



**Beyond Nuclear**  
6930 Carroll Avenue  
Suite 400  
Takoma Park, MD 20912  
Email: [paul@beyondnuclear.org](mailto:paul@beyondnuclear.org) [kevin@beyondnuclear.org](mailto:kevin@beyondnuclear.org)  
Tel. 301 270 2209  
[www.beyondnuclear.org](http://www.beyondnuclear.org)

April 13, 2011

Mr. James Borchardt  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001  
By email: [secretary@nrc.org](mailto:secretary@nrc.org)

**10 CFR 2.206 PETITION TO IMMEDIATELY SUSPEND THE  
OPERATING LICENSES OF GE BWR MARK I UNITS  
PENDING FULL NRC REVIEW  
WITH INDEPENDENT EXPERT AND PUBLIC PARTICIPATION  
FROM AFFECTED EMERGENCY PLANNING ZONE COMMUNITIES**

Mr. Borchardt:

Beyond Nuclear (the Petitioner) submits 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](#)). This section 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 nuclear facilities that require emergency enforcement action by the United States Nuclear Regulatory Commission (NRC).

The Petitioner seeks this enforcement action to ensure that the public health and safety is not unduly being jeopardized by the unsafe operations at twenty one (21) General Electric Boiling Water Reactors Mark I units that rely upon a

fundamentally flawed combination of free standing steel primary containments for their pressure suppression containment system, the installation of the “hardened vent system,” or not, and an additional three (3) Mark 1 units for a total of twenty four (24) units which rely upon used radioactive fuel storage pools (also known as “spent fuel pools” elevated to the top the reactor building outside and above the rated containment structure without safety-related back-up electric power (Class E1) systems to cool high-density storage of thermally hot and highly radioactive nuclear waste in the event of loss of grid power.

The still unfolding catastrophic aftermath of the Great Eastern Japan Earthquake and Tsunami of March 11, 2011 leading to the station blackout at Fukushima Dai-Ichi nuclear power plant complex and multiple severe accidents raise significant long standing concerns to a new level of questions and concerns. Specifically, the Emergency Enforcement Petition focuses on the unreliability of General Electric Boiling Water Reactor Mark I containment system to mitigate a severe accident and the lack of emergency power systems to cool high density storage pools each containing hundreds of tons thermally hot and extremely radioactive used reactor fuel assemblies located atop the reactor buildings and outside a rated containment.

Sincerely,

-----/s/-----

Paul Gunter, Director  
Reactor Oversight Project  
[paul@beyondnuclear.org](mailto:paul@beyondnuclear.org)

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Kevin Kamps, Director  
Nuclear Waste Specialist  
[kevin@beyondnuclear.org](mailto:kevin@beyondnuclear.org)

April 13, 2011

UNITED STATES OF AMERICA  
BEFORE THE  
NUCLEAR REGULATORY COMMISSION  
EXECUTIVE DIRECTOR OF OPERATIONS

BEYOND NUCLEAR PETITION  
FOR  
EMERGENCY ENFORCEMENT ACTION  
PER  
10 CFR 2.206

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IN THE MATTER OF  
BROWNS FERRY 1, 2 & 3 (AL)  
BRUNSWICK 1 & 2 (NC)  
COOPER 1 (NE)  
DRESDEN 2 & 3 (IL)  
DUANE ARNOLD 1 (IA)  
FERMI 2 (MI)  
FITZPATRICK 1 (NY)  
HATCH 1 & 2 (GA)  
HOPE CREEK 1 (NJ)  
MONTICELLO 1 (MN)  
MILLSTONE 1 (CT)  
NINE MILE POINT 1 (NY)  
OYSTER CREEK 1 (NJ)  
PEACH BOTTOM 2 & 3 (PA)  
PILGRIM 1 (MA)  
QUAD CITIES 1 & 2 (IL)  
VERMONT YANKEE 1 (VT)

**PETITION FOR EMERGENCY ENFORCEMENT ACTION  
FOR GE BOILING WATER REACTORS UTILIZING  
MARK 1 PRIMARY CONTAINMENT SYSTEMS  
AND WITHOUT DEDICATED CLASS E1 POWER FOR COOLING  
ELEVATED IRRADIATED USED FUEL STORAGE POOLS  
OUTSIDE A RATED CONTAINMENT STRUCTURE**

Beyond Nuclear (the Petitioner) hereby petitions the United States Nuclear Regulatory Commission (NRC) to suspend the operating licenses of all General Electric Boiling Water Reactors (BWR) that utilize the Mark I primary containment system pending a complete and thorough [near term and long term review](#)<sup>1</sup> by NRC to include statements by public and independent experts in public meetings convened by NRC within each of the emergency planning zones on the unreliability and inadequacy of current accident mitigation modifications, the need for further changes or the permanent revocation of the captioned BWR operating licenses.

