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

March 26, 2014

Mr. Paul Gunter, Director
Reactor Oversight Project
Beyond Nuclear
6930 Carroll Avenue, #400
Takoma Park, MD 20912

Dear Mr. Gunter:

I am responding to your petition dated March 21, 2013, and supplemented on May 2, May 6, May 13, July 19, September 30, and October 29, 2013.[1] On behalf of Beyond Nuclear, and representing numerous public interest groups (collectively Beyond Nuclear et. al. or Petitioners), you submitted a petition pursuant to Section 2.206 of Title 10 of the *Code of Federal Regulations* (10 CFR 2.206) of the U.S. Nuclear Regulatory Commission's (NRC's) regulations. Your petition requested that the NRC revoke the operating licenses at General Electric Mark I and II Boiling-Water Reactors. Your petition, addressed to former Executive Director for Operations, Mr. R.W. Borchardt, was referred to the Office of Nuclear Reactor Regulation.

The final recommendation of the NRC's Petition Review Board (PRB) is that no proceeding will be instituted with respect to your petition in accordance with 10 CFR 2.206(b). The PRB determined that the issues raised in your petition, as supplemented, did not provide information beyond what the NRC had already reviewed, evaluated, and/or addressed relative to the safe operation of the subject plants. Therefore, no proceeding will be instituted with respect to your petition in accordance with 10 CFR 2.206(b) and the specific reasons for the decision are provided in the enclosure to this letter.

Sincerely,

Jack Davis, Director
Mitigating Strategies Directorate
Office of Nuclear Reactor Regulation

Docket Nos. 50-259, 50-260, 50-296,
50-325, 50-324, 50-397, 50-298, 50-237,
50-249, 50-331, 50-321, 50-366, 50-341,
50-354, 50-333, 50-373, 50-374, 50-352,
50-353, 50-263, 50-220, 50-410, 50-219,
50-277, 50-278, 50-293, 50-254, 50-265,
50-387, 50-388, and 50-271

Enclosure:
As stated

cc: Licensees – Mark I and II BWRs
Listserv

1 Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML13085A218, ML13144A127, ML13144A135, ML13298A085, ML13298A098, ML13144A161, ML13144A173, ML13134A372, ML13210A397, ML13297A089, and ML13304C006, respectively.

2.206 PETITION BY BEYOND NUCLEAR (ET. AL.)

FOR GENERAL ELECTRIC MARK I AND II BOILING-WATER REACTORS

DOCKET NOS. 50-259, 50-260, 50-296, 50-325, 50-324, 50-397, 50-298, 50-237, 50-249, 50-331, 50-321, 50-366, 50-341, 50-354, 50-333, 50-373, 50-374, 50-352, 50-353, 50-263, 50-220, 50-410, 50-219, 50-277, 50-278, 50-293, 50-254, 50-265, 50-387, 50-388, and 50-271

BACKGROUND

The regulations in Section 2.206 of Title 10 of the *Code of Federal Regulations* (10 CFR) describe the petition process, which is the primary mechanism for the public to request enforcement action by the U.S. Nuclear Regulatory Commission (NRC) in a public process. This process permits anyone to petition the NRC to take enforcement-type action related to NRC licensees or licensed activities. Depending on the results of its evaluation, the NRC could modify, suspend or revoke an NRC-issued license or take any other appropriate enforcement action to resolve a problem.

INTRODUCTION

In the petition submitted March 21, 2013, and supplemented on May 2, May 6, May 13, July 19, September 30, and October 29, 2013,[1] Mr. Paul Gunter of Beyond Nuclear, representing numerous public interest groups (collectively Beyond Nuclear (et. al.) or Petitioners) asked the NRC to revoke the operating licenses for the General Electric (GE) Mark I and II Boiling-Water Reactors (BWRs) in the United States.

The Petition Review Board (PRB) met internally on April 8, 2013, to review the petition and determine if NRC needed to take any immediate action because of identified safety concerns. The PRB determined that NRC immediate action was not needed on the basis that there was no immediate safety concern to the licensed facilities, or to the health and safety of the public. Mr. Gunter was informed of this in an email dated April 17, 2013.[2]

By email dated April 3, 2013,[3] the petition manager contacted Mr. Gunter to discuss the 10 CFR 2.206 process and to offer an opportunity to address the PRB by phone or in person. Mr. Gunter requested to address the PRB in a public meeting prior to the PRB's internal meeting to develop the initial recommendation to accept or reject the petition for review.

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1 Agencywide Documents Access and Management System (ADAMS) Accession No. ML13085A218, ML13144A127, ML13144A135, ML13298A085, ML13298A098, ML13144A161, ML13144A173, ML13134A372, ML13210A397, ML13297A089, and ML13304C006, respectively.

2 ADAMS Accession No. ML13109A230.
3 ADAMS Accession No. ML13112A279.

The NRC informed the Petitioners that the PRB public meeting would be held at the NRC Headquarters in Rockville, Maryland. The NRC also informed the Petitioners that the purpose of the public meeting was to give them an opportunity to provide any additional explanation or support for the petition before the PRB's initial consideration and recommendation. The NRC also indicated that the meeting was not a hearing, nor was it an opportunity for the Petitioners to question or examine the PRB on the merits or the issues presented in the petition request. Further, the PRB would not make any decisions regarding the merits of the petition at the meeting.

On May 2, 2013,[4] the Petitioners addressed the PRB in a public meeting held in the Commissioners' Hearing Room in Rockville, Maryland. The public PRB meeting was recorded by the NRC Operations Center and was transcribed by a court reporter. The transcript became a supplement to the petition. The transcript was also made publicly available. There were telephone lines for members of the public to listen to the public PRB meeting. In addition, the public PRB meeting was webcasted through the NRC webpage. As the basis for this request, the Petitioners stated that they have serious concerns about the ongoing safety at GE Mark I and II BWRs.

On September 30, 2013,[5] the Petitioners were provided another opportunity to address the PRB through a public meeting and conference call. The meeting was recorded by the NRC Operations Center and was transcribed by a court reporter. The transcript became a supplement to the petition. The transcript was also made available to the public. There were telephone lines for the petitioners and members of the public to participate in the PRB meeting. In addition, the public PRB meeting was webcasted through the NRC webpage.

Due to the length of the petition, the NRC staff will summarize the request and refer interested individuals to the petition, dated March 21, 2013, as supplemented, for the exact wording.

The petitioners state, in part, that the NRC should revoke the licenses for GE Mark I and II BWRs because their containments are: (1) highly unreliable and therefore unsafe as reactor protective systems by design, construction and operation under certain to-be-anticipated accident conditions, (2) in violation of licensing agreements governing licensed conditions that require safe operation and a reliable containment, (3) not in compliance with General Design Criteria (GDC)-10, "Reactor Design," (4) are not in compliance with GDC-16, "Containment Design," and (5) in need of filtered vents.

In addition, the Petitioners state, in part, that the NRC: (6) needs to order installation of filtered vents, (7) needs to order installation of hardened vents, (8) should gain consensus on SRM SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and II Containments," and (9) should improve the timeliness on the part of the NRC regarding an enhanced reliable vent.

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4 ADAMS Accession No. ML13144A127.
5 ADAMS Accession No. ML13297A089.

RESPONSES

Petitioners Concern #1

> Whereas, it is historically documented and in reality demonstrated by the Fukushima Daiichi nuclear disaster with the widespread land and water contamination in and around Japan, that under certain to-be-anticipated accident conditions involving reactor core and "spent" fuel damage, the General Electric Boiling Water Reactors with Mark I and Mark II containments are highly unreliable and therefore unsafe as reactor protective systems by design, construction and operation under certain to be-anticipated accident conditions.

NRC Response to Petitioners Concern #1

The current NRC regulatory approach includes: (1) requirements for design-basis events with features controlled through specific regulations or the GDC (10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants") and the quality requirements of 10 CFR Part 50, Appendix B, (2) beyond-design-basis requirements through specific rules (e.g., the station blackout (SBO) rule) with specified quality requirements, (3) voluntary industry initiatives to address severe accident features, strategies, and guidelines for operating reactors, and (4) specific requirements to address damage from fires and explosions and their mitigation.

