilian uses of nuclear materials and facilities be licensed, and it empowers the NRC to establish by rule or Order, and to enforce, such standards to govern these uses as “the Commission may deem necessary or desirable in order to protect health and safety and minimize danger to life or property.”

The NRC disagrees that the EP regulations are outdated and inadequate, as explained in the FRN and throughout this document. However, if the commenter has specific input regarding what regulations are inadequate and why, the NRC would review the specific information and revise regulations if necessary.

**Comment:** *The NTF report concluded that although there was no imminent risk, enhancements to emergency preparedness were warranted.* [162-006]

**NRC Response:** The NRC agrees with this comment. The NRC is pursuing enhancements to emergency preparedness regulations. By letter dated March 12, 2012 (ADAMS Accession No. ML12056A046), the NRC issued a request for information pursuant to 10 CFR 50.54(f). The request was issued as a part of implementing lessons learned from the accident at Fukushima Dai-ichi. Enclosure 5 to the letter contained specific requested information associated with NRC’s NTF Recommendation 9.3 for emergency preparedness communications. Specifically, the letter requested that licensees provide an assessment of the current communications systems and equipment used during an emergency event and to determine if additional regulatory action is warranted regarding the staff required to fill all necessary positions to respond to a multi-unit event.

The licensees’ responses are being evaluated to determine the need for regulatory action. Additional items are being considered in the longer term in accordance with the NTF Report.

**Comment:** *Shadow evacuations occurred after the accidents at Fukushima and Three Mile Island and would be a problem for any future evacuation.* [003-004, 005-004, 007-004, 009-004, 011-004, 041-004, 123-004, 137-016, 202-001]

**NRC Response:** The NRC agrees that shadow evacuations may occur and should be appropriately considered. The NRC’s guidance document for preparing evacuation time

estimate studies establishes the need to include a 20 percent shadow evacuation in the analysis (NUREG/CR-7002 “Criteria for Development of Evacuation Time Estimate Studies”). The NRC defines a shadow evacuation as an evacuation of people from areas outside 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. Twenty 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>2</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.

**Comment:** *Some commenters stated that geography, roadways, bridges, traffic patterns, and other site-specific features would make evacuation in an emergency difficult or impossible.* [030-004, 030-007, 072-002, 095-001, 115-001, 120-001, 130-001, 137-018, 137-021, 137-023, 159-003, 170-001, 176-006, 176-007, 182-003, 192-001, 214-001, 253-008, 262-003, 287-003, 288-003, 289-003, 290-003]

**NRC Response:** 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 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)

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<sup>2</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.

- 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)

**Comment:** *There should be a ban on nuclear facilities in densely populated urban areas such as New York City because the area cannot be reliably evacuated. [012-002] Two comments expressed concerns with Indian Point including earthquake risk and concluded that the evacuation plans are inadequate. [186-004, 252-012]*

**NRC Response:** The NRC disagrees with the comments that the Indian Point EPZ cannot be reliably evacuated. Please see the response to the previous comment. The Indian Point ETE indicates that evacuation can be accomplished in a reasonable time given the likely timing of a release (see the response to comments 162-002, 060-002, and 063-004 in section 2.2 above). It should be noted that two of the evacuations above took place in New York City and are generally viewed as successful.

**Comment:** *Under average wind conditions, a radiation plume from Turkey Point would travel beyond the 10-mile EPZ in an hour, but a decision to notify the public would take 70 minutes. [137-017, 137-022]*

**NRC Response:** The NRC agrees in part with the comment.

The criteria required for emergency classification schemes in 10 CFR 50.47(b)(4) are anticipatory, i.e., they require declaration of a General Emergency well before core damage or release. Protective actions are expected at a General Emergency to begin evacuation before a radiological release begins.