The Petitioner asserts that new information and analyses generated by the Fukushima Dai-Ichi nuclear accident in Japan raises this request to the level of an emergency enforcement petition for all US reactors where public health and safety relies upon the same failed design of a free standing steel primary containment system based on the pressure suppression concept. This new information and analysis supersede any prior NRC Final Director's Decision on any previous Petition for Emergency Enforcement Action to include the Director's Final Decision of December 12, 1989 to deny the Anne Harlow petition under 10 CFR 2.206 which requested the NRC to take emergency action to "fix or close" all GE Boiling Water Reactors in the US.

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<sup>1</sup> Charter for the Nuclear Regulatory Commission Task Force To Conduct A Near Term Evaluation of the Need for Agency Actions Following the Events in Japan, USNRC, Undated March 2011, ML11089A045

As provided by Section 2.206 in Title 10 of the Code of Federal Regulation (10 CFR 2.206), Beyond Nuclear is submitting this emergency enforcement petition for the immediate suspension of operating licenses for all nuclear power plant units that:

A. Currently rely upon the General Electric Boiling Water Reactor ([GE BWR](#))<sup>2</sup> [Mark I Pressure Suppression Containment System](#)<sup>3</sup> fabricated of a free standing steel primary containment comprised of carbon steel drywell and wetwell (also known as the “torus”) as components credited by the Final Safety Analysis Report (as updated) to be a leak tight structure originally designed, constructed and licensed to mitigate and contain uncontrolled radiation releases from a severe core damage accident.

The Petitioner submits that these same Mark I units were identified as early as [September 22, 1972 by memo from Dr. Stephen Hanauer](#), United States Atomic Energy Commission, to be vulnerable to early failure under severe accident conditions including over-pressurization.<sup>4</sup> Dr. Hanauer states that *“Recent events have highlighted the safety disadvantages of the pressure suppression containment. While they have some safety advantages, on balance I believe the disadvantages to be preponderant. I recommend that the AEC adopt a policy of discouraging further use of pressure suppression containments, and that such designs not be accepted for construction permits files after a date to be decided (say two years after the policy is adopted).”*<sup>5</sup> Dr. Hanauer went on to point out *“Since the pressure suppression containments are smaller than conventional ‘dry’ containments, the same amount of hydrogen, formed in a postulated accident, would constitute a higher volume or weight percentage of the containment atmosphere. Therefore, such hydrogen generation tends to be a*

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<sup>2</sup> Graphic of General Electric Boiling Water Reactor Mark I unit, USNRC

<sup>3</sup> Drawing of the GE BWR Mark I pressure suppression system credited for containment, USNRC

<sup>4</sup> Memo of Dr. Stephen Hanauer, DRTA, “Pressure Suppression Containments, United States Atomic Energy Commission, September 20, 1972

<sup>5</sup> Ibid, p. 1

*more serious problem in pressure suppression containments.*<sup>6</sup> While the AEC did adopt a policy to not accept further new construction applications in 1972, the nuclear agency did not take action to discourage the further use of the vulnerable design and in fact allowed three more Mark I projects then under construction to be completed after 1972 for licensing. Dr. Hanauer's now significant warning to the agency for the need of "discouraging further use" of the Mark I was ignored by US federal safety officials. In this context, US nuclear safety officials bear in part responsibility for the Japanese nuclear disaster given the very direct warning and description of the Fukushima Dai-Ichi containment failure mechanism raised early on by Dr. Hanauer and subsequently ignored over the decades.

Moreover, safety concerns over the substandard Mark I pressure suppression containment system were again [affirmed in 1986 by Dr. Harold Denton](#), Director of Nuclear Reactor Regulation, United States Nuclear Regulatory Commission when he told a nuclear industry conference that the flawed reactor containment type has as high as a 90% chance of failure if challenged by a severe accident conditions.<sup>7</sup>

This same reactor design has now dramatically failed in Japan to reliably and adequately mitigate and contain significant and mounting radiological releases to the atmosphere, groundwater and the ocean from multiple severe accidents in multiple GE BWR Mark I units at the Fukushima Dai-Ichi nuclear power plant.