The NRC staff reviewed the current licensing basis of the Mark I and II BWRs and stated the following in SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and II Containments:"[6]

> For currently operating plants, the design of the containment barrier provides either (1) a large enough air volume to accommodate the energy released from a design-basis loss-of-coolant accident (LOCA) while not exceeding the design pressure for the containment, or (2) systems that include water or ice to absorb the energy released from a LOCA by condensing steam and thereby suppressing the increase in pressure to values below the design pressure for the containment. BWRs employ such pressure suppression containment designs. Mark I and Mark II containments are specific containment configurations for BWRs that use water suppression pools to condense the steam released from the reactor following a LOCA or other plant transients or accidents. As a result of the heat capacity of a suppression pool (i.e., the ability to condense steam), Mark I and Mark II containments have relatively small free volumes compared to other types of containments (e.g., large dry containments). For additional background information on Mark I and Mark II containments, see Enclosure 2 [ADAMS Accession No. ML12326A344].
>
> Mark I and Mark II containments (as well as other pressure suppression containments) have been shown to be capable of addressing the requirements related to the design-basis accidents that the NRC and its predecessor (Atomic Energy Commission) established for the licensing of currently operating plants.

6 ADAMS Accession No. ML12325A704.

> However, various studies (e.g., NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants") and events have shown that the Mark I and Mark II containments do not have the same margins of safety that other containments (e.g., large dry ones) have during accidents that exceed the conditions established by design basis events. These include events that result in an extended addition of energy (i.e., decay heat from the reactor core) to the containment and suppression pool without having available heat removal systems that include pumps and heat exchangers to direct that energy to the ultimate heat sink (e.g., the atmosphere, a nearby river, reservoir), and events that result in the production of significant quantities of noncondensable gases (e.g., hydrogen, carbon monoxide) that are released into the containment. The events at the Fukushima Dai-ichi nuclear power plant involved an extended loss of electrical power and heat-removal systems, resulting in containment pressures that exceeded the containment design pressure. Plant conditions at Fukushima Dai-ichi (e.g., loss of all electrical power or station blackout) hampered the efforts of operators to address the containment overpressure conditions using the installed venting systems, which ultimately contributed to the compromise of all fission product barriers and significant releases of radioactive material. The insights that the NRC gained from Fukushima Dai-ichi on the difficulties in venting the containments led the agency to impose additional requirements for reliable hardened venting systems for plants with Mark I and Mark II containments. It also led the NRC to initiate proposed new regulations for all plants to improve operator readiness to respond to severe accident conditions.

In the NRC Near-Term Task Force Report, "Recommendations for Enhancing Reactor Safety in the 21st Century – The Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," dated July 12, 2011, it stated the following:

> The current regulatory approach, and more importantly, the resultant plant capabilities allow the Task Force to conclude that a sequence of events like the Fukushima accident is unlikely to occur in the United States and some appropriate mitigation measures have been implemented, reducing the likelihood of core damage and radiological releases. Therefore, continued operation and continued licensing activities do not pose an imminent risk to public health and safety.

The Mark I and II BWRs meet their current licensing basis. The extended loss of electrical power and other conditions associated with the Fukushima Daiichi event is a beyond-design basis event for the reactors in the United States. The NRC has taken significant action to enhance the safety of reactors in the United States based on the lessons learned from this accident. After the Fukushima accident, a task force of senior NRC staff reviewed the circumstances of the event to determine what lessons could be learned. In July 2011, the task force provided recommendation to enhance U.S. reactor safety[7] and these became the foundation of the NRC's post-Fukushima activities. The Commission then approved a three-tiered prioritization of the recommendations. These safety margin improvement recommendations are currently being developed and implemented at all U.S. commercial

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7 ADAMS Accession No. ML111861807.

nuclear reactor facilities. These recommendations can be found on the NRC public webpage at http://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/priorities.html.

Subsequently, the Commission issued a series of Orders, EA-13-109 (Severe Accident Capable Reliable Hardened Vents), EA-12-049 (Station Blackout Mitigation Strategies), and EA-12-051 (Enhanced Spent Fuel Pool Instrumentation) to further and significantly enhance the margins of safety to the effects of extreme natural phenomena at commercial operating reactors in the United States. These additional requirements have been imposed to address concerns related to beyond-design-basis conditions identified after the Fukushima Daiichi accident.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #2

> Whereas, all 23 Mark I units and 8 Mark II units currently operating in the United States are by design, construction and operation in violation of licensing agreements governing licensed conditions that require safe operation and a reliable containment, and;

NRC Response to Petitioners Concern #2

As illustrated more fully in the Response to Petitioner's Concern #1, the current NRC regulatory approach includes: (1) requirements for design-basis events with features controlled through specific regulations or the GDC and the quality requirements of 10 CFR Part 50, Appendix B, (2) beyond-design-basis requirements through specific rules (e.g., the SBO rule) with specified quality requirements, (3) voluntary industry initiatives to address severe accident features, strategies, and guidelines for operating reactors, and (4) specific requirements to address damage from fires and explosions and their mitigation.

As stated above in SECY-12-0157, the NRC staff concluded the Mark I and II BWRs meet their current licensing basis in terms of design-basis containment functions.

Although the Fukushima Daiichi event was a beyond-design basis event, the accident highlighted the need for reevaluation of the impacts from extreme natural phenomena, and where appropriate, the implementation of additional safety margin improvements.

The NRC has taken significant action to enhance the safety margin of reactors in the United States based on the lessons learned from this accident. After the Fukushima accident, a task force of senior NRC staff reviewed the circumstances of the event to determine what lessons could be learned. In July 2011, the task force provided recommendation to enhance U.S. reactor safety (ADAMS Accession No. ML111861807), and these became the foundation of the NRC's post-Fukushima activities. The Commission then approved a three-tiered prioritization of the recommendations. These safety margin improvement recommendations are currently being developed and implemented at all U.S. commercial nuclear reactor facilities. These recommendations can be found on the NRC public webpage at http://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/priorities.html.

Subsequently, the Commission issued a series of orders, EA-13-109 (Severe Accident Capable Reliable Hardened Vents), EA-12-049 (Station Blackout Mitigation Strategies), and EA-12-051 (Enhanced Spent Fuel Pool Instrumentation) to further and significantly enhance the margins of safety to the effects of extreme natural phenomena at commercial operating reactors in the United States.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #3

> Whereas, all Mark I and Mark II reactor containment structures do not comply with Nuclear Regulatory Commission (NRC) General Design Criteria 10 "Protection with Multiple Fission Barriers" which requires reactor protection systems "designed with appropriate margins" including the containment structure to "anticipate operational occurrences" including to-be-anticipated accident conditions including loss of offsite and onsite electrical power to reactor safety systems, reactor core cooling systems, and other events leading to nuclear fuel damage, the overpressure and over-temperature events challenging the unreliable Mark I and Mark II containment systems;

NRC Response to Petitioners Concern #3

Criterion 10 of 10 CFR 50, Appendix A, states, in part, that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences. The regulations in 10 CFR 50, Appendix A, define an anticipated operational occurrence as, "those conditions of normal operation which are expected to occur one or more times during the life of the nuclear power unit and include but are not limited to loss of power to all recirculation pumps, tripping of the turbine generator set, isolation of the main condenser, and loss of all offsite power."

As stated above in SECY-12-0157, the NRC staff concluded that the Mark I and II BWRs meet their current licensing basis. An anticipated operational occurrence (including the loss of all offsite power) would be handled by the safety and design features (e.g., Emergency Diesel Generators) required as part of their licensing basis.

The Fukushima Daiichi event was a significant beyond-design basis event resulting from extreme natural phenomena. Nevertheless, the accident highlighted the need for reevaluation of the impacts from extreme natural phenomena, and where appropriate, the implementation of additional safety margin improvements.

The NRC has taken significant action to enhance the safety margin of reactors in the United States based on the lessons learned from this accident. After the Fukushima accident, a task force of senior NRC staff reviewed the circumstances of the event to determine what lessons could be learned. In July 2011, the task force provided recommendation to enhance U.S.

reactor safety (ADAMS Accession No. ML111861807), and these became the foundation of the NRC's post-Fukushima activities. The Commission then approved a three-tiered prioritization of the recommendations. These safety margin improvement recommendations are currently being developed and implemented at all U.S. commercial nuclear reactor facilities. These recommendations can be found on the NRC public webpage at http://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/priorities.html.

Subsequently, the Commission issued a series of orders, EA-13-109 (Severe Accident Capable Reliable Hardened Vents), EA-12-049 (Station Blackout Mitigation Strategies), and EA-12-051 (Enhanced Spent Fuel Pool Instrumentation) to further and significantly enhance the margins of safety to the effects of extreme natural phenomena at commercial operating reactors in the United States.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #4

> Whereas, all Mark I and Mark II reactor containment structures do not comply with NRC General Design Criteria 16 "Containment Design" which requires "an essentially leak tight containment against uncontrolled releases of radioactivity to the environment," as the result of a to-be anticipated accident involving reactor core fuel damage and the overpressure and over-temperature events of the Mark I and Mark II containment system.

NRC Response to Petitioners Concern #4

Criterion 16 of 10 CFR 50, Appendix A, "Containment Design," states:

> Reactor containment and associated systems shall be provided to establish an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment and to assure that the containment design conditions important to safety are not exceeded for as long as postulated accident conditions require.

As stated above in SECY-12-0157, the NRC staff concluded that the Mark I and II BWRs meet their current licensing basis. The design includes containment and other associated systems that provide a barrier against uncontrolled releases of radioactivity due to postulated accident conditions. The postulated accident used in the analyses of the design-basis functions of the containment are defined in well-established regulatory guidance documents and plant-specific results are provided in each plant's updated final safety analysis report.

The Fukushima Dai-ichi event was a significant beyond-design basis event resulting from extreme natural phenomena not expected for a plant in the United States. Nevertheless, the accident highlighted the need for reevaluation of the impacts from extreme natural phenomena, and where appropriate, the implementation of additional safety margin improvements.

The NRC has taken significant action to enhance the safety margin of reactors in the United States based on the lessons learned from this accident. After the Fukushima accident, a task force of senior NRC staff reviewed the circumstances of the event to determine what lessons could be learned. In July 2011, the task force provided recommendation to enhance U.S. reactor safety (ADAMS Accession No. ML111861807), and these became the foundation of the NRC's post-Fukushima activities. The Commission then approved a three-tiered prioritization of the recommendations. These safety margin improvement recommendations are currently being developed and implemented at all U.S. commercial nuclear reactor facilities. These recommendations can be found on the NRC public webpage at http://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/priorities.html.

Subsequently, the Commission issued a series of orders, EA-13-109 (Severe Accident Capable Reliable Hardened Vents), EA-12-049 (Station Blackout Mitigation Strategies), and EA-12-051 (Enhanced Spent Fuel Pool Instrumentation) to further and significantly enhance the margins of safety to the effects of extreme natural phenomena at commercial operating reactors in the United States.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #5

> Whereas, the NRC currently intends to mitigate by a severe accident capable containment vent the release of high pressure, high temperature, non-compressible gases including explosive hydrogen gas generated by an accident stemming from reactor core fuel damage and overheated zircoloy [zircalloy] fuel cladding interaction with water, the Commission is diversely divided by professional opinion and has by majority vote unduly and significantly delayed so as to effectively reject the timely implementation of the professional judgment of the agency's Japan Lessons Learned Project Directorate and Nuclear Reactor Regulation staff on the value to public health and safety to simultaneous vent radiation from fuel damage to the atmosphere without effective filtration by deliberately and principally defeating the conceptually flawed and structurally vulnerable Mk I and II containment system to preserve it from permanent failure;

NRC Response to Petitioners Concern #5

The Commission's primary decision-making tool is a written issue paper submitted by the NRC staff to the Commission, known as a "SECY Paper." Issues before the Commission are decided by majority vote. After the Commission completes voting on a SECY Paper, the Office of the Secretary (SECY) records the decision in a memorandum to the staff called a "Staff Requirements Memorandum" (SRM) and also issues a "Commission Voting Record" (CVR), which includes the record of votes and individual views of all Commissioners.

On November 26, 2012, the NRC staff submitted SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and II Containments." The NRC staff recommended Option 3 (filtered vents). By letter dated

November 8, 2012,[8] the Advisory Committee on Reactor Safeguards (ACRS) recommended Option 4 (performance-based approach). On March 19, 2013, the CVR and SRM for SECY-12-0157[9] were issued. SRM SECY-12-0157 approved Option 2 (vents capable of operating under severe accident conditions) and approved a rulemaking to consider Options 3 and 4 (severe accident confinement strategy).

In the SRM for SECY-12-0157, the Commission directed the NRC staff to issue a modification to Order EA-12-050 requiring licensees with Mark I and Mark II containments to "upgrade or replace the reliable hardened vents required by Order EA-12-050 with a containment venting system designed and installed to remain functional during severe accident conditions." The NRC staff has determined that continued operation does not pose an imminent risk to public health and safety; however, the additional requirements outlined in Order EA-13-109 are necessary in light of insights gained from the events at Fukushima Dai-ichi. The NRC issued Order EA-13-109 on June 6, 2013.[10]

The PRB understands the Petitioners' opinion that Option 3 is the preferred option; the NRC staff recommended Option 3 in SECY-12-0157. The Commission deliberately weighed the options and cast their votes. It was determined that the proposed order requiring engineered filters was not a matter of assuring adequate protection of the public, but instead addressed very low-probability, beyond-design-basis events. The Commission approved the development of technical bases and rulemaking for filtering strategies with drywell filtration and severe accident management of BWR Mark I and II containments. The Commission directed the NRC staff to engage a diversity of external stakeholders throughout the development of the technical bases and rulemaking and to interact with the ACRS at appropriate points in the process. To engage a diversity of stakeholders and viewpoints most effectively, the Commission directed the NRC staff to consider various formats, to include public meetings, workshops, and tabletop exercises to foster detailed discussion of analytical methods, modeling assumptions, and potential performance criteria.

The Commission SRM SECY-12-0157 provided clear direction and actions for the NRC staff. The PRB understands that the petitioners disagree with the Commission, but the petitioners did not provide information not considered by the Commission during its deliberations. The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #6

> Whereas, the NRC staff and the Commissioners have not adequately addressed the apparent violation of General Design Criteria 10 and General Design Criteria 16 in an analysis of the implications of the Fukushima Daiichi nuclear accident for the similarly fundamentally flawed design, construction and operation of the vulnerable Mark I and Mark II containment system.

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8 ADAMS Accession No. ML12312A099.
9 ADAMS Accession Nos. ML13078A012 and ML13078A017, respectively.
10 ADAMS Accession No. ML13143A321.

NRC Response to Petitioners Concern #6

As stated above in SECY-12-0157, the NRC staff concluded that the Mark I and II BWRs meet their current licensing basis in terms of design-basis functions.

The NRC has taken significant action to enhance the safety margin of reactors in the United States for beyond-design basis events based on the lessons learned from this accident. After the Fukushima accident, a task force of senior NRC staff reviewed the circumstances of the event to determine what lessons could be learned. In July 2011, the task force provided recommendation to enhance U.S. reactor safety (ADAMS Accession No. ML111861807), and these became the foundation of the NRC's post-Fukushima activities. The Commission then approved a three-tiered prioritization of the recommendations. These safety margin improvement recommendations are currently being developed and implemented at all U.S. commercial nuclear reactor facilities. These recommendations can be found on the NRC public webpage at http://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/priorities.html.