It is possible, but highly unlikely, that an immediate release could occur. In this case, Supplement 3 to NUREG-0654 provides guidance for sheltering in place versus evacuation in order to limit exposure. Exposure is a time dependent measure. The fact that a plume front reaches a spot only means the exposure begins. The full dose is time dependent. Even if a plume front reaches a location, evacuation may remain the best protective action to reduce dose as it would limit exposure time.

As required by 10 CFR 50.47(b)(5), licensees must notify offsite authorities within 15 minutes of an emergency. Appendix E to 10 CFR Part 50, Section IV.D, requires the capability to warn the public within 15 minutes. While protective action decisionmaking may require additional time, 70 minutes from declaration of a General Emergency to public warning is longer than expected.

#### Opposition to the arguments in the petition

**Comment:** *Chernobyl and September 11<sup>th</sup> do not show that the current 10- and 50-mile EPZs are inadequate. [196-014] The events at Fukushima do not show that the current 10- and 50-mile EPZs are inadequate. [196-017]*

**NRC Response:** The NRC agrees with this comment. The 2011 EP final rule enhanced EP regulations, but expansion of the EPZ was not found to be a necessary enhancement.

As noted above in response to comments 160-003, 164-002, and 164-003 in section 2.1 and comment 163-001 in section 2.5, the NRC reviewed the Chernobyl accident and the September 11, 2001, events and found that there were no necessary regulatory enhancements for U.S. nuclear power plant EPZs.

As explained in the response to comments in section 2.1, 2.2, 2.3, and 2.5 above, the NRC has determined that the current information related to the event at Fukushima Dai-ichi does not provide a basis to recommend a change to the size of the EPZs. However, further study is warranted and the staff plans a longer-term action that is already being evaluated by existing activities. The staff will use insights from the current Level 3 PRA study as well as information obtained from the UNSCEAR assessment to inform the evaluation of the potential impacts that a multi-unit event may have on the EPZ.

**Comment:** *The existing basis in NUREG-0396 is still valid and provides a basis for expansion, if necessary. [286-001] The existing EPZs are based on conservative analysis of a wide range of accident consequences and continue to provide assurance that adequate protective measures can and will be taken in the event of an emergency. [179-002, 190-002, 196-002, 196-008, 196-023]*

**NRC Response:** The NRC agrees that the technical basis for the EPZ remains valid, as explained in the response to comments 162-002, 060-002, and 063-004 in section 2.2 and 152-001, 050-007, et al. and 116-001 in section 2.5.

### ***2.13 Require EP exercises to include a regionally-relevant initiating or concurrent natural disaster because natural disasters can challenge nuclear safety systems***

**Comment:** *Natural disasters can challenge nuclear safety systems. [137-010, 158-010, 162-009, 285-011] The Fukushima Dai-ichi nuclear accident demonstrated that natural disasters can initiate severe nuclear accidents. [137-008, 158-008, 285-009]*

**NRC Response:** The NRC agrees with these comments. The emergency classification scheme required by NRC in 10 CFR 50.47(b)(4) includes criteria for natural events such as flood, earthquake, and wind, in recognition that plant systems can be challenged by these events. Further, each nuclear power plant is designed to withstand natural events such as earthquakes, hurricane winds, and floods.

On March 12, 2012, the NRC issued to all nuclear power plant licensees a 50.54(f) letter requesting that they reevaluate the seismic and flooding hazards at their sites using updated seismic and flooding hazard information and current regulatory guidance and methodologies. Based upon the results of the evaluations, the NRC will determine whether additional regulatory actions are necessary.

As described in the response to comments 003-001, et al. in section 2.1 above, the NTF conducted a systematic and methodical review of the NRC regulations and processes to determine if the agency should make safety improvements in light of the events in Japan. As a result of this review, the NTF issued SECY-11-0093. 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, provide a 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.