There are twenty one (21) GE Mark I BWRs in the United States utilizing the Fukushima Dai-Ichi style free standing steel primary containment composed of a carbon steel drywell connected by large diameter piping to the carbon steel suppression chamber or wetwell or "torus" to make up the safety-credited pressure suppression containment system.

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<sup>6</sup> Ibid, p. 2

<sup>7</sup> "Reactor design in Japan has long been questioned," New York Times, March 15, 2011, Tom Zeller referencing "Denton Urges NRC to Settle Doubts About Mark I Containment," [Inside NRC](#), McGraw-Hill, Vol. 8 No. 12, June 9, 1986.

The nuclear reactor units located within the jurisdiction of the NRC are identified as Browns Ferry 1, 2, and 3 (AL), Cooper 1 (NE), Dresden 2 & 3 (IL), Duane Arnold 1 (IA), Fermi 2 (MI), Fitzpatrick 1 (NY), Hatch 1 & 2 (GA), Hope Creek 1 (NJ), Monticello 1 (MN), Nine Mile Point 1 (NY), Oyster Creek 1 (NJ), Peach Bottom 2 & 3 (PA), Pilgrim 1 (MA), Quad Cities 1 & 2 (IL) and Vermont Yankee 1 (VT).

The Petitioner notes that the NRC technical report “Containment Integrity Research at Sandia National Laboratory: An Overview” ([NUREG /CR-6906, Sandia National Labs, July 2006](#)) identifies only twenty (20) Mark I containments with free standing pressure suppression containments of a carbon steel drywell and wetwell. In fact, the Sandia National Laboratory contract report to the NRC inadvertently excluded the Vermont Yankee nuclear power plant (VT) from its listing in Table 3 at “BWR Containment Construction Types.”<sup>8</sup> The Petitioner is unaware if this omission was subsequently corrected in a later reference document. The Petitioner is however well aware that the Commission voted to relicense the Vermont Yankee nuclear power plant and its Fukushima Dai-Ichi style pressure suppression containment for another twenty (20) years on March 14, 2011.

Additionally, NUREG/CR-6906 identifies that unlike other Fukushima Dai-Ichi style Mark I containment systems, there are two (2) U.S Mark I units at Brunswick 1 and 2 (NC) where the credited primary pressure suppression containment structure, the drywell, is instead a reinforced concrete structure that is lined with carbon steel and the wetwell or “torus” and also called the suppression chamber is a hollow concrete structure that is lined with cylindrical carbon steel sections to form the torus steel liner.

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<sup>8</sup> “Containment Integrity Research at Sandia National Laboratory: An Overview,” US NRC, NUREG/CR 6909, July 2006 Table 3, p. 9

Additionally, there is one (1) Mark II at Columbia (WA) that unlike what was intended to be a more unified Mark II containment design, the credited primary containment utilizes a variation of the free standing steel drywell and steel wetwell system. Similarly, NUREG/CR-6906 identifies that there are two (2) Mark III units at Perry (OH) and Riverbend (LA) that unlike other Mark III containment units constructed of reinforced concrete and steel liner instead, again, utilize a variation of free standing steel primary containment comprised of a reinforced concrete drywell and carbon steel wetwell pressure suppression containment system.

The inadvertent omission of Vermont Yankee from listing in NUREG/CR-6906 lends to the Petitioner's overall concern for the accurate tracking of various modifications to containment design, their differences and similarities within the three BWR designs (Mark I, Mark II, Mark III), their construction and the presence or omission of pre-approved but voluntary industry back fits. This concern now regards to the current heightened uncertainty and demonstrated unreliability of U.S. Mark I free standing steel primary containment integrity as back fitted, or not, for mitigating potential severe accident conditions.

B. Of the twenty one (21) GE BWR Mark I with the free standing steel primary containment a number of the units currently rely upon a "[hardened vent system](#)"<sup>9</sup> also known as the Direct Torus Vent System (DTVS) where the control room can now deliberately vent the recognized undersized and vulnerable Mark I pressure suppression containment temporarily under severe accident conditions in order to prevent the containment from over-pressurizing and/or internally venting explosive environments that would likely cause the permanent rupture and breach of containment and result in a sustained uncontrolled release of significant amounts of harmful radioactivity . These back fits were pre-approved

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<sup>9</sup> DTVS schematic, US NRC Generic Letter 89-16 "Installation of Hardened Wetwell Vent System," September 1, 1989



by NRC [Generic Letter 89-16](#) "Installation of Hardened Wetwell Vent System," September 1, 1989.<sup>10</sup>

The NRC staff pre-approval was provided as incentive to the Mark I operators to voluntarily install "hardened vent systems" also known as the Direct Torus Vent System (DTVS) to the pressure suppression pool component also known as the "torus." The DTVS is an 8-inch hardened steel line that runs from the Mark I suppression pool chamber or torus, bypasses the BWR charcoal bed radiation filtration system and connects directly to the three hundred (300) foot tall off gas ventilation stack. The DTVS design to bypass the radiation filtration system is essential to reduce back pressure on release through the experimental pipe system. The control room operates a butterfly valve in the pipe in conjunction with a 30 psi carbon rupture disc designed given the operator an option to temporarily defeat containment in order to assure long term containment integrity. It is the understanding of the Petitioner that a certain number of nuclear power plants operators may have installed the DTVS but subsequently either abandoned it or removed it while some number of operators did not follow-through with the installation of these hardened vents for on their containments. A complete and transparent review is necessary to determine which and why operators did and did not experiment with the hardened vent systems to mitigate potential severe accident consequences in Mark 1 containment systems.

C. All GE BWR Mark I units in the United States that currently;

1) Rely upon the cooling and indefinite storage of hundreds of tons of used radioactive fuel also known as high-level radioactive waste being stored in each of the elevated, densely-packed ("high-density") nuclear waste storage ponds, also known as "spent fuel pools" located atop the reactor building and outside the credited primary containment structure, and;

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<sup>10</sup> Ibid, GL 89-16

2) Utilize densely packed, elevated used radioactive fuel pools with cooling water systems that do not have safety-related electrical backup systems (Class E1) to assure circulating water for reliable long term cooling to thermally hot and extremely radioactive used fuel assemblies stored outside any rated containment structure. The Fukushima Dai-Ichi nuclear catastrophe demonstrates the vulnerability of this large volume of nuclear materials outside of any rated containment in the event of a prolonged electrical grid power failure without backup emergency Alternating Current electrical generators and without the additional reliable emergency backup of Direct Current battery systems.

The GE BWRs with elevated storage irradiated fuel storage pools outside of a credited primary containment structure and without Class E1 safety-related power systems for backup fuel pool cooling are identified as the above listed twenty four (24) Mark I units and include the permanently closed Millstone 1 unit (CT).

D. All GE BWR Mark I units subject to the internal NRC near term thirty (30) day, sixty (60) day and ninety (90) day review process and a yet-to-be specified long term evaluation period of review as described in the [NRC charter](#) issued in March, 2011 as a direct result of the multiple severe accidents at the Fukushima Dai-Ichi nuclear power station in Japan.<sup>11</sup> For purposes of the Petitioner's emergency enforcement petition the Petitioner asserts that written and oral public and expert comment to be included into the "NRC review process" is in reference to the on-going near term and yet-to-be specified long term evaluation period.

### **REQUESTED NRC EMERGENCY ENFORCEMENT ACTIONS**

The Petitioner requests that the NRC suspend the operating license of all GE BWR Mark I units in response to the dramatic and ongoing failure of similarly designed and constructed GE Boiling Water Reactors systems, structures and

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<sup>11</sup> NRC Fukushima Charter, Ibid

components at one or more units at the Fukushima Dai-Ichi nuclear power plant in Fukushima, Japan. These same GE Mark I systems, structures and components are demonstrated to have failed to effectively mitigate and contain significant and mounting radiological releases to the atmosphere, groundwater and the sea which in turn is likely to affect the health and safety of the public, the long term and potentially permanent dislocation of entire communities, significant long term disruption and potentially permanent destruction by radioactive contamination of meat, dairy and agricultural farms, the offshore coastal fishing industry of northeast Japan and potentially beyond, the long term disruption and dislocation of commercial and industrial infrastructure and the associated significant financial disruption and damage to Japan and its investors.