Subsequently, the Commission issued a series of orders, EA-13-109 (Severe Accident Capable Reliable Hardened Vents), EA-12-049 (Station Blackout Mitigation Strategies), and EA-12-051 (Enhanced Spent Fuel Pool Instrumentation) to further and significantly enhance the margins of safety to the effects of extreme natural phenomena at commercial operating reactors in the United States.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #7

> Whereas, the analysis and recommendation of the Japan Lessons Learned Project Directorate and NRC Nuclear Reactor Regulation staff concluded that in order to restore some significant measure of Mark I and Mark II containment integrity which would effectively bring Mark I and Mark II containment violations more into alignment with GDC 10 and GDC 16 considered the following;
>
> *"The events at the Fukushima Daiichi nuclear power plant involved an extended loss of electrical power and heat removal systems, resulting in containment pressures that exceeded the* (Mark I and Mark II) *containment design pressure;*
>
> *"For BWRs, estimates of low core melt frequencies have, in part, justified - the NRC's previous acceptance of the estimated high conditional failure probability of the Mark I and II containments. The containments did fail, however, during the accident at the Fukushima Dai-ichi facility, as predicted for those plant conditions. Further, the failure of containments during the Fukushima accident resulted in a large release of radioactive material and greatly complicated the attempts of plant operators to stop conditions from worsening.*

"The key design attributes of Mark I and Mark II containments relevant to the need for containment venting during severe accidents such as Fukushima are: (1) the containment free gas volumes are relatively small compared to other light-water reactors, so gas and steam buildup in containment will cause the pressure to rise more dramatically, (2) BWR reactor cores have about three times the zirconium inventory compared to pressurized-water reactors (PWRs) with comparable power levels, so there is a greater potential to generate significant amounts of hydrogen gas which also will increase containment pressures;

"Given the key role of containment performance as an essential element of defense in depth, concerns about the performance of Mark I and II containments during severe accident conditions have been discussed for many years;

"[V]arious studies (e.g., NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants") and events have shown that the Mark I and Mark II containments do not have the same margins of safety that other containments (e.g. large dry ones) have during accidents that exceed the conditions;

In response to the identified Mark I and Mark II containment vulnerability to over-pressure and over-temperature accident conditions with a high likelihood of permanent rupture with the release of radioactivity from containment, the NRC introduced on September 1, 1989, a request to industry through a voluntary initiative ["Generic Letter 89-16, Installation of a Hardened Wetwell"] to install a venting system on the flawed and vulnerable containment. The containment hardened vent was installed on most Mark I containments.

However, the NRC staff now notes, "*The hardened vent* [GL 89-16] *was specifically to provide an exhaust line from the wetwell vapor space to a suitable release point (e.g. stack, reactor building or turbine building roof). The basic design objective of the hardened vent was to mitigate the loss of decay heat removal accident sequence. As such, the piping was designed (sized) to accommodate a steam flow equivalent of 1percent decay heat power assuming a pressure equal to the primary containment pressure limit (PCPL), and <u>not designed for operation during a severe</u>* <u>accident</u>. [Emphasis added]

As a direct result and response to the core damage severe accident at the Mark I units at Fukushima and the widespread land and water contamination, the NRC Japan Lessons Learned Directorate and NRR staff has determined that,

"Based on its regulatory analyses, the staff concludes that the installation of engineered filtered venting systems for Mark I and Mark II containments is the option that would provide the most regulatory certainty and the timeliest implementation;

"Based on the assessments completed this past year, the staff concludes that approaches, such as filtering technologies, currently exist and could be implemented in the near term to resolve issues related to Mark I and Mark II severe accident containment venting. These technologies are technically

feasible and have been demonstrated through significant testing and application at nuclear power plants worldwide. Furthermore, the staff concludes that the best solution to address the combination of quantitative and qualitative factors (e.g., providing improved defense in depth) is the installation of passive, engineered filtered venting systems at BWRs with Mark I and Mark II containments;

"The installation of a filtering system with expected performance requirements would significantly reduce the estimated affected land area and related economic consequences.

Therefore, the Petitioners contend that in an effort to restore the basic requirement for containment integrity to retain significant amounts of radioactivity liberated from a to-be-anticipated severe accident involving fuel damage,

"The staff recommends that the Commission approve Option 3 to require the installation of an engineered filtered containment venting system for BWRs with Mark I and Mark II containments.

The Petitioners note that Option 3 was to be implemented by prompt direct Order to all Mark I and Mark II licensees.

NRC Response to Petitioners Concern #7

The accident at the Fukushima Dai-ichi nuclear facility in Japan highlighted the need for reevaluation of the impacts from extreme natural phenomena, and where appropriate, the implementation of additional safety margin improvements, particularly for plant systems and barriers from an extended loss of electrical power and loss of access to heat removal systems.

The PRB understands the Petitioners' opinion that Option 3 is the preferred option; the NRC staff recommended Option 3 in SECY-12-0157. The Commission deliberately weighed the options and cast their votes. It was determined that the proposed order requiring engineered filters was not a matter of assuring adequate protection of the public, but instead addressed very low-probability, beyond-design-basis events. The Commission approved the development of technical bases and rulemaking for filtering strategies with drywell filtration and severe accident management of BWR Mark I and II containments. The Commission directed the NRC staff to engage a diversity of external stakeholders throughout the development of the technical bases and rulemaking and should present to the ACRS at appropriate points in the process. To engage a diversity of stakeholders and viewpoints most effectively, the Commission directed the NRC staff to consider various formats, to include public meetings, workshops, and tabletop exercises to foster detailed discussion of analytical methods, modeling assumptions, and potential performance criteria.

The concerns raised are related to plant conditions that result from beyond-design basis accidents. The Commission SRM SECY-12-0157 provided clear direction and actions for the NRC staff. The PRB understands that the petitioners disagree with the Commission, but the petitioners did not provide information not considered by the Commission during its deliberations. The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #8

> Whereas, on March 19, 2013, the NRC Commissioners by Notation Vote unanimously accepted the Staff Recommendation set forth in SECY-2012-0157 to issue an Order to all Mark I and Mark II operators to install an upgraded severe accident capable hardened vent (Option 2) but by majority rejected the recommendation of Japan Lessons Learned Project Directorate and the NRC Nuclear Reactor Regulation staff to promptly Order the installation of a engineered high-capacity radiation filter in the upgraded containment vent;

NRC Response to Petitioners Concern #8

The accident at the Fukushima Dai-ichi nuclear facility in Japan highlighted the need for reevaluation of the impacts from extreme natural phenomena, and where appropriate, the implementation of additional safety margin improvements, particularly for plant systems and barriers from an extended loss of electrical power and loss of access to heat removal systems.

The PRB understands the Petitioners' opinion that Option 3 is the preferred option; the NRC staff recommended Option 3 in SECY-12-0157. The Commission deliberately weighed the options and cast their votes. It was determined that the proposed order was not a matter of assuring adequate protection of the public, but instead addressed very low-probability, beyond-design-basis events. The Commission approved the development of technical bases and rulemaking for filtering strategies with drywell filtration and severe accident management of BWR Mark I and II containments. The Commission directed the NRC staff to engage a diversity of external stakeholders throughout the development of the technical bases and rulemaking and should present to the ACRS at appropriate points in the process. To engage a diversity of stakeholders and viewpoints most effectively, the Commission directed the NRC staff to consider various formats, to include public meetings, workshops, and tabletop exercises to foster detailed discussion of analytical methods, modeling assumptions, and potential performance criteria.

The concerns raised are related to plant conditions that result from beyond design basis accidents. The Commission SRM SECY-12-0157 provided clear direction and actions for the NRC staff. The PRB understands that the petitioners disagree with the Commission, but the petitioners did not provide information not considered by the Commission during its deliberations. The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #9

Whereas, it is evident that there is no consensus and diverse opinion within the Commissioners in their professional opinion as reflected in the voting record over to promptly mitigate the unreliable and therefore unsafe Mark I and Mark II protective containment systems;

In the affirmative of Staff Recommendation for Option 3 by prompt Order, NRC Chair Allison Macfarlane approved the staff recommendation in SECY 2012-0157 high-capacity radiation filters on the proposed severe accident capable hardened vent system on the unreliable containment system in the event of a to-be-anticipated accident condition involving fuel damage stating;

"My decision reflects, in part, my experiences during a recent trip the Fukushima Daiichi plant in Japan. The visit required to the reactors required travel through deserted villages, full of abandoned homes and businesses overgrown with weeds, and past fallow fields, and unused industrial buildings, roads and railroad tracks, all of which emphasized the impact of the accident from a nuclear plant that was over 10 kilometers away.

