Beyond Nuclear
6930 Carroll Avenue
Suite 400
Takoma Park, MD 20912
Email: paul@beyondnuclear.org
Tel. 301 270 2209 x 3
www.beyondnuclear.org

PETITION TO REVOKE THE OPERATING LICENSES AT GE MARK I & II BOILING WATER REACTORS IN VIOLATION OF LICENSED CONDITIONS FOR SAFE OPERATION AND RELIABLE CONTAINMENT

March 21, 2013

Mr. James Borchardt
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
By email: Bill.Borchardt@nrc.gov

Mr. Borchardt:

Beyond Nuclear in conjunction with petitioners Georgia Women's Action for New Directions, Nuclear Watch South, Nuclear Energy Information Service, Cape Downwinders, Citizens Awareness Network, Central New York-Citizens Awareness Network, Vermont Citizens Action Network, Coalition for a Nuclear Free Great Lakes, Citizens Resistance at Fermi 2, Don't Waste Michigan, Unplug Salem Campaign for Hope Creek, No Nukes Northwest, Iowa Chapter of the Sierra Club, New Jersey Environmental Federation/Clean Water Action, Washington Physicians for Social Responsibility, Oregon Physicians for Social Responsibiltiy, Alliance for a Green Economy, Syracuse Peace Council, Citizens' Environmental Coalition, Oregon and Washington Physicians for Social Responsibility Joint Task Force on Nuclear Power, Grandmothers, Mothers and

More for Energy Safety and the Safe and Green Campaign, hereafter simply referred to as the Petitioners, submit the following request for emergency enforcement action as provided by Section 2.206 of Title 10 of the Code of Federal Regulation (10 CFR 2.206) for the revocation of the operating licenses for the General Electric Mark I and Mark II boiling water reactors in the United States.

This section of federal law is intended to help ensure the protection of public health and safety through the prompt and thorough evaluation of an alleged health and safety problem at these nuclear facilities that requires emergency enforcement action by the United States Nuclear Regulatory Commission (NRC).

The Petitioners therefore submit the following:

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, and;

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;

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”[1] 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 over-pressure and over-temperature events challenging the unreliable Mark I and Mark II containment systems;

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 ”[2] as the result of a to-be-anticipated accident involving reactor core fuel damage and the over-pressure and over-temperature events of the Mark I and Mark II containment system.

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 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

[1] US NRC Code of Federal Regulation Chapter 10 Appendix A, General Design Criteria 10, http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appa.html

[2] US NRC Code of Federal Regulation Chapter 10 Appendix A, General Design Criteria 16, http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appa.html

containment system to preserve it from permanent failure;

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;

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;* [3]

"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.[4]

"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

[3] "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments," US NRC, November 26, 2012, p. 5
http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0157scy.pdf
[4] Ibid, p. 42 0f 331

there is a greater potential to generate significant amounts of hydrogen gas which also will increase containment pressures;[5]

"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; [6]

"[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; [7]

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. [8] 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 1 percent decay heat power assuming a pressure equal to the primary containment pressure limit (PCPL), and <u>not designed for operation during a severe accident</u>.*[9] [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

[5] Ibid, p. 62 of 331
[6] Ibid, p. 41 of 331
[7] Ibid, p. 4 of 331
[8] "Installation of a Hardened Wetwell Vent (Generic Letter 89-16), US NRC, September 1, 1989, http://www.nrc.gov/reading-rm/doc-collections/gen-comm/gen-letters/1989/gl89016.html
[9] SECY 2012-0157, Ibid. p. 66 of 331

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;* [10]

"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; [11]

"The installation of a filtering system with expected performance requirements would significantly reduce the estimated affected land area and related economic consequences.[12]

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. [13]

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

8) Whereas, on March 19, 2013, the NRC Commissioners by Notation Vote unanimously accepted the Staff Recommendation set forth in SECY-2012-

[10] Ibid, p. 2 of 331
[11] Ibid, p. 9 of 331
[12] Ibid, p. 28 of 331
[13] Ibid, p. 10 of 331

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;[14]

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.* [15]

"Engineered filtered containment system can help protect the public and the environment by significantly reducing the amount of radiological

[14] Commission Voting Record: SECY 2012-0157, "Consideration for Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments," http://www.nrc.gov/reading-rm/doc-collections/commission/cvr/2012/2012-0157vtr.pdf
[15] Ibid, p. 4 of 28

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;[16]

""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, its 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* [17]

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

[16] Ibid, p. 5 of 28
[17] Ibid, p. 4-5 of 28

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 Captiol 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 systms for BWRs with Mrk I and Mark II containments by order.* [18]

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 disingenous 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.

[18] Ibid, p. 13 of 28

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 theCommission 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;

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.

Sincerely,

---------/s/----------
Paul Gunter, Director
Reactor Oversight Project
Beyond Nuclear
6930 Carroll Ave. #400
Takoma Park, MD 20912
paul@beyondnuclear.org
301-270-2209

----------/s/----------
Kevin Kamps, Director
Nuclear Waste Specialist
Beyond Nuclear
6930 Carroll Ave. #400
Takoma Park, MD
kevin@beyondnuclear.org
301-270-2209

----------/s/----------
Bobbie Paul
Georgia Women's Action for
New Directions
250 Georgia Ave. SE, Ste. 202
Atlanta, GA 30312
404-524-5999
bobbie@georgiawand.org

----------/s/----------
David Kraft
Nuclear Energy Information Service
3411 W. Diversey #16
Chicago, IL 60647
773-342-7650
neis@neis.org

----------/s/----------
Deb Katz
Executive Director
Citizens Awareness Network
PO Box 83
Shelburne Falls, MA 01370
(413) 339-5781
deb@nukebusters.org

----------/s/----------
David Agnew
Cape Downwinders
18 Marthas Lane
Harwich, MA 02645
gogreens@comcast.net

----------/s/----------
Tim Judson
Central New York-
Citizens Awareness Network
2013 E. Genesee Street
Syracuse, NY 13210
(315) 415-3005
judson.tim@gmail.com

----------/s/----------
Sally Shaw
100 River Road
Gill, MA 01345
acer8sac@comcast.net

----------/s/----------
Chris Williams
President
Vermont Citizens Action Network
PO Box 16
Hancock, VT 05748
(802) 767-4276
cevan@sover.net

----------/s/----------
Mike Keegan
Coalition for a Nuclear Free Great Lakes
P.O. Box 463
Monroe, MI 48161
mkeeganj@comcast.net

----------/s/----------
Norm Cohen, Coordinator
Unplug Salem Campaign for
Hope Creek.
321 Barr Ave
Linwood NJ 08221
609-365-8176
ncohen12@comcast.net

----------/s/----------
Jessie Pauline Collins
Citizens Resistance at Fermi 2
P.O. Box 1201
Gore, OK 74435
jessiepauline@gmail.com

----------/s/----------
Alice Hirt
Don't Waste Michigan
6677 Summit View
Holland, MI
AliceHirt@gmail.com

----------/s/----------
Miriam Wells
No Nukes Northwest
Portland, OR
Miriam@nonukesnw.org
(971) 238-3898

----------/s/----------
Wally Taylor, Esq.
Iowa Chapter of the Sierra Club
118 3rd Ave. S.E., Suite 326
Cedar Rapids, Iowa 52401
319-366-2428
wtaylor784@aol.com

----------/s/----------
Leslie Sullivan Sachs
Safe and Green Campaign
P.O. Box 6052
Brattleboro, VT 05302
safeandgreencampaign@gmail.com

----------/s/----------
Glenn Carroll
Nuke Watch South
P.O. Box 8574
Atlanta, GA 31106
404-378-4263
nukewatchsouth@mindspring.com

----------/s/----------
Peggi Strumfels
New Jersey Environmental Federation/
Clean Water Action
198 Brighton Avenue
Long Branch, NJ
(732) 963-9714
psturmfels@aol.com

----------/s/----------
Tom Buchanan
Vice President, Washington
Physicians for Social Responsibility
1604 NE 50th Street
Seattle, WA 98105
206-947-6832
clrtom@earthlink.net

----------/s/----------
Anne Rabe
Campaign Coordinator
Center for Health, Environment
& Justice
Castleton, NY

----------/s/----------
Jessica Azulay
Organizer
Alliance for a Green Economy
(AGREE)
Syracuse, New York `

----------/s/----------
Charles K. Johnson
Director, Joint Task Force on Nuclear Power
Oregon and Washington Physicians for Social
Responsibility
812 SW Washington Street, Suite 1050
Portland, OR 97205
(503) 777-7294 cell
chuck@oregonpsr.com

----------/s/----------
Ursula Rozum
Staff Organizer
Syracuse Peace Council

----------/s/----------
Barbara J. Warren
Executive Director
Citizens' Environmental Coalition
Albany, NY

----------/s/----------
Jeff Brown
GRAMMES
Jersey Shore Area, NJ
jbnj@comcast.net

----------/s/----------
John Pearson, MD
President, Oregon Physicians for
Social Responsibility
812 SW Washington Street, Suite 1050
Portland, OR 97205
503-915-8697
jp456781@comcast.net