**Comment:** *Current NRC regulations do not require that emergency exercises take into consideration an initiating or concurrent natural disaster that might further complicate accidents and subsequent evacuation efforts. Both Fukushima and Hurricane Katrina demonstrated the difficulties associated with evacuating when a natural disaster strikes that causes roadways to wash out.* [042-006, 050-010, 051-007, 054-007, 056-007, 057-007, 060-005, 061-007, 063-002, 065-007, 066-007, 067-007, 069-007, 070-007, 071-007, 074-007, 075-008, 076-007, 077-007, 080-007, 082-006, 085-005, 087-007, 088-007, 090-007, 093-006, 094-007, 095-007, 096-007, 097-007, 098-007, 099-002, 101-006, 102-007, 103-007, 104-007, 105-007, 107-008, 108-007, 109-010, 110-008, 111-007, 112-006, 113-002, 114-007, 117-008, 119-007, 120-007, 121-004, 124-007, 126-006, 127-010, 128-006, 130-007, 131-006, 133-006, 134-007, 135-006, 136-006, 137-011, 138-007, 139-008, 142-002, 143-007, 144-007, 146-007, 147-007, 148-001, 149-007, 150-007, 153-007, 154-007, 155-007, 157-007, 158-011, 169-005, 171-007, 172-007, 173-003, 174-007, 176-004, 177-006, 178-007, 180-007, 181-006, 184-007, 185-007, 185-008, 186-009, 188-007, 189-006, 191-007, 192-007, 195-007, 197-007, 198-006, 199-007, 200-007, 202-007, 203-007, 206-007, 207-006, 208-007, 212-006, 213-007, 214-007, 216-007, 217-007, 218-009, 219-007, 221-008, 222-007, 227-007, 233-008, 240-005, 240-006, 241-012, 242-007, 244-007, 245-007, 246-007, 248-007, 252-011, 253-006, 254-007, 255-007, 256-006, 258-006,

259-007, 260-007, 261-007, 262-006, 264-006, 265-007, 266-002, 267-007, 268-007, 285-012] *Weather patterns are growing more extreme and dangerous. In 2011, there were several examples where severe weather caused damage to nuclear reactors in the United States. Therefore, emergency preparedness drills should include regionally appropriate natural disasters.* [042-007, 050-011, 051-008, 054-008, 056-008, 057-008, 061-008, 063-003, 065-008, 066-008, 067-008, 068-004, 069-008, 070-008, 071-008, 073-002, 074-008, 075-009, 076-008, 077-008, 080-008, 082-007, 084-002, 085-006, 087-008, 088-008, 090-008, 094-008, 095-008, 096-008, 097-008, 098-008, 099-003, 101-007, 102-008, 103-008, 104-008, 105-008, 107-009, 108-008, 109-012, 110-009, 111-008, 112-007, 114-008, 117-009, 119-008, 120-008, 124-008, 126-007, 127-011, 128-007, 130-008, 131-007, 133-007, 134-008, 135-007, 136-007, 138-008, 139-009, 143-008, 144-008, 145-006, 146-008, 147-008, 148-002, 149-008, 150-008, 153-008, 154-008, 155-008, 156-002, 157-008, 171-008, 172-008, 173-004, 174-008, 176-005, 177-007, 178-008, 180-008, 181-007, 184-008, 186-010, 188-008, 189-007, 191-008, 192-008, 195-008, 197-008, 198-007, 199-008, 200-008, 202-008, 203-008, 206-008, 207-007, 208-008, 212-007, 213-008, 214-008, 216-008, 217-008, 218-010, 219-008, 221-009, 222-008, 227-008, 233-009, 241-013, 242-008, 244-008, 245-008, 246-008, 248-008, 252-013, 253-007, 254-008, 255-008, 256-007, 258-007, 259-008, 260-008, 261-008, 262-007, 264-007, 265-008, 266-003, 267-008, 268-008, 269-006]

**NRC Response:** The NRC agrees in part with these comments. All NRC-licensed sites in the United States have emergency action levels (EAL) in their radiological emergency plans that address response to natural events. These EALs are contained in the site emergency plan and allow the licensee to make informed decisions to implement pre-planned emergency response measures in a timely manner. This allows the licensee to be forward-looking during an event and provide timely protective action recommendations to protect public health and safety.

The emergency classification scheme required by the NRC in 10 CFR 50.47(b)(4) includes criteria for natural events, such as flood, earthquake, and wind, in recognition that plant systems can be challenged by these events. Further, each nuclear power plant is designed to withstand natural events such as earthquakes, hurricane winds, and floods. The majority of nuclear power plants currently incorporate natural disasters into their drill and exercise scenarios that allow them to prepare for natural disasters that could coincide with a reactor emergency. However, current activities being undertaken by the NRC staff for the NTTF recommendations resulting from the Fukushima Dai-ichi event are addressing the issue of additional requirements, including drills, for beyond-design-basis events such as a beyond design basis external event. The proposed requirements to perform a drill for an event that originates from a beyond-design-basis external event and leads to a multi-unit prolonged station blackout would involve licensees planning, preparing, and practicing for these unlikely natural events. In addition, the staff is coordinating the demonstration of a drill with other NTTF recommendations such as mitigation strategies (NTTF Recommendation 4) and the enhancement of onsite emergency response procedures (NTTF Recommendation 8).

**Comment:** *The August 2011 mid-Atlantic earthquake resulted in a ground speed motion double that which the nearby North Anna nuclear complex was designed to withstand and caused a loss of offsite power.* [137-009, 158-009, 285-010]

**NRC Response:** The NRC agrees with this comment and notes that the North Anna Power Station shut down as designed when it lost electricity from the grid following the earthquake. The NRC evaluated the licensee's response and restart readiness determination plan and also performed confirmatory inspections and a technical evaluation. The NRC staff concluded that the licensee had acceptably demonstrated that no functional damage had occurred to those

features necessary for continued operation and that the plant could be operated without undue risk to the health and safety of the public. For more information, see the letter from the NRC to Virginia Electric and Power Company dated November 11, 2011 (ADAMS Accession No. ML11308B405).

**Comment:** *Emergency preparedness drills and exercises should consider the possibility of a terrorist attack.* [109-013]

**NRC Response:** The NRC agrees with this comment and notes that one of the requirements in the 2011 EP final rule is that licensees must include hostile action-based exercises routinely in the exercise planning cycle. A hostile action-based exercise is an EP exercise in which the scenario used includes significant damage created by malicious intention and that requires immediate mitigation to prevent core damage or mitigate core damage and/or protect containment. Additionally, licensees must identify and describe in their site emergency plan the assistance expected from appropriate State, local, and Federal agencies with responsibilities for coping with emergencies, including hostile action at the site.

The NRC also required in the 2011 EP final rule that nuclear power plant licensees:

- Establish onsite protective action procedures specific to hostile action events
- Establish alternative facilities for the emergency response organization to assemble should the site not be accessible
- Include hostile action criteria for emergency declaration

**Comment:** *The scheduling of drills should be random and suddenly announced because real-life accidents come by surprise.* [185-002]

**NRC Response:** The NRC agrees in part with the comment. However, full scope biennial exercises are not fully unannounced due to logistics and respect for first responders. These exercises require the participation of offsite response organizations and involve first responders whose duties include protection of the public from all manner of threats (i.e., fire, crime, etc). Some first responders are volunteers. These individuals and their agencies are committed to respond to emergencies immediately should that be necessary. However, it would be disruptive to public safety and the livelihood of volunteers to require such response to routine exercises conducted for evaluation by federal agencies.

However, where only the licensee is involved, such as in routine drills that occur between biennial exercises, the NRC expectation as contained in NSIR/DRP-ISG-01, dated November 20, 2011 (ADAMS Accession No. ML113010523), is for unannounced drills. These drills involve real time staffing of facilities after normal work hours and are expected as part of a program to maintain key skills of the response organization. The NRC also maintains an internal unannounced drill program for agency responders.

#### Opposition to the arguments in the petition

**Comment:** *One comment described the performance of the United States nuclear power plants in response to several severe natural events in 2011. The comment stated that all of the affected units were able to power emergency systems and shut down safely.* [196-020]

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

**Comment:** *Many nuclear power plant licensees already incorporate natural disasters into their drills. [160-004, 164-021, 286-006]*

**NRC Response:** The NRC agrees with this comment. The majority of nuclear power plant licensees currently incorporate natural or destructive phenomena into their drill and exercise scenarios. This planning helps licensees prepare for natural disasters that could coincide with a 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"). 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 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 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**

**Comment:** *The petition should be denied because the proposed changes to the regulations are not cost beneficial.* [160-001, 166-012, 274-002, 282-001, 286-002]

**NRC Response:** The NRC disagrees with the comments' implication that the only regulatory changes the NRC should make are those changes that are cost beneficial. The NRC is precluded from considering the costs of a proposed change if the change is necessary to ensure adequate protection of public health and safety and is in accord with the common defense and security. The NRC can consider the costs when there are two or more ways to achieve adequate protection or the proposed change would provide a level of protection beyond adequate protection. See 10 CFR 50.109 and *Union of Concerned Scientists v. U.S. Nuclear Regulatory Commission*, 824 F.2d 108 (D.C. Circuit 1987). In this case, the NRC is denying the petition for the reasons stated in the FRN. None of the reasons for the denial relates to the costs of the proposed amendments in the petition, and the NRC did not reach the point of considering the costs of the proposed changes in the petition.

**Comment:** *Several comments questioned the statement in the petition that the expansion of the EPZ from 10 miles to 25 miles would provide no new requirements other than expansion of the EPZ. The comments stated that there would be a significant financial burden on State and local governments and that this impact should be carefully considered when evaluating the petition.* [164-017, 166-001, 286-005] *Specific examples of costs that would be incurred by State and local governments if the 10-mile EPZ were expanded to 25 miles include costs associated with relocating reception centers and shelters, expanding the siren system, additional manpower and training, purchasing additional radiation portal monitors, and reviewing and updating evacuation time estimates.* [164-014, 166-002, 166-003, 166-004, 166-005, 166-006, 166-007, 166-008, 166-009, 166-010, 166-011, 275-002]

**NRC Response:** The NRC agrees that the economic impacts of proposed regulations can be considered in the rulemaking process. The NRC's rulemaking procedures require the preparation of a regulatory analysis that assesses the costs and benefits of a proposed change. Because the NRC is denying the petition, the changes proposed in the petition will not be considered in a rulemaking, so the NRC will not prepare a regulatory analysis of the proposed changes' costs and benefits.

**Comment:** *Although the petition suggests that expanding the EPZs would reduce risk, it may actually increase risk, exacerbate costs, and disrupt communities.* [163-004]

**NRC Response:** The NRC agrees with the comment. A sensitivity analysis in State-of-the-Art Reactor Consequence Analyses (SOARCA) Report, (NUREG-1935) estimated that risk to the public close to the plant would increase if evacuation areas were expanded and concurrently evacuated. Evacuation of people not at risk would increase their risk due to various factors such as stress, traffic accidents, and relocation. Additionally, the evacuation of special needs facilities, e.g., hospitals, would put those patients at risk of injury due to evacuation stress for an evacuation that may not be necessary.

## **2.16 Sheltering in place is not a viable alternative to evacuation planning**

**Comment:** *Sheltering in place is not a viable alternative to evacuation planning. Both FEMA and the NRC have stated that sheltering in place is not as effective in reducing the risk to the public as evacuation. [252-002]*

**NRC Response:** The NRC disagrees in part with this comment because sheltering in place is a viable alternative to evacuation in some circumstances. Sheltering in place can be more effective in the unlikely event of a rapidly developing radiological release. Additionally, sheltering may be necessary if weather events make evacuation impractical. However, evacuation is the preferred protective strategy when the PAGs are expected to be exceeded, if it reduces exposure and can be carried out effectively. Supplement 3 to NUREG-0654 provides guidance for protective action strategies, including sheltering. Additional information about sheltering in place is available on the NRC's public Web site under the "Fact Sheets and Brochures" document collection of the NRC Library at <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-emerg-plan-prep-nuc-power.html> (Evacuation, Sheltering, and the Use of Potassium Iodide).

### Opposing argument on this issue

**Comment:** *Evacuation is not always the safest protective action. For example, there may be significant risks and challenges in evacuating those under direct medical care. [160-002]*

**NRC Response:** The NRC agrees with this comment. Please see the response to the previous comment. Hospitals, prisons, and other large buildings provide more protection than normal housing stock, and sheltering in place may be more protective than evacuation. See the additional information about evacuations on the NRC's public Web site under the "Fact Sheets and Brochures" document collection of the NRC Library at <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-emerg-plan-prep-nuc-power.html> (Evacuation, Sheltering, and the Use of Potassium Iodide).

### **3. Issues Outside the Scope of the Petition for Rulemaking**

#### ***3.1 I do not support nuclear power. I prefer shutting down or phasing out nuclear power plants***

**Comment:** *Many comments expressed opposition to nuclear power. The comments proposed that operating nuclear power plants in the United States should either be shut down or phased out over time.* [003-005, 005-005, 007-005, 008-001, 009-005, 010-001, 013-001, 013-003, 013-004, 016-001, 021-001, 022-002, 027-001, 030-009, 032-001, 035-002, 036-004, 041-005, 042-001, 042-002, 044-004, 045-002, 045-004, 045-006, 047-003, 049-001, 049-004, 050-003, 053-001, 055-001, 061-001, 066-001, 067-001, 076-001, 077-001, 078-002, 079-001, 081-001, 083-004, 086-003, 087-001, 089-001, 089-003, 090-001, 092-002, 098-001, 104-001, 108-001, 109-001, 109-011, 110-002, 111-001, 115-002, 117-002, 127-001, 127-002, 127-003, 127-004, 135-009, 139-002, 140-004, 143-001, 144-001, 145-008, 150-001, 154-001, 159-002, 159-005, 159-007, 171-001, 178-001, 182-002, 184-001, 188-001, 197-001, 203-001, 208-001, 210-001, 215-003, 216-001, 217-001, 218-003, 219-001, 220-001, 222-001, 233-002, 242-001, 250-003, 250-004, 255-001, 257-002, 259-001, 260-001, 261-001, 264-009, 266-001, 270-001, 285-001, 287-002, 287-005, 287-007, 288-002, 288-005, 288-007, 289-002, 289-005, 289-007, 290-002, 290-005, 290-007]

**NRC Response:** These comments are out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones, not a decision on revoking existing licenses. The NRC regulates the civilian use of nuclear materials, including nuclear power plants. The NRC does not determine whether reactors are to be operated in the United States; rather, its mission is to ensure that, if reactors are to be operated in the United States, they comply with NRC requirements in a manner that protects public health and safety.

#### ***3.2 I prefer other sources of energy over nuclear power***

**Comment:** *There are better alternatives to nuclear power including solar, wind, geothermal, tidal, hydroelectric, natural gas, or coal.* [042-003, 050-004, 070-001, 089-002, 092-001, 107-002, 151-002, 211-001, 227-001, 246-001, 251-001]

**NRC Response:** These comments are out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones. The NRC takes no position on these comments. The NRC does not advocate for any particular project or type of energy development. The NRC regulates the civilian use of nuclear materials, including nuclear power plants. Other forms of energy generation such as solar, wind, geothermal, tidal, hydroelectric, natural gas, or coal are not regulated by the NRC.

#### ***3.3 Comments with general criticisms of the NRC or Federal government***

**Comment:** *Some comments expressed general criticisms of the NRC or Federal government including, for example, a belief that the NRC places the interests of the nuclear industry ahead of the general public.* [020-001, 023-001, 028-001, 029-003, 049-003, 056-001, 057-001, 072-004, 094-001, 096-001, 106-001, 123-001, 123-005, 124-001, 139-001, 151-001, 167-002, 174-001, 175-001, 183-002, 213-001, 236-001, 250-001, 257-003, 268-001, 271-001]

**NRC Response:** The NRC disagrees with the implication that the NRC's primary concern is the promotion of the nuclear industry. The NRC's mission is limited by law to non-promotional oversight of civilian uses of radioactive materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.

### **3.4 Price-Anderson liability limits are inadequate**

**Comment:** *The Price-Anderson liability limits are inadequate.* [072-003, 215-004, 241-005]  
*What would the liability implications be if a nuclear accident in the United States resulted in an evacuation in Canada?* [241-004]

**NRC Response:** These comments are out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones. Information on the Price-Anderson Act can be found on the NRC's public Web site under the "Fact Sheets and Brochures" document collections of the NRC Library at <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/funds-fs.html> (Fact Sheet on Nuclear Insurance and Disaster Relief Funds).

### **3.5 Dollar per person-rem is too low and must be revised**

**Comment:** *Why is the value of a life lost in a nuclear incident worth about 1/3 the value of a life in other disasters?* [186-011]

**NRC Response:** This comment is out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones. However, the NRC staff is updating specific aspects of relevant guidance as described in SECY-12-0110, Enclosure 8, "Current Staff Initiatives to Update the Dollar per Person-Rem Conversion Factor Policy and Replacement Power Costs," dated August 14, 2012 (ADAMS Accession No. ML12173A505).

### **3.6 NRC should require funding for independent radiation detection equipment**

**Comment:** *The NRC should require funding for independent radiation detection equipment.* [058-002, 252-003]

**NRC Response:** These comments are out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones.

### **3.7 NRC should improve potassium iodide availability and distribution**

**Comment:** *The NRC should improve potassium iodide availability and distribution.* [030-002, 186-002, 252-014]

**NRC Response:** The NRC agrees in part with this comment. As part of the NRC's ongoing efforts following the accident at Fukushima Dai-ichi, the issue of whether potassium iodide should be distributed beyond the 10-mile EPZ will be evaluated within ongoing efforts to address issues surrounding the use of potassium iodide. The NRC plans to review information

obtained from studies proposed by the Japanese Government and will propose any changes to policy regarding potassium iodide as a result of these studies.

### **3.8 The United States should hold realistic drills and actually shut down the electrical grid because of the risk of solar flares**

**Comment:** *The United States should hold realistic drills and actually shut down the electrical grid because of the risk of solar flares.* [209-001]

**NRC Response:** This comment is out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones. However, the NRC is considering in the rulemaking process the related issue of solar storms, which was raised in a petition for rulemaking, PRM-50-96. The FRN announcing that the NRC would consider that petition in the rulemaking process was published in the *Federal Register* on December 18, 2012 (77 FR 74788). The materials related to the petition are available through the Federal rulemaking Web site (i.e., [www.regulations.gov](http://www.regulations.gov)) under Docket ID NRC-2011-0069.

### **3.9 NRC should require licensees to take new seismic information into consideration and upgrade the plants accordingly**

**Comment:** *The NRC should require licensees to take new seismic information into consideration and upgrade the plants accordingly.* [159-009, 287-009, 288-009, 289-009, 290-009]

**NRC Response:** This comment is related to NTF Recommendations 2.1 and 2.3. See SECY-11-0124, "Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report," SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," and related staff requirements memoranda for immediate actions and prioritization of follow-up actions. More information about the NRC's actions to implement lessons learned from the accident at Fukushima Dai-ichi is available at the following web site: <http://www.nrc.gov/reactors/operating/ops-experience/japan-info.html>.

### **3.10 NRC should allow the use of thorium as a fuel**

**Comment:** *If thorium were used instead of uranium, this action would not be necessary. The NRC should allow the use of thorium in current as well as new reactors.* [025-001]

**NRC Response:** This comment is out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones. The NRC does not prohibit the use of thorium fuel in power reactors. If an applicant proposes to use thorium fuel in power reactors, the NRC would review the safety of the proposal. The NRC does not advocate for any particular project or type of energy development, nor does the NRC determine whether or what kinds of reactors are to be built in the United States. Rather, its mission is to ensure that, if reactors are to be built in the United States, they comply with NRC requirements.

### **3.11 An international foundation should be created to deal with health, decommissioning, and economic issues associated with nuclear power plants**

**Comment:** *An international foundation funded by nuclear nations should be created to deal with health, decommissioning, and economic issues associated with nuclear power plants.* [187-001]

**NRC Response:** This comment is out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones. The NRC does not have a role in the creation of international foundations.

### **3.12 Miscellaneous out-of-scope comments**

**Comment:** *The plants at Fukushima worked as designed after the earthquake, but the problem was the design height of the tsunami barrier.* [164-005]

**NRC Response:** The NRC is continuing to study the causes and effects of the accident at Fukushima Dai-ichi.

**Comment:** *Two comments questioned the petition's conclusions regarding Fukushima. What type and level of radiation was detected on farms 100 km away? Was it low? The petition did not consider the possibility that beef or milk were smuggled out.* [164-011, 164-012]

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

**Comment:** *One comment explained how the NRC re-examined offsite emergency planning requirements after September 11<sup>th</sup>.* [196-016]

**NRC Response:** No response is necessary.

**Comment:** *Aging concrete and human error are too dangerous. Diablo Canyon should be shut down and decommissioned.* [182-001]

**NRC Response:** This comment is out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones.

**Comment:** *The spent fuel pools at Indian Point are located in warehouse-type buildings with commercially available steel roofs, have no independent electricity or cooling systems, and do not have containment or backup systems.* [159-004, 287-004, 288-004, 289-004, 290-004] *Full containment and backup electricity should be required for spent fuel pools, and spent fuel should be moved as quickly as possible into hardened dry cask storage.* [159-008, 287-008, 288-008, 289-008, 290-008]

**NRC Response:** This comment is out of the scope for this action, which is the evaluation of a petition for rulemaking related to emergency planning zones. This comment addresses the design basis of spent fuel pools and the use of dry cask storage.

**Comment:** *The petition has some valid points regarding spent fuel, but the utilities were forced into this situation due to inaction by various levels of government. The primary concern is that*

*the health and safety of citizens is protected in the event of a release, regardless of the source.* [286-008]

**NRC Response:** No response is necessary.

**Comment:** *Three comments from local government organizations stated that their citizens deserve the best possible protection and preparation possible to mitigate the effects of nuclear accidents.* [137-013, 158-012, 285-013]

**NRC Response:** No response is necessary.

**Comment:** *Diablo Canyon has a “paper plan” only, and there is insufficient public participation in the licensee’s exercises.* [134-001]

**NRC Response:** No response is necessary.

**Comment:** *What would the public drink or cook with if food and water within 50 miles were contaminated?* [137-020]

**NRC Response:** Similar to the response after a hurricane or other major disaster, Federal, State, and local resources would be available to support affected citizens in the unlikely event of an accident at a nuclear power plant with offsite consequences. This support may include water, food, or shelter. For more information, see <http://www.fema.gov/help-after-disaster>.

**Comment:** *Within the 10-mile EPZ, transportation should be provided for those without cars, public transport, or personal mobility.* [036-003]

**NRC Response:** The NRC agrees with this statement. The NRC notes that State and local emergency plans include provisions to ensure that transportation is available to evacuate transit-dependent populations and other people who need assistance. Local emergency management officials frequently communicate information to their citizens to assist individuals in making plans so they are better prepared in the event of an emergency.