

Congress of the United States
House of Representatives
Washington, DC 20515-2107

DISTRICT OFFICES:

5 HIGH STREET, SUITE 101
MEDFORD, MA 02155
(781) 396-2900188 CONCORD STREET, SUITE 102
FRAMINGHAM, MA 01702
(508) 875-2900<http://markey.house.gov>

Testimony on “Nuclear Disaster Preparedness”
Submitted by the Honorable Edward J. Markey (D-Mass.)
April 6, 2011

TO:

The Honorable Marc R. Pacheco, Senate Chair, Joint Committee on Environment, Natural Resources and Agriculture

The Honorable Anne M. Gobi, House Chair, Joint Committee on Environment, Natural Resources and Agriculture

The Honorable Susan C. Fargo, Senate Chair, Joint Committee on Public Health

The Honorable Jeffrey Sanchez, House Chair, Joint Committee on Public Health

The Honorable James E. Timilty, Senate Chair, Joint Committee on Public Safety and Homeland Security

The Honorable Harold P. Naughton, Jr., House Chair, Joint Committee on Public Safety and Homeland Security

The Honorable Benjamin B. Downing, Senate Chair, Joint Committee on Telecommunications, Utilities and Energy

The Honorable John D. Keenan, House Chair, Joint Committee on Telecommunications, Utilities and Energy

Thank you very much for allowing me to submit written testimony on “Nuclear Disaster Preparedness”. I regret that I cannot be there in person today.

First of all, I'd like to begin by commending all of you, Governor Patrick and Attorney General Coakley for all of your leadership in the area of nuclear reactor safety and emergency preparedness. Governor Patrick has displayed tremendous leadership in disaster preparedness, emergency management, and crisis response. Whether it has been record-breaking blizzards, catastrophic flooding, or severe winter storms, he has taken a hands-on approach and worked with emergency management personnel in the Commonwealth to ensure the safety and security of our residents. Because of Governor Patrick's work in emergency management, Massachusetts is a national leader in this field.

I have long been convinced that the safety of our domestic nuclear energy sector is not what it should be. In 1979, before the Three Mile Island accident, I introduced legislation calling for a three-year moratorium on licensing of new nuclear power plants until a top-to-bottom safety analysis on nuclear safety was undertaken. In 1982, I chaired a hearing on the need to stockpile potassium iodide to residents living near nuclear power plants because this safe,

effective medication is proven to prevent radiation-induced thyroid cancer and other disorders, especially in young children. In the wake of the Chernobyl disaster, I chaired hearings into its causes and consequences. In 2010, I asked the Government Accountability Office to investigate numerous aspects of nuclear reactor safety, including resilience to earthquakes and other natural disasters. Most recently, three days before the Japanese earthquake and tsunami, I sent a letter to the Nuclear Regulatory Commission urging it not to approve the Westinghouse AP1000 design for a new nuclear reactor because one of its longest-serving top scientists had warned that its containment dome could “shatter like a glass cup” under sufficient stress and that the model used to simulate its resiliency to an earthquake was unrealistic.

In the wake of the meltdown at the Fukushima nuclear power plant in Japan, as we learn each day of new challenges to efforts to get these reactors under control and of higher levels of harmful radiation being found greater distances away from the reactor site, I have continued to focus on the problems that plague the nuclear industry. This industry is, after all, “special” as compared to other types of electricity generation. It does not require billions of dollars in taxpayer-guaranteed funds to enable a wind-farm to obtain an accident insurance policy. And it will not take months of risky efforts using what amount to giant water guns to cool down an overheating solar plant, and we also won’t need to dump large quantities of the absorbent polymers used in diapers to sop up a radioactive mess from any renewable electricity source.

As these catastrophic events have unfolded in Japan, it has become clear that the meltdowns and radiation releases did not occur primarily because of earthquake-related damage; rather, they occurred because of a prolonged loss of electricity to the reactor cores and their spent nuclear fuel pools. Such critical events could be caused by severe storms, terrorist attacks or other events. We also have learned of some disturbing realities about America’s nuclear power plants as well as the sector’s regulator, the Nuclear Regulatory Commission (NRC):

