

Blue Ridge Environmental Defense League

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January 31, 2013

Timothy W. Manning, Deputy Administrator
Protection and National Preparedness
Federal Emergency Management Agency
c/o Regulatory Affairs Division
Office of the Chief Counsel
500 C Street, SW., Room 840
Washington, DC 20472-3100

Re: Docket ID No. FEMA-2012-0026

Criteria for Preparation and Evaluation of Radiological Emergency Response Plans
and Preparedness in Support of Nuclear Power Plants, NUREG-0654/FEMA-REP-1,
Rev. 1

Dear Mr. Manning:

On behalf of the Blue Ridge Environmental Defense League and its chapters, I submit the following comments regarding the above-captioned matter.

Overview

The regulatory guidance document referenced *supra* (hereinafter, "Criteria") is utilized by both the Nuclear Regulatory Commission and the Federal Emergency Management Agency to evaluate the emergency plans at commercial nuclear power plants. The criteria applied to the plant owners and operators and any state and local governments within the respective emergency planning zones (EPZ). The Criteria were established in 1980 and, although updated, emergency planning regulations have remained essentially unchanged for thirty years. They state:

Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles in radius and the ingestion pathway EPZ shall consist of an area about 50 miles in radius.¹

Presently, FEMA and NRC are considering a new revision. Among the areas under consideration are lessons learned from the Fukushima-Daiichi nuclear power plant accident, evacuation time estimates, certain protective measures and expanding emergency planning zones.

Recommendations

The Blue Ridge Environmental Defense League calls upon FEMA and the NRC to:

¹ 10 C.F.R. § 50.47(c)(2)

1. Expand the radius of the Plume Exposure Pathway EPZ from a 10-mile radius to a 25-mile radius;
2. Distribute potassium iodide and instructions on how to use it to all residents living within the new 25-mile plume exposure EPZ;
3. Establish a new 50-mile radius Emergency Response Zone, with more limited requirements than the EPZ;
4. Expand the radius of the Ingestion Pathway EPZ from the current 50 mile radius to a 100 mile radius;
5. Ensure that emergency plans are tested to encompass initiating and/or concurrent natural disasters that may affect both accident progression and evacuation conduct.

General Comments

Emergency planning should extend 100 miles from nuclear power plants. An IAEA report² on the Windscale nuclear accident states: "Even as far as 100 miles away, levels of radioactivity in milk were nearly 40,000 picocuries per liter one week after the accident." This is over eight times the United States FDA's action level of 4,600 picocuries per liter. The Windscale accident occurred in Great Britain and ranked at severity level 5 on the 7-point scale (see photo).³ (Fukushima was a 7). One of the major threats to public health was radioactive iodine-131, which is taken up by the human body and stored in the thyroid, causing cancer. In 2007 the increased incidence of thyroid cancer alone from the accident was estimated to be 240 cases.

Radiation spreads in unpredictable ways and can contaminate vast areas. Dave Lochbaum, of the Union of Concerned Scientists, when asked about the extent of radioactive contamination after Fukushima, said: "Contamination levels are not linear. Further away you don't necessarily get lower doses."⁴ He explained that prevailing winds and other factors determine which areas are affected and how much. For example, after the nuclear accident at Chernobyl, areas 100 miles from that plant had radiation levels higher than areas only 10 or 20 miles away.

Lesson Learned from Fukushima: Earthquakes Cannot Be Predicted

An earthquake is an unpredictable event. This fact was made clear by the Fukushima disaster which occurred in an area with a known seismic history and to a society well adapted to living on the fault line. But modern science and engineering is no match for tectonic movement:

² IAEA Bulletin Vol. 2, No. 5.

<http://www.iaea.org/Publications/Magazines/Bulletin/Bull215/21502795459.pdf>

³ This image was taken from the *Geograph* project collection. See this photograph's page on the Geograph website for the photographer's contact details. The copyright on this image is owned by Chris Eaton and is licensed for reuse under the Creative Commons Attribution-ShareAlike 2.0 license

⁴ Josie Garthwaite, *National Geographic News*, March 16, 2011

<http://news.nationalgeographic.com/news/energy/2011/03/1103165-japan-nuclear-chernobyl-three-mile-island/>

An earthquake results from sudden slip on a geological fault. Such fracture and failure problems are notoriously intractable. The heterogeneous state of the Earth and the inaccessibility of the fault zone to direct measurement impose further difficulties. Except during a brief period in the 1970s, the leading seismological authorities of each era have generally concluded that earthquake prediction is not feasible. Richter, developer of the eponymous magnitude scale, commented as follows in 1977: "Journalists and the general public rush to any suggestion of earthquake prediction like hogs toward a full trough... [Prediction] provides a happy hunting ground for amateurs, cranks, and outright publicity-seeking fakers"⁵

Charles Richter, California Institute of Technology professor of seismology, spent most of his life in this field. He assisted officials in Japan and California with earthquake engineering and safety. His description of earthquake predictors ought to be taken seriously.