"Engineered filtered containment system can help protect the public and the environment by significantly reducing the amount of radiological effluent released from containment during a severe accident. All currently available information indicates that the ability to vent containment through filters would be an improvement to safety;

"Defense-in-depth is one of the ways the agency accounts for uncertainties in quantitative estimates of component failure or accident frequency. While the existing Order [EA 2012-050] requiring reliable hardened vents focuses on the prevention of core damage, it's prudent to consider an accident scenario in which a plant operator, using plant systems, is not able to preclude core damage and the accident escalates. Such a scenario illustrates mitigation and containment aspects of defense-in-depth provide their primary benefit. As the paper [SECY 2012-0157] *notes in Enclosure 1,*

> *'While it may not be necessary or practical to ensure the complete independence of each barrier to the release of radiation, it is desirable to minimize dependencies and address the high conditional failure probability of the Mark I and Mark II containments following a compromise of preceding barriers (fuel and cooling system). The filtered system would provide the most independence while the unfiltered vent could result in large releases in the attempts to reduce containment overpressure conditions. Page 34*

The Petitioners therefore contend that the Commission March 19, 2013, majority decision to effectively introduces the undue, indeterminate and imprudent delay for the timely installation, if at all ever, of an engineered high-capacity radiation filter in a more robust severe accident capable hardened vent line which in the

Petitioners contend exacerbates the violation of licensed conditions as related to the design and operability of effective reactor protective systems (GDC 10) and an essentially leak tight containment to uncontrolled releases of radioactivity as generated during a reactor accident with loss of cooling and fuel damage (GDC 16).

The Commission's March 19, 2013, Notation Vote demonstrates a significant and troubling lack of consensus on a critical Post-Fukushima matter of public safety and a divided professional opinion not only within the Commission but also between the Commission and the deliberated scientific judgment of their Lessons Learned Task Force's technical staff in rejecting the staff's professionally guided recommendation to install engineered filters in a severe accident capable hardened vent on all Mark I and Mark II by Order.

The Petitioners further contend that the nuclear industry through the Nuclear Energy Institute, its lobbying agents and its Congressional champions on Capitol Hill have asserted undue influence on the Commissioners so as to undermine the public health and safety that would otherwise require and enforce compliance with the licensing agreement namely GDC 10 and GDC 16.

As similarly reflected in the notation votes of Commissioners Magwood, Apostolakis and Ostendorf, Commissioner Kristine Svinicki states,

> *"I join a Commission majority in approving the development of a technical basis and rulemaking alternatives for the staff's Options 3 and 4. I disapprove of the immediate movement to require the installation of engineered filtered containment systems for BWRs with Mark I and Mark II containments by order.*

Given that the agency's Japan Lessons Learned Directorate and the Nuclear Reactor Regulation staff have invested thousands of hours with extensive interaction with the U.S. nuclear industry, foreign industry and their regulators and the public stakeholders beginning with the establishment of the Japan Lessons Learned Task Force in the immediate aftermath of the Fukushima Daiichi nuclear catastrophe beginning on March 11, 2011, to the issuance of SECY 2012-0157 on November 26, 2012, the Petitioners contend that it is undue and disingenuous of the agency to extend and indeterminately delay resolution to this critical public health and safety debate on the Mark I and Mark II containment vulnerability to a potential severe accident by many more years.

NRC Response to Petitioners Concern #9

The NRC is headed by five Commissioners appointed by the President and confirmed by the Senate for 5-year terms. The Commission, as a collegial body, formulates policies, develops regulations governing nuclear reactor and nuclear material safety, issues orders to licensees, and adjudicates legal matters.

The Commission's primary decision-making tool is a written issue paper submitted by the NRC staff to the Commission, known as a "SECY Paper." Issues before the Commission are decided

by majority vote. After the Commission completes voting on a SECY Paper, the Office of the Secretary (SECY) records the decision in a memorandum to the staff called a "Staff Requirements Memorandum" (SRM) and also issues a "Commission Voting Record" (CVR), which includes the record of votes and individual views of all Commissioners. It is not unusual, and in fact, quite desirable, to have diverse opinions.

On November 26, 2012, the NRC staff submitted SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and II Containments." The NRC staff recommended Option 3 (filtered vents). By letter dated November 8, 2012,[11] the Advisory Committee on Reactor Safeguards (ACRS) recommended Option 4 (performance-based approach). On March 19, 2013, the CVR and SRM for SECY-12-0157[12] were issued. SRM SECY-12-0157 approved Option 2 (vents capable of operating under severe accident conditions) and approved a rulemaking to consider Options 3 and 4 (severe accident confinement strategy).

In the SRM for SECY-12-0157, the Commission directed the NRC staff to issue a modification to Order EA-12-050 requiring licensees with Mark I and Mark II containments to "upgrade or replace the reliable hardened vents required by Order EA-12-050 with a containment venting system designed and installed to remain functional during severe accident conditions." The NRC staff has determined that continued operation does not pose an imminent risk to public health and safety; however, the additional requirements outlined in Order EA-13-109 are necessary in light of insights gained from the events at Fukushima Dai-ichi. The NRC issued Order EA-13-109 on June 6, 2013.[13]

The PRB understands the Petitioners' opinion that Option 3 is the preferred option; the NRC staff recommended Option 3 in SECY-12-0157. The Commission deliberately weighed the options and cast their votes. It was determined that the proposed order was not a matter of assuring adequate protection of the public, but instead addressed very low-probability, beyond-design-basis events. The Commission approved the development of technical bases and rulemaking for filtering strategies with drywell filtration and severe accident management of BWR Mark I and II containments. The Commission directed the NRC staff to engage a diversity of external stakeholders throughout the development of the technical bases and rulemaking and to interact with the ACRS at appropriate points in the process. To engage a diversity of stakeholders and viewpoints most effectively, the Commission directed the NRC staff to consider various formats, to include public meetings, workshops, and tabletop exercises to foster detailed discussion of analytical methods, modeling assumptions, and potential performance criteria.

The PRB understands that Petitioners are concerned that an Option 3 rulemaking will take years to complete. The Commission views the rulemaking process as a deliberate process that allows a diversity of external stakeholders to participate in the process. The Commission has determined that Option 3 is not needed for adequate protection of the public but instead it will address a very low-probability, beyond-design-basis event.

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11 Ibid 10.
12 Ibid 11.
13 Ibid 12.

The Petitioners contend that "Nuclear Energy Institute, its lobbying agents and its Congressional champions on Capitol Hill have asserted undue influence on the Commissioners." This is outside the purview of the PRB and has been referred to the Office of the Inspector General, for consideration. The PRB can comment that Commissioner Apostolakis' voting record showed that he had the benefit of comments submitted by external stakeholders, such as Pilgrim Watch and the Nuclear Energy Institute.

The concerns raised are related to plant conditions that result from beyond design basis accidents. The Commission SRM SECY-12-0157 provided clear direction and actions for the NRC staff. The PRB understands that the petitioners disagree with the Commission, but the petitioners did not provide information not considered by the Commission during its deliberations. The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #10

> Whereas, the Petitioners raise an issue of the undue risk to public health and safety introduced by the lack of timeliness on the part of NRC and industry as evident by Order (EA 2012-050) which requires no action on an enhanced reliable vent (specifically excluding any service for enhancing containment reliability for post-fuel damage events) before December 31, 2016, SECY 2012-0157 for containment upgrades with no requirement for action for Options 2 through 4 before December 31, 2017, and now the undue and indeterminate delay introduced by majority the Commission Notation Vote announced March 19, 2013, with no effective Orders with deadlines specified for reliably operable containment strategies and therefore extended non-compliance with the licensed agreements established under General Design Criteria 10 and General Design Criteria 16.

NRC Response to Petitioners Concern #10

In the SRM for SECY-12-0157, the Commission directed the NRC staff to issue a modification to Order EA-12-050 requiring licensees with Mark I and Mark II containments to "upgrade or replace the reliable hardened vents required by Order EA-12-050 with a containment venting system designed and installed to remain functional during severe accident conditions." The NRC staff has determined that continued operation does not pose an imminent risk to public health and safety; however, the additional requirements outlined in Order EA-13-109 are necessary in light of insights gained from the events at Fukushima Dai-ichi. The NRC issued Order EA-13-109 on June 6, 2013.

The PRB understands the Petitioners' opinion that Option 3 is the preferred option; the NRC staff recommended Option 3 in SECY-12-0157. The Commission deliberately weighed the options and cast their votes. It was determined that the proposed order requiring engineered filters was not a matter of assuring adequate protection of the public, but instead addressed very low-probability, beyond-design-basis events. The Commission approved the development of technical bases and rulemaking for filtering strategies with drywell filtration and severe accident management of BWR Mark I and II containments. The Commission directed the NRC

staff to engage a diversity of external stakeholders throughout the development of the technical bases and rulemaking and to interact with the ACRS at appropriate points in the process. To engage a diversity of stakeholders and viewpoints most effectively, the Commission directed the NRC staff to consider various formats, to include public meetings, workshops, and tabletop exercises to foster detailed discussion of analytical methods, modeling assumptions, and potential performance criteria.

The PRB understands that Petitioners are concerned that an Option 3 rulemaking will take years to complete. The Commission views the rulemaking process as a deliberate process that allows a diversity of external stakeholders to participate in the process. The Commission has determined that Option 3 is not needed for adequate protection of the public but instead it will address a very low-probability, beyond-design-basis event.

The concerns raised are related to plant conditions that result from beyond design basis accidents. The Commission SRM SECY-12-0157 provided clear direction and actions for the NRC staff. The PRB understands that the petitioners disagree with the Commission, but the petitioners did not provide information not considered by the Commission during its deliberations. The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Requested Enforcement Action #11

> Therefore, the Petitioners call for the revocation of the operating licenses for boiling water reactors with the Mark I and Mark II containment systems.

NRC Response to Petitioners Concern #11

As stated above in SECY-12-0157, the NRC staff concluded that the Mark I and II BWRs meet their current licensing basis.

The Fukushima Daiichi event was a significant beyond-design basis event resulting from extreme natural phenomena. Nevertheless, the accident highlighted the need for reevaluation of the impacts from extreme natural phenomena, and where appropriate, the implementation of additional safety margin improvements.

The NRC has taken significant action to enhance the safety margin of reactors in the United States based on the lessons learned from this accident. After the Fukushima accident, a task force of senior NRC staff reviewed the circumstances of the event to determine what lessons could be learned. In July 2011, the task force provided recommendation to enhance U.S. reactor safety (ADAMS Accession No. ML111861807), and these became the foundation of the NRC's post-Fukushima activities. The Commission then approved a three-tiered prioritization of the recommendations. These safety margin improvement recommendations are currently being developed and implemented at all U.S. commercial nuclear reactor facilities. These recommendations can be found on the NRC public webpage at http://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/priorities.html.

Subsequently, the Commission issued a series of orders, EA-13-109 (Severe Accident Capable Reliable Hardened Vents), EA-12-049 (Station Blackout Mitigation Strategies), and EA-12-051 (Enhanced Spent Fuel Pool Instrumentation) to further and significantly enhance the margins of safety to the effects of extreme natural phenomena at commercial operating reactors in the United States.

The concerns raised are related to plant conditions that result from beyond design basis accidents. The Commission SRM SECY-12-0157 provided clear direction and actions for the NRC staff. The PRB understands that the petitioners disagree with the Commission, but the petitioners did not provide information not considered by the Commission during its deliberations. The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #12

> The Commission is making decisions based on financial burden to licensees that overshadows public safety.

NRC Response to Petitioners Concern #12

This is outside the purview of the PRB and has been referred to the Office of the Inspector General, for consideration. The PRB reviewed the CVR dated March 19, 2013 (ADAMS Accession No. ML13078A012). The Commission deliberately weighed the options and cast their votes. The Commission determined that the proposed order requiring engineered filters was not a matter of assuring adequate protection of the public, but instead addressed very low-probability, beyond-design-basis events. The Commission approved the development of technical bases and rulemaking for filtering strategies with drywell filtration and severe accident management of BWR Mark I and II containments. The Commission directed the NRC staff to engage a diversity of external stakeholders throughout the development of the technical bases and rulemaking and to interact with the ACRS at appropriate points in the process. To engage a diversity of stakeholders and viewpoints most effectively, the Commission directed the NRC staff to consider various formats, to include public meetings, workshops, and tabletop exercises to foster detailed discussion of analytical methods, modeling assumptions, and potential performance criteria.

Once again, the Mark I and II BWRs meet their current licensing basis.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #13

The evacuation plan, at Limerick Generating Station, will not work.

NRC Response to Petitioners Concern #13

A key component of the mission of the NRC is to ensure adequate protective actions are in place to protect the health and safety of the public. Protective actions are taken to avoid or reduce radiation dose and are sometimes referred to as protective measures.

The overall objective of Emergency Preparedness (EP) is to ensure that the nuclear power plant operator is capable of implementing adequate measures to protect public health and safety in the event of a radiological emergency. As a condition of their license, operators of these nuclear power plants must develop and maintain EP plans that meet comprehensive NRC EP requirements. Increased confidence in public protection is obtained through the combined inspection of the requirements of emergency preparedness and the evaluation of their implementation.

The NRC assesses the capabilities of the nuclear power plant operator to protect the public by requiring the performance of a full-scale exercise at least once every 2 years that includes the participation of government agencies. These exercises are performed in order to maintain the skills of the emergency responders and to identify and correct weaknesses. They are evaluated by NRC inspectors and Federal Emergency Management Agency (FEMA) evaluators. Between these 2-year exercises, additional drills are conducted by the nuclear power plant operators that are evaluated by NRC inspectors.

The roles and responsibilities of the NRC and FEMA (part of the Department of Homeland Security (DHS)) with regard to emergency preparedness are found in their respective regulations and in a Memorandum of Understanding (June 17, 1993, 58 FR 47996) between the two agencies relating to nuclear power plant EP.

State and local government officials have the overall responsibility of deciding and implementing the appropriate protective actions for the public during a nuclear power plant radiological emergency. They are responsible for notifying the public to take protective actions, such as evacuation, sheltering in place or taking potassium iodide pills as a supplement. State and local officials base their decisions on the protective action recommendations by the nuclear power plant operator and their own radiological or health organizations. The NRC provides advice, guidance, and support to the State and local government officials. Neither the nuclear power plant operator nor the NRC can order the public to take protective actions.

The operators of the GE Mark I and II BWRs, including Limerick Generating Station, are capable of implementing adequate EP measures to protect public health and safety in the event of a radiological emergency.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders (including enhancements to some provisions related to EP), and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #14

Various licensees with Mark I & II BWRs have numerous equipment issues and plant events.

NRC Response to Petitioners Concern #14

The regulatory framework for reactor oversight consists of three key strategic performance areas: reactor safety, radiation safety, and safeguards. Within each strategic performance area are cornerstones that reflect the essential safety aspects of facility operation. These seven cornerstones include: initiating events, mitigating systems, barrier integrity, emergency preparedness, public radiation safety, occupational radiation safety, and physical protection. Satisfactory licensee performance in the cornerstones provides reasonable assurance of safe facility operation and that the NRC's safety mission is being accomplished. Each cornerstone contains inspection procedures and performance indicators to ensure that their objectives are being met.

The NRC evaluates plant performance by analyzing two distinct inputs: inspection findings resulting from NRC's inspection program and performance indicators (PIs) reported by the licensee (Inspection Findings + Performance Indicators = Plant Assessment). Both PIs and inspection findings are evaluated and given a color designation based on their safety significance. Green inspection findings indicate a deficiency in licensee performance that has very low risk significance and therefore has little or no impact on safety. Green PIs represent acceptable performance in which cornerstone objectives are fully met and likewise have little or no impact on safety. Both Green inspection findings and PIs allow for licensee initiatives to correct performance issues before increased regulatory involvement is warranted. White, Yellow, or Red inspection findings or PIs each, respectively, represent a greater degree of safety significance and therefore trigger increased regulatory attention.

NRC Inspection Findings for each plant are documented in inspection reports in accordance with Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," and summarized in Plant Issues Matrices (PIMs). Inspection findings are evaluated using the significance determination process (SDP) in accordance with IMC 0609, "Significance Determination Process for Power Reactor." The latest PIMs and inspection reports are posted on the plant web along with the PIs about 5 weeks after the end of each quarter. The inspection findings/PIMs are also updated on the web as soon as practical to reflect any final significance determinations that result in a risk significance that is more than very low significance (i.e., greater than green). Inspection findings that cut across cornerstones, such as corrective action program and PI verification findings, are listed in the PIMs as miscellaneous findings.

Performance Indicators are reported to the NRC by licensees on a quarterly basis after the end of each quarter in accordance with IMC 0608, "Performance Indicator Program," and the latest PI reporting guidance.

The NRC assesses plant performance continuously, and communicates its assessment of plant performance in letters to licensees, typically semi-annually. The assessment letters also contain a proposed inspection plan for the next 15 months of operation. The assessment letters are available on the plant performance summary page for each plant, and are posted on the NRC public website as they become available.

The NRC determines its regulatory response in accordance with an Action Matrix that provides for a range of actions commensurate with the significance of the PI and inspection results. The Action Matrix is intended to provide consistent, predictable, understandable agency responses to licensee performance. The actions of the matrix are graded such that the NRC becomes more engaged as licensee performance declines. One basic tenet of the Reactor Oversight Program was that a licensee's corrective action program should be relied upon to correct identified issues that do not result in safety performance thresholds being crossed. So for a plant that has all of its PIs and inspection findings characterized as green, the NRC will implement its baseline inspection program, typically consisting of approximately 2700 hours per site. In the implementation of the baseline program, the NRC can make adjustments to the inspection plan based on plant performance trends. For example, if a PI is trending toward the green/white threshold, the NRC can focus inspection effort in that area. In the same manner, licensees track inspection findings and PI results, as well as other identified issues, and take corrective actions as necessary. For plants that do not have all green PIs and inspection findings, the NRC will perform additional inspections beyond the baseline program and initiate other actions commensurate with the safety significance of the issues.

The events at the GE Mark I and II BWRs do not warrant any unit to be placed into the "Unacceptable Performance" Column of the Action Matrix; therefore, the request to revoke the licenses is rejected.

Petitioners Concern #15

> Various plants with GE Mark I & II BWRs cannot withstand potential earthquake hazards.

NRC Response to Petitioners Concern #15

The NRC staff continues to conclude that the GE Mark I and II BWRs have been designed, built, and operated to safely withstand earthquakes likely to occur in its region and meet their current licensing basis. As part of the NRC post-Fukushima lessons-learned activities, the NRC is requiring all licensees to reevaluate seismic hazards at their sites. To this end, on March 12, 2012, the NRC issued a request for information under 10 CFR Section 50.54(f) (ADAMS Accession No. ML12053A340). Site seismic hazard reevaluations for licensees in the central and eastern U.S. are expected to submit their findings to the NRC by March 2014.

In addition, the Commission issued order, EA-12-049 (Station Blackout Mitigation Strategies), which requires mitigation strategies to protect against, among many other hazards, postulated seismic events. Such actions significantly enhance the margins of safety to the effects of extreme natural phenomena at commercial operating reactors in the United States.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #16

> Various plants with GE Mark I & II BWRs cannot withstand potential flooding hazards.

NRC Response to Petitioners Concern #16

The NRC staff continues to conclude that the GE Mark I and II BWRs have been designed, built, and operated to safely withstand flooding hazards likely to occur in its region and meet their current licensing basis. As part of the NRC post-Fukushima lessons-learned activities, the NRC is requiring all licensees to reevaluate flooding hazards at their sites. To this end, on March 12, 2012, the NRC issued a request for information under 10 CFR Section 50.54(f) (ADAMS Accession No. ML12056A046). Site flooding hazard reevaluations for all licensees are expected to be submitted to the NRC by March 2015.

In addition, the Commission issued order, EA-12-049 (Station Blackout Mitigation Strategies), which requires mitigation strategies to protect against, among many other hazards, postulated flooding hazards. Such actions significantly enhance the margins of safety to the effects of extreme natural phenomena at commercial operating reactors in the United States.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #17

> In a letter dated September 24, 2011 (ADAMS Accession No. ML11279A034), petitioners raised concerns regarding the controls rods entering the bottom of the reactor pressure vessel and that the explosion at Fukushima Daiichi Unit 3 was a detonation, not a deflagration.

NRC Response to Petitioners Concern #17

The supplement dated September 24, 2011, is being addressed as part of 2.206 petition dated April 23, 2011 (ADAMS Accession No. ML11104A058), under NRC Green Ticket G20110262. The NRC staff provided a letter dated December 13, 2011 (ADAMS Accession No. ML11339A077), that accepted for review the 2.206 petition dated April 23, 2011, as supplemented.

Petitioners Concern #18

> There is an accumulation of spent fuel stored at various plant sites with GE Mark I & II BWRs.

NRC Response to Petitioners Concern #18

All U.S. nuclear power plants store spent nuclear fuel in "spent fuel pools." These pools are made of reinforced concrete several feet thick, with steel liners. The water is typically about 40 feet deep, and serves both to shield the radiation and cool the spent fuel assemblies.

As the pools near capacity, utilities move some of the older spent fuel into "dry cask" storage. Fuel is typically cooled at least 5 years in the pool before transfer to cask. NRC has authorized transfer as early as 3 years; the industry norm is about 10 years.

The NRC determined spent fuel pools and dry casks both provide adequate protection of the public health and safety and the environment. Therefore, there is no pressing safety or security reason to mandate earlier transfer of fuel from pool to cask. The Commission is considering the potential expedited transfer of spent fuel to dry cask storage in response to COMSECY-13-0030, "Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel" (ADAMS Accession No. ML13329A918).

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 were meant 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 tsunami. These mitigating measures include:

1. 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.
2. Establishing emergency spent fuel cooling capability.
3. Staging emergency response equipment nearby so it can be deployed quickly.

The GE Mark I and II BWRs meet their current license requirements related to spent fuel storage and inventory; therefore, the request to revoke the licenses is rejected.

Petitioners Concern #19

The plants cannot maintain spent fuel cooling.

NRC Response to Petitioners Concern #19

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 were meant to deal with the aftermath of a terrorist attack or plane crash; however, they could also be effective in responding to natural phenomena such as tornadoes, earthquakes or tsunami. These mitigating measures include:

1. 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.
2. Establishing emergency spent fuel cooling capability.
3. Staging emergency response equipment nearby so it can be deployed quickly.

During the accident at Fukushima, the plants lost their ability to cool the spent fuel pools. Plant operators could not determine how much water was in the pools during the accident, which was a problem. If enough water boiled away or was otherwise lost, the spent fuel rods could emerge from the receding water and potentially release significant amounts of radiation. Weeks later, it was learned that the spent fuel was **always** covered, but the information gap diverted significant attention and extremely limited resources from more important tasks during the accident. The

NRC issued an Order on March 12, 2012, requiring all U.S. nuclear power plants to install water level instrumentation in their spent fuel pools. The instrumentation must remotely report at least three distinct water levels: (1) normal level; (2) low level but still enough to shield workers above the pools from radiation; and (3) a level near the top of the spent fuel rods where more water should be added without delay.

The GE Mark I and II BWRs meet their current licensing basis. The margins of safety to extreme natural phenomena will be further enhanced when compliance with Order EA-12-051 is achieved.

The reason for rejection is that the licensees meet their current licensing basis, are taking actions as directed in the recently issued NRC orders, and the petitioners have not provided information not previously considered by the NRC; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #20

> The petitioners contend that the NRC lacks a safety culture. Therefore, the NRC cannot be relied upon to be in a position to guarantee that the adequate protection of the public health and safety can be provided by their oversight.

NRC Response to Petitioners Concern #20

This is outside the purview of the PRB and has been referred to the Office of the Inspector General, for consideration.