- Although the NRC has received new information that indicates a higher risk of core damage occurring due to earthquakes at many nuclear reactors located in the central and eastern U.S. (Indian Point in New York and Pilgrim in Massachusetts top this list), it has done nothing to incorporate this new information into these reactors’ safety requirements. The NRC’s risk estimate of core damage being caused by an earthquake for Pilgrim is up more than 7 times (763 percent) from its earlier 1989 estimate.
- Twenty-three nuclear reactors in the U.S. share the same design as the nuclear reactors that are currently damaged in Japan, including several near the seismically-active New Madrid fault line in the Midwest. Pilgrim and Vermont Yankee are also on this list.
- In the U.S., major electricity outages have been caused by [squirrels](#)¹ and [hot weather](#)². In 1990, a fuel truck accidentally backed into a power line at the Vogtle nuclear power plant in Georgia, knocking out electricity; as with the Fukushima nuclear power plants, it turned out that the plant’s emergency diesel generation was also disabled.³ Yet most nuclear reactors in this country currently have only 7 days worth of diesel fuel for its backup generators, and only 4-8 hours worth of secondary battery generation capacity. The Fukushima nuclear power plant only had 8-hour battery powered generators.

1 http://www.usatoday.com/news/nation/2007-03-11-suicide-squirrels_N.htm

2 <http://www.cbsnews.com/stories/2006/07/26/national/main1836674.shtml>

3 <http://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/1990/in90025s1.html>

- Spent nuclear fuel pools in this country are filled nearly to overflowing in some cases. For example, the NRC gave the Pilgrim nuclear power plant permission to pack almost 4,000 spent fuel assemblies (up from the 2,320 the NRC had previously allowed at the site) into its spent nuclear fuel pool, which, like the Fukushima Daiichi reactors, is located on top of the unit⁴. This means that in the event of a loss of spent fuel coolant water or electricity supply, the higher density configuration of spent nuclear fuel would lead to a higher probability of a fire and radiation release than if the spent nuclear fuel were moved into safer dry cask storage as soon as it became possible to do so.

Although the NRC has announced steps to review the safety of U.S. nuclear power plants in the wake of the Japanese meltdown, it has also indicated that it will not suspend any of its pending actions on new construction licenses, design licenses or license extensions. Ironically, shortly after the announcement of the safety review, the Commission approved a request for a twenty year extension of the license for the Vermont Yankee plant, a plant which we already know has been plagued with leaks of radioactive tritium from its aging pipes. I believe that approving license extensions for existing plants before we have fully taken into account the lessons of the Fukushima disaster is a foolish mistake. It is akin to buying a used car before it has been inspected or giving a patient a clean bill of health before the medical test results have been reviewed by a doctor. That is why last week I introduced the Nuclear Power Plant Safety Act of 2011, which will impose a moratorium on all new reactor licenses, reactor designs or license extensions until new safety requirements are in place. Specifically, it will require that the NRC implement regulations to impose the following requirements, and do so *before* approving any new nuclear reactor or re-license applications.

The Nuclear Power Plant Safety Act of 2011 will:

- Ensure that nuclear power plants and spent nuclear fuel pools can withstand and respond to earthquakes, tsunamis, strong storms, long power outages, or other events that threaten a major impact.
- Require nuclear power plants to have emergency backup plans and systems that can withstand longer electricity outages. This legislation will make sure there is 14 days worth of diesel fuel backup generators where most reactors currently have only 7 days worth, and that reactors have 72 hours worth of battery generation capacity where most reactors currently have battery generators that work for only 4-8 hours. The Fukushima nuclear power plant had 8-hour battery powered generators.
- Require spent nuclear fuel be moved into safer, dry cask storage as soon as the fuel is sufficiently cooled to do so.
- Require the Department of Energy to factor in the lessons learned from the Fukushima meltdown when calculating the risk of default on loan guarantees for new nuclear power plants.

In the wake of Fukushima, I also believe that it is vital to reflect on what we would do in the event a meltdown occurred in our country to keep people safe. Rapid evacuation may not be a viable option for residents near many nuclear reactors, and could require driving right past the nuclear reactors for many people living near the Pilgrim and Seabrook nuclear power plants.

⁴ <http://www.gpo.gov/fdsys/pkg/FR-1994-06-21/html/94-15024.htm>

Our previous experience with Hurricane Katrina and now with the Japanese emergency shows just how difficult it can be to rapidly evacuate large population centers in the middle of a crisis. That is why I have long advocated for the distribution of potassium iodide for residents living within 20 miles of nuclear power plants, and why I have been dismayed at the failure to implement section 127 of the Bioterrorism Preparedness and Response Act of 2002, which I authored, requiring that such distribution be undertaken.

Potassium iodide, known by its chemical symbol KI, protects the thyroid gland by flooding it with stable iodine so that the gland cannot take up the cancer-causing radioactive form. Radioactive iodine can be released during nuclear reactor meltdowns such as the one now occurring in Japan.

If an earthquake, terrorist attack, or accident caused a radiation release in the U.S., one of the greatest risks to health comes from radioactive forms of the chemical element iodine. Children are the most vulnerable because their thyroid glands concentrate more iodine on a mass basis than adults and are more sensitive to radiation because of their rapidly growing cells. Thyroid cancer was the biggest negative health impact caused by the Chernobyl nuclear reactor disaster. More than 6,000 Russian, Ukrainian and Belarusian residents who were children at the time of the Chernobyl nuclear reactor disaster developed thyroid cancer. The incidence of thyroid cancer in the contaminated areas was triple that of normal thyroid cancer incidence in the area⁵. However, despite the elevated levels of radioactive iodine detected in Poland after the Chernobyl accident, exposed individuals in Poland did not experience such an increase in thyroid cancer because they were provided with prophylactic potassium iodide⁶.

Section 127 of the Bioterrorism Preparedness and Response Act of 2002 directed the President to establish a program to make potassium iodide available free to state and local governments for distribution to residents living within 20 miles of a nuclear power plant. Previously, distribution was limited to just those within 10 miles, and only to states that requested it from the NRC. Massachusetts is among those states that have protected its residents out to the 10-mile radius.

The Congress' choice of a minimum 20-mile KI distribution radius was driven by its recognition that radiological exposure during a nuclear emergency is almost certain to exceed the "intervention level", set by the NRC to 5 rem, at distances greater than 10 miles from the nuclear event. Two NRC-commissioned technical studies predicted exposure at 25 miles from the event to be over 1000 rem, with the probability of thyroid damage to an adult outdoors to be 40 percent. For infants and children, the potential for damage is much higher⁷. The Japanese government has evacuated residents within 19 miles of the Fukushima reactors, and has distributed potassium iodide to protect against the radioactive iodine being released. The NRC has already recommended evacuation out to 50 miles from Fukushima for U.S. citizens, and KI is being provided to military personnel and U.S. citizens assisting with the disaster. Some

⁵ http://www.unscear.org/docs/reports/2008/Advance_copy_Annex_D_Chernobyl_Report.pdf

⁶ Nauman J, Wolff J. (1993) Iodide prophylaxis in Poland after the Chernobyl reactor accident: Benefits and risks. *The American Journal of Medicine*, Volume 94, Issue 5, Pages 524-532.

⁷ NUREG/CR-1433, Sandia National Laboratories, October 1980, and NUREG/CR-6310, S. Cohen & Associates, April 1992.

experts, including the American Thyroid Association, believe that potassium iodide should be pre-distributed to households within 50 miles of a nuclear power plant.

Timing of KI distribution is critical, as the drug is most effective if used within 3-4 hours of exposure⁸. According to the Food and Drug Administration (FDA), inhalation of radioactive iodine is a significant contributor to exposure and is of particular concern for those residing in the immediate area of a nuclear accident or otherwise directly exposed to the radioactive plume. This means that it is critical to distribute KI to residents and local authorities before a radiation release happens, rather than scrambling to try to do it afterwards as happened during the 1979 Three Mile Island accident.

Regrettably, instead of moving to implement my law and ensure that potassium iodide is available to more U.S. residents who might be at risk in the event of a nuclear meltdown in this country, the Bush Administration refused to do so, and thus far, the Obama Administration has not yet reversed this unwise decision. It is my hope that in the reviews that occur in the wake of Fukushima, that my law will finally be fully implemented.

I also believe that emergency response zones and plans should be updated and modernized. Many of the evacuation plans for areas around nuclear power plants have not taken population growth into account, and the planning zones of 10 miles are not realistically sized given the likely scope of an evacuation in the event of a Fukushima-like event. Additionally, reports indicate that Entergy Corporation may actually be attempting to cut funding for local communities to train emergency response personnel. It seems to me that in the wake of Fukushima, we should be beefing up the resources expended on such activities and expanding the emergency planning zones so that we can be prepared to respond to a more realistic threat.

In closing, I thank you for the opportunity to submit this testimony, commend you for your efforts to explore and address the nuclear safety issues facing the State of Massachusetts, and stand by prepared to assist you in any way possible.

⁸ <http://www.fda.gov/Drugs/EmergencyPreparedness/BioterrorismandDrugPreparedness/ucm072265.htm>