For all of the above concerns arising out of the longstanding identified Mark I design flaws and experimental back fits now demonstrated to have failed to mitigate severe accident conditions, Beyond Nuclear requests that all GE BWR Mark I operating licenses be suspended until the following emergency enforcement actions are taken:

I. Each of the four US NRC Regional Offices will publicly notice and conduct public meetings within each of the ten-mile Emergency Planning Zone for each General Electric Boiling Water Reactor (GE BWR) site in their Region for the purpose of receiving public comment and independent expert testimony from the communities affected in each Emergency Planning Zone to be incorporated into the NRC review process so as to:

A. Publicly identify and communicate which GE BWR Mark I operators did and why some did not install as pre-approved by [NRC Generic Letter 89-16](#)<sup>12</sup> the “[hardened vent system](#)” also known as the Direct Torus Vent System (DTVTS) on the GE BWR Mark I pressure suppression containment system to determine as part of the agency’s

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<sup>12</sup> Installation of the Hardened Wetwell Vent, Generic Letter 89-16, US NRC, September 1, 1989

review process whether or not past modifications can still be considered reliable and/or if further modifications by license amendment are needed and justified or if the permanent revocation of these operating licenses is necessary, and;

B. Given the demonstrated failures of the Fukushima Dai-Ichi Mark I containment system and containment vent system to effectively mitigate the severe accident resulting in the significant and ongoing radioactive releases to the environment, the Petitioner requests;

- 1) the NRC immediately revoke prior pre-approval for the installation of an experimental “hardened vent system” also known as the Direct Torus Vent System (DTVS) at each US GE BWR Mark I as pre-approved in GL 89-16 under the provisions of [10 CFR 50.59](#) . The Petitioner asserts that Section 50.59 of Title 10 of the Code of Federal Regulation is provided only for “changes, tests and experiment” that the NRC believes acceptable for a licensee to install and test themselves so long as such activities do not place the facility in *a condition for which a NRC review is necessary*. The fact that NRC is now reviewing the Mark I containment and the experimental hardened vent nullifies pre-approval by 10 CFR 50.59.

The Petitioner asserts that the failure of the Mark I containment and the hardened vent system at Fukushima Dai-Ichi are at the root of the current near-term and long-term review of all US reactors to include the above captioned Mark I units.

The Petitioner further asserts that demonstrated unreliability of the Mark I containment and the experimental hardened vent system raises a significant compliance issue to defeat and

ultimately fail the design function of the Mark I containment and hardened vent contrary to NRC regulations “which for such SSC (systems, structures and components) demonstrate that their intended function will be accomplished [10 CFR 50.59(a)(3)(iii)] and:

- 2) NRC will then direct the licensees in accordance with 10 CFR 50.59(2) that prior to restart “A licensee *shall obtain a license amendment* pursuant to Sec. 50.90 prior to implementing any proposed change, test or experiment if the change, test or experiment that would result;

- (i) In *more than a minimal increase* in the frequency of occurrence of an accident previously evaluated in the final safety analysis report (as updated);

Whereby the Petitioner responds that the Fukushima Dai-Ichi accident demonstrates the failure of the Mark I containment to adequately mitigate and contain a severe accident even with a hardened vent system as the direct result of the combination of a more severe than previously analyzed earthquake and a higher than previously postulated tsunami which led to the much longer than expected station blackout. These shortcomings of analyses demonstrate the unreliability of placing public health and safety at undue risk by miscalculation or more to the point bad guesswork on the frequency of an occurrence of an accident as basis for justifying and tolerating the continued operation of a nuclear power plant with an identified substandard containment. It is unreasonable to back fit an identified design flaw with a venting system to deliberately defeat the purpose of a leak tight containment in order to save it

from failure based on the unlikelihood that the task will be required. Petitioners assert that such back fits do not constitute a “safety enhancement” for unsafe operations. Long standing public safety advocate Ralph Nader might compare it to irrationally putting an airbag on the dangerously designed and “unsafe at any speed” Corvair automobile to justify further corporate sales and keeping a dangerous vehicle on the road. Similar unanticipated events in the United States can reasonably lead a similar prolonged and longer than expected station blackout for which the hardened vent would now constitute more than minimal increase in occurrence of severe accidents in the vulnerable Mark I containment. A similar unanticipated combination of events might include such station blackout scenarios as a severe flood followed by a severe thunderstorm or accompanied by large tornado, or a prolonged blizzard with repeated heavy snow fall and ice accumulation, or a prolonged severe solar flare affecting grid stability combined with similar severe meteorological events. It is really now more about whether it is rational or reasonable to leave the all too apparent unforgiving consequences to chance or unexpected events to challenge a fundamentally flawed reactor containment system.

(ii) Result in *more than a minimal increase* in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the final safety analysis report (as updated);

Whereby the Petitioner responds that the [New York Times](#) reported on March 12, 2011 (“Japan Orders Evacuation at Second Plant,” Matthew Wald, NYT, March 12, 2011) that “the company (TEPCO) is considering ‘a controlled containment

venting' in order to avoid an 'uncontrolled rupture and damage' to the containment unit."<sup>13</sup> The Mark I hardened vent concept as pre-approved by NRC Generic Letter 89-16 and installed by some number of Mark I operators in the 1990's was to provide U.S. operators with exactly such an option for controlled containment venting to avoid an uncontrolled rupture and damage to the containment unit resulting in uncontrolled radiological releases to the environment.

An [AREVA PowerPoint Presentation](#) prepared to evaluate the etiology of the accident further points to the failure of the Mark I containment vent system resulting in an internal explosion in the pressure suppression containment system for Fukushima Dai-ichi Unit 2. Slide 24 of the AREVA Power Point focuses on the failure of the Mark I containment venting system installed in Unit 2 failure resulting in the rupture of the suppression chamber component (wetwell or torus) and the uncontrolled release of fission products from containment.<sup>14</sup> AREVA offered no clear information on why the vent failed to mitigate the severe accident.

The USNRC Japan [Reactor Safety Team Assessment of Fukushima Daiichi Units](#) report of March 26, 2011 further identifies in its assessment of Unit Two (2) Primary Containment is "Damage suspected" as based on the most recent data and input from the Japanese Atomic Industrial Forum, Japan Nuclear and Industrial Safety Agency and Tokyo Electric Power Company.<sup>15</sup> The damage is identified as resulting in an uncontrolled radioactive release from containment. The same RTS report identified that for it is their assessment of Unit Three

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<sup>13</sup> "Japan Orders Evacuation at Second Plant," Matthew Wald, NYT, March 12, 2011

<sup>14</sup> "The Fukushima Daiichi Incident," Dr. Matthias Braun, AREVA, April 12, 2011, Slide 24

<sup>15</sup> RST Assessment of Fukushima Daiichi Units, USNRC, March 26, 2011, p. 5

Primary Containment they assume “Damage suspected” according to Japan Nuclear and Industrial Safety Agency and Tokyo Electric Power Company and “Not damaged” according to an earlier assessment by Japan Atomic Industrial Forum.<sup>16</sup> The RST assessment finds that the reactor core fuel is damaged, the reactor coolant system potentially breached at the recirculation seals and the primary containment damaged resulting in the uncontrolled release of radioactivity.

These are clear indications by NRC’s own assessment that two of the Mark I containments at Fukushima Dai-Ichi are “damaged” and as the Petitioner reads ruptured as the result of an experimental controlled venting system that failed conceptually, mechanically and/or by operator actions. Further reliance upon the demonstrated failure of the experimental concept, experimental design and/or operator actions must be furthered discouraged by the revocation of any further reliance.

The failure of the Fukushima Dai-Ichi Unit 2 experimental vent on the undersized and vulnerable Mark I pressure suppression containment system dramatically demonstrates the unreliability of both the containment design and construction as well as the hardened vent system whether by mechanical failure and/or human error in practice of the operator action.

(iii) Result in *more than a minimal increase* in the consequences of an accident previously evaluated in the final safety analysis report;

Whereby the Petitioner responds that at the time of submission of this Emergency Enforcement Petition, the Washington Post of

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<sup>16</sup> NRC RST, Ibid. p. 6



April 11, 2011 reports "[Japan rates nuclear crisis at highest severity](#)" stating that Japanese authorities raised the Fukushima Dai-ichi nuclear disaster from Level 5 to Level 7, the highest level on the international scale, equal to that of the 1986 Chernobyl disaster.<sup>17</sup> On April 11, 2011, Japanese authorities further [expanded the emergency evacuation zone](#) around the severely damaged reactor complex.<sup>18</sup> Japanese authorities are further admitting that the ongoing accident may have [huge impacts on the ocean](#) with reports that 7.5 million times permitted limits of radioactive iodine and 1.1 million times radioactive cesium have been released into the Pacific Ocean contaminating the marine food web such as the example of the near shore schools of sand lance which tuna, salmon and whales feed upon.<sup>19</sup> News reports and expert documents confirm each day the nuclear accident stemming from the flaws and failure of the Mark I design is surpassing all accident consequences previously analyzed for the GE BWR Mark I pressure suppression system and vulnerable elevated "spent fuel pools."

(iv) Result in a more than minimal increase in the consequences of an accident of a different type than previously evaluated in the final safety analysis report (as updated);

Whereby the Petitioner responds that as the result of station blackout conditions, the combined and simultaneous failures of the undersized Mark I containment systems, the failure of the experimental hardened vent systems as intended back fit to

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<sup>17</sup> "Japan rates nuclear crisis at highest severity level," Washington Post, April 12, 2011

<sup>18</sup> "Evacuation areas around crippled nuclear plant expanded," Kyodo News Service, April 12, 2011

<sup>19</sup> Beyond Nuclear website link to "Japan nuclear plant operator reports some success on leak," Los Angeles Times, April 6, 2011

mitigate the consequences of a severe accident resulting in significant damaged to the identified undersized and flawed GE Mark I containment system and the significant used nuclear fuel damage in at least four (4) of the Mark I of the total of six (6) Fukushima Dai-Ichi units that did not have Class EI backup power systems to cool the “spent fuel pools” have resulted in a different type of accident that was not previously evaluated in the final safety analysis report (as updated). Repeated nuclear waste fires and high radiation fields from the combined reactor and “spent fuel pool” severe accidents repeatedly thwarted operator actions to effectively cool either.

(v) Create the possibility for an accident of a different type than previously evaluated in the final safety evaluation report (as updated);

Whereby the Petitioner responds as stated above the catastrophic accident now demonstrated at Fukushima Dai-Ichi is a cascading sequence of accidents defeating the vulnerable and flawed Mark I containment system and the experimental hardened vent back fit that failed to mitigate the consequence of severe core accident and the severe damage to the elevated “spent fuel pools” outside of any rated containment structure without Class E1 power for cooling high density storage of nuclear waste (irradiated fuel assemblies).

The NRC RTS report further identifies that Fukushima Daiichi Unit 3 pressure suppression containment is “damaged” according to Nuclear and Industrial Safety Agency and Tokyo Electric Power Company and “not damaged” according to the

Japanese Atomic Industrial Forum.<sup>20</sup> While no assessment is provided at this time as how the Mark I pressure suppression containment was damaged, the very energetic explosion from hydrogen gas venting operations at Unit 3 are not ruled out as yet. Petitioner is concerned that the actual operation of the containment vent at Fukushima Daiichi Unit 3 failed to preserve containment integrity rather than the intended mitigation. The RST further reports that highly radioactive fuel fragments were found not only on the reactor site but also in locations one mile from the reactor site after a series of the hydrogen explosions occurred as a result of the unanalyzed severe accidents at this GE Mark I complex.

(vi) Create a possibility for a malfunction of an SSC (system, structure or component) important to safety with a different result than any previously evaluated in the final safety analysis report (as updated);

Whereby the Petitioner responds that the Fukushima Dai-Ichi nuclear catastrophe involving the reliance upon the GE BWR Mark I has dramatically demonstrated that the free standing steel primary containment or pressure suppression system can malfunction as previously warned in 1972 and again in 1985 to be unreliable in severe accident conditions. The reactor core accident and containment failure can complicate then defeat vital mitigation efforts to cool the elevated high density nuclear waste storage pools located outside of primary containment significantly worsening the environmental consequences of the severe accident.

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<sup>20</sup> NRC RST, Ibid p. 9

(vii) Result in a design limitation for a fission product barrier as described in the FSAR (as updated) being exceeded or altered.”

Whereby the Petitioner responds that at the emergency enforcement petition filing the scope of the severe accident exceeding the Mark I pressure suppression containment and the failure of the containment venting system to mitigate increased releases of more fission products generated by reactor core fuel and “spent fuel” damage, loss of reliable cooling, the damaged /breached containment is now dramatically demonstrated to have been exceeded perhaps to even surpass the Level 7 international rating for this nuclear accident still in progress.

The Petitioner argues that the Fukushima Dai-Ichi nuclear disaster has demonstrated a clear and present danger exists with the continued operation of all GE BWR Mark I units here in the United States as well as in Japan and other countries utilizing a fundamentally flawed design with an unreliable experimental back fit containment venting system. The combination cannot be accurately or rationally described as an “enhancement” to public safety.

It is no longer reasonable or rational to further ignore the early warnings of Dr. Stephen Hanauer in 1972 that further use of the Mark I pressure suppression containment system “should be discouraged.” The NRC’s 1989 pre-approval and the BWR industry’s 1990’s installation of the hardened vent system is now clearly demonstrated to be a failed experiment that comes at unacceptable risk with the increasing and widening tragic consequence to the health and safety of the people in northern Japan in addition to the immeasurable loss of life and human

suffering caused by the Great Eastern Japan Earthquake and Tsunami.

C. As the NRC RST report of March 26, 2011 further confirms the demonstrated failure of the elevated GE BWR Mark I [nuclear waste storage pools](#)<sup>21</sup> at Fukushima Dai-Ichi as the result of prolonged station blackout with severe nuclear fuel damage occurring above and outside a credited containment structure in cooling ponds that did not have emergency backup power for reliable cooling, the NRC shall;

- 1) Immediately issue Confirmatory Action Orders to all BWR Mark I operators to promptly install for each unit's elevated irradiate fuel storage pool a dedicated Class E1 power system to assure:
  - a) the prompt and reliable availability of standby backup electrical power from redundant Alternating Current (AC) Power emergency power systems (i.e. bunkered AC emergency onsite generators) and;
  - b) additional standby emergency backup power be provided by Direct Current (DC) battery systems rated to provide sufficient power for a minimum of 72 hours to assure the operation of nuclear waste storage ponds cooling systems until main grid power, emergency standby generators can be restored or additional battery power can be made available.

## **CONCLUSION**

The Petitioner asserts that the Fukushima Dai-Ichi nuclear catastrophe has both dramatically illuminated and grievously darkened the undue risks and unforgiving consequences of a severe accident as a result of the fundamental failures of the

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<sup>21</sup> Schematic of BWR spent fuel pool, USNRC

Mark I containment concept, design, construction and the subsequent experimental retrofit employed to conceptually mitigate these significant flaws.

The Petitioner concludes that the situation for the need for Emergency Enforcement Action at US GE BWR Mark 1 units is best summed up in the reporting of the Daily Yomiuri news service of an interview with a Fukushima Prefecture government official who told to the [Daily Yomiuri news source](#):

“Fukushima Gov. Yuhei Sato has expressed anger at the central government and Tokyo Electric Power Co., saying both ‘betrayed’ the people of Fukushima Prefecture with repeated assurances about the safety of nuclear power plants.

“‘We feel we were betrayed [by the central government and TEPCO],’ Sato said during an interview with The Yomiuri Shimbun on Thursday, nearly a month after the March 11 earthquake and tsunami and the outbreak of a series of accidents at the Fukushima No.1 nuclear power plant.

“‘The central government and TEPCO repeatedly told us, ‘Nuclear power plants are safe because they’ve got multiple protection systems,’ and, ‘Earthquake-proof measures have been taken,’” Sato said.

“‘TEPCO used the term ‘beyond our expectations’ [to describe the natural disaster], but they can’t establish effective policies for nuclear energy safety unless they take into account things that are beyond their expectations,” Sato said.”<sup>22</sup>

The United States Nuclear Regulatory Commission is obligated to uphold and protect the interests of the public health and safety over the corporate interests of the nuclear industry. Given this tragic demonstration at Fukushima, the rational, reasonable and only relevant protection is remove the Mark I from any set of circumstances that might ever challenge the failed experiment again.

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<sup>22</sup> “Fukushima Daiichi was beyond our (TEPCO) expectations,” DailyYomiuri Online, Japan news service, April 10, 2011, <http://www.yomiuri.co.jp/dy/national/T110408005027.htm>

Respectfully submitted,

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Paul Gunter  
Reactor Oversight Project

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Kevin Kamps  
Radioactive Waste Specialist

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