Petitioners Concern #21

> The petitioners contend there is a greater risk of cancer for people living near the Browns Ferry nuclear power plant.

NRC Response to Petitioners Concern #21

A National Cancer Institute (NCI) survey published in the *Journal of the American Medical Association*, March 20, 1991, showed no general increased risk of death from cancer for people living in 107 U.S. counties containing or closely adjacent to 62 nuclear facilities. The facilities in the survey had all begun operation before 1982. Included were 52 commercial nuclear power plants, 9 Department of Energy research and weapons plants, and one commercial fuel reprocessing plant. The survey examined deaths from 16 types of cancer, including leukemia. In the counties with nuclear facilities, cancer death rates before and after the start-up of the facilities were compared with cancer rates in 292 similar counties without nuclear facilities (control counties). The NCI survey showed that, in comparison with the control counties, some of the study counties had higher rates of certain cancers and some had lower rates, either before or after the facilities came into service. None of the differences that were observed could be linked with the presence of nuclear facilities.

Currently, the NRC is sponsoring *Analysis of Cancer Risks in Populations Near Nuclear Facilities,* a study that is being undertaken by the National Academy of Sciences (NAS). *Phase 1* of the study will update a 1990 study performed by the National Institutes of Health, NCI, *Cancer in Populations Living Near Nuclear Facilities*. The NRC uses the 1990 report as a primary resource when communicating with the public about cancer mortality risk in counties that contain or are adjacent to nuclear power facilities. In the new study, the NRC is asking the NAS to evaluate cancer diagnosis rates, in addition to mortality risk, for populations living near decommissioned, operating, and proposed NRC-licensed nuclear facilities. Phase 1 of the new NAS study will determine whether a technically defensible approach to meet the goals of the study request is feasible, and, if it is, the approach will be developed using scientifically sound processes for evaluating cancer risk that could be associated with nuclear facilities. The NAS is a non-governmental organization chartered by the U.S. Congress to advise the nation on issues of science, technology, and medicine. Through the National Research Council and Institute of Medicine, it carries out studies independently of the government, using processes designed to promote transparency, objectivity, and technical rigor.

A NCI survey published in the *Journal of the American Medical Association*, March 20, 1991, showed no general increased risk of death from cancer for people living in 107 U.S. counties containing or closely adjacent to 62 nuclear facilities; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #22

> The petitioners contend there is not enough staff, due to lay-offs, to keep the GE Mark I & II BWR plants owned by Entergy safe.

NRC Response to Petitioners Concern #22

The core of the NRC inspection program for nuclear power plants is carried out by resident inspectors, who are (on-site) and at least, two inspectors are assigned to each site. Resident inspectors continuously monitor licensee activities in accordance with the baseline inspection program.

Inspection specialists from the regional offices review plant security, emergency planning, radiation protection, environmental monitoring, periodic testing of plant equipment and systems, fire protection, construction activities, and other more specialized areas. During the course of a year, NRC specialists may conduct 10 to 25 routine inspections at each nuclear power plant, depending on the activities at the plants and problems that may occur. Team inspections regularly review fire protection, plant design, and corrective actions. Special team inspections may focus on a specific plant activity, such as maintenance or security, or a team may be sent to the plant to look at a specific operating problem or accident.

The staff levels at the GE Mark I and II BWRs do not warrant any unit to be placed into the "Unacceptable Performance" Column of the Action Matrix; therefore, the requested action to revoke the licenses is rejected.

Petitioners Concern #23

The petitioners contend that it is not safe to store spent fuel on-site, for many years, after a unit is decommissioned.

NRC Response to Petitioners Concern #23

The NRC Decommissioning regulations are found in Chapter I of the Title 10, "Energy," of the *Code of Federal Regulations* (CFR). The regulations in 10 CFR, Part 20, Subpart E provide the main decommissioning requirements. A great deal of decommissioning information is located on the NRC public website at http://www.nrc.gov/about-nrc/regulatory/decommissioning.html.

The NRC has determined spent fuel pools and dry casks both provide adequate protection of the public health and safety and the environment. Therefore, there is no pressing safety or security reason to mandate earlier transfer of fuel from pool to cask.

The reason for rejection is that the licensees meet their current licensing basis; therefore, the requested action to revoke the licenses is not warranted.

Petitioners Concern #24

The petitioners contend that the NRC sweeps under the rug the possibility that a terrorist attack could actually cause a problem.

NRC Response to Petitioners Concern #24

In response to the terrorist attacks of September 11, 2001, NRC took immediate action by advising nuclear power plants to go the highest level of security, which all licensees promptly implemented. Shortly afterward, NRC and the industry re-evaluated the physical security at the nation's nuclear power plants. In February 2002, the NRC issued Interim Compensatory Measures (ICMs) requiring all U.S. nuclear power plants to perform specific plant design studies, add additional security personnel, enhance physical protection features, improve Emergency Preparedness, and provide additional training. Further information can be found on the NRC website at http://www.nrc.gov/about-nrc/emerg-preparedness/respond-to-emerg/response-terrorism.html.

The operators of the GE Mark I and II BWRs have taken the necessary actions to be prepared for a possible terrorist attack; therefore, the requested action to revoke the licenses is rejected.

Petitioners Concern #25

The petitioners contend that the NRC is not taking the Fukushima event seriously.

NRC Response to Petitioners Concern #25

The NRC has taken the Fukushima accident very seriously and has worked diligently since the accident to learn the lessons and implement those lessons. For further information, please see the NRC public website at https://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard.html.

CONCLUSION

The PRB's final recommendation is that no proceeding will be instituted with respect to your petition in accordance with 10 CFR 2.206(b), with the reasons for the decision described above. The petition is rejected, because the concerns raised did not reveal that the licensees of the Mark I and II BWRs are in violation of their current licensing basis nor warrant that the licenses need to be revoked.

March 26, 2014

Mr. Paul Gunter, Director
Reactor Oversight Project
Beyond Nuclear
6930 Carroll Avenue, #400
Takoma Park, MD 20912

Dear Mr. Gunter:

I am responding to your petition dated March 21, 2013, and supplemented on May 2, May 6, May 13, July 19, September 30, and October 29, 2013.[1] On behalf of Beyond Nuclear, and representing numerous public interest groups (collectively Beyond Nuclear et. al. or Petitioners), you submitted a petition pursuant to Section 2.206 of Title 10 of the *Code of Federal Regulations* (10 CFR 2.206) of the U.S. Nuclear Regulatory Commission's (NRC's) regulations. Your petition requested that the NRC revoke the operating licenses at General Electric Mark I and II Boiling-Water Reactors. Your petition, addressed to former Executive Director for Operations, Mr. R.W. Borchardt, was referred to the Office of Nuclear Reactor Regulation.

The final recommendation of the NRC's Petition Review Board (PRB) is that no proceeding will be instituted with respect to your petition in accordance with 10 CFR 2.206(b). The PRB determined that the issues raised in your petition, as supplemented, did not provide information beyond what the NRC had already reviewed, evaluated, and/or addressed relative to the safe operation of the subject plants. Therefore, no proceeding will be instituted with respect to your petition in accordance with 10 CFR 2.206(b) and the specific reasons for the decision are provided in the enclosure to this letter.

Sincerely,
/ra/
Jack Davis, Director
Mitigating Strategies Directorate
Office of Nuclear Reactor Regulation

Docket Nos. 50-259, 50-260, 50-296,
50-325, 50-324, 50-397, 50-298, 50-237,
50-249, 50-331, 50-321, 50-366, 50-341,
50-354, 50-333, 50-373, 50-374, 50-352,
50-353, 50-263, 50-220, 50-410, 50-219,
50-277, 50-278, 50-293, 50-254, 50-265,
50-387, 50-388, and 50-271
Enclosure:
As stated
cc: Licensees – Mark I and II BWRs
Listserv

1 Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML13085A218, ML13144A127, ML13144A135, ML13298A085, ML13298A098, ML13144A161, ML13144A173, ML13134A372, ML13210A397, ML13297A089, and ML13304C006, respectively.

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