State-of-the-art Reactor Consequence Analyses (SOARCA)

The SOARCA study updates older studies with the latest state-of-the-art computer models and incorporates new plant safety and security enhancements. Probabilistic assessments take into account what can go wrong, how bad and how likely based on current information. The problem is that probabilistic risk assessments do not account for unexpected failures. A physicist writing for the *Bulletin of the Atomic Scientists* said:

The lesson from the Fukushima, Chernobyl, and Three Mile Island accidents is simply that nuclear power comes with the inevitability of catastrophic accidents. While these may not be frequent in an absolute sense, there are good reasons to believe that they will be far more frequent than quantitative tools such as probabilistic risk assessments predict. Any discussion about the future of nuclear power ought to start with that realization.⁶

According to the NRC, to estimate earthquake risks, nuclear engineers use "probabilistic" techniques to describe ground motion potential. They attempt to account for all potential seismic sources in the region around the plant. The standard is ground motion with an annual frequency of 1×10^{-4} /year, or ground motion that occurs every 10,000 years on average.⁷ But the 5.8 scale quake in Mineral, Virginia on August 23, 2011 was preceded by a 5.8 quake in 1897.

⁵ Geller RJ et al, "Earthquakes Cannot Be Predicted," Volume 275, Number 5306, pp. 1616, 1996, The American Association for the Advancement of Science, <http://sceec.ess.ucla.edu/~ykagan/perspective.html>

⁶ Ramana, NV, "Beyond our imagination: Fukushima and the problem of assessing risk," *Bulletin of the Atomic Scientists*, April 19, 2011. M. V. Ramana, a physicist, is currently appointed jointly with the Nuclear Futures Laboratory and the Program on Science and Global Security, both at Princeton University, and works on the future of nuclear energy in the context of climate change and nuclear disarmament. He is the author of *The Power of Promise: Examining Nuclear Energy in India*, to be published later this year by Penguin Books. Ramana is a member of the Bulletin of Atomic Scientists Science and Security Board.

⁷ NRC frequently asked questions related to the March 11, 2011 Japanese Earthquake and Tsunami, available at <http://www.nrc.gov/japan/faqs-related-to-japan.pdf>

Specific Comments

Based on our investigations of nuclear power plant sites in the Southeast, we submit the following in support of more stringent regulatory approach to federal emergency management Criteria and expanded EPZ.

Eastern Tennessee Seismic Zone

Tennessee Valley Authority's Bellefonte nuclear plant site is in one of the most active earthquake areas east of the Rocky Mountains. Studies indicate that this seismic zone may have the potential to produce large magnitude earthquakes. Critical issues for Bellefonte include ground motion, surface tectonics, seismically induced floods and waves, soil and rock stability, and cooling water supply.

The Eastern Tennessee Seismic Zone extends from southwest Virginia to northeast Alabama. Recent large earthquakes include a magnitude 4.6 in 1973 near Knoxville and the 2003 Fort Payne Earthquake, also a magnitude 4.6, one of the largest to have occurred anywhere in the southern Appalachians. This quake damaged chimneys and formed cracks in structures. Locally, these earthquakes raised concerns about the impact on essential services like water supplies and potential landslides on nearby mountain slopes.

Central Savannah River Area

Major earthquakes have affected the Plant Vogtle site, which is located in the Central Savannah River Area, on the Georgia-South Carolina state line. The National Earthquake Information Center reports over 20 earthquakes of intensity V or greater (5 or more on a scale of 10 in the Modified Mercalli scale) have been centered nearby. A USGS map⁸ indicates the magnitude and the extent of the 1886 quake:

The initial shock lasted nearly one minute. The earthquake had a magnitude of 7.3 (Johnson, 1996) and was felt over 2.5 million square miles, from Cuba to New York, and Bermuda to the Mississippi River.⁹

A principal measure of an earthquake's power is measured as horizontal acceleration. The Charleston, South Carolina earthquake's epicenter was 120 miles from the Vogtle site but caused an estimated peak horizontal acceleration of 10 percent of gravity (0.1g) during the quake (URS/Blume 1982).¹⁰ The horizontal component of ground motion for the NRC Safe Shutdown Earthquake is a peak ground acceleration of at least 0.1g.¹¹ Note that the Charleston quake's impact on the Vogtle site was equal to the NRC's standard for so-called Safe Shutdown.

⁸ US Geological Survey, Charleston Earthquake, http://neic.usgs.gov/neis/eqlists/USA/1886_09_01_iso.html

⁹ South Carolina Emergency Management Division has responsibility for the development, coordination, and maintenance of the Earthquake Plan and selected other plans, http://www.scemd.org/news/publications/EQ%20Guide%202008/1886_EQ_New_08.html

¹⁰ C://my documents/BREDL/Campaigns/nuclear campaigns/SRS/EIS1995/3eis-Affected Environment

¹¹ 10 CFR Part 50 Appendix Sô Earthquake Engineering Criteria for Nuclear Power Plants (IV)(a)(1)(i)

Virginia Earthquake of 2011

On August 23, 2011 an earthquake in central Virginia rattled the North Anna nuclear power station twice as hard as what plant was designed to withstand. The earthquake registered 5.8 on the Richter scale; caused 115-ton steel casks storing highly radioactive nuclear waste to shift 4½ inches on concrete storage pads; and was felt by residents from Georgia to Maine and Illinois.

Dominion-Virginia Power's North Anna plant went on line over 30 years ago, generating power and high-level nuclear waste; today, about 1200 tons of waste is stored on site containing 228,000 curies of radiation. According to the Project On Government Oversight, North Anna's irradiated fuel pools hold from 15 to 30 times more radioactive Cesium-137 than was released by the Chernobyl accident. Cesium-137 has a half-life of 30 years, meaning it remains dangerous for 300 years. Cesium is water soluble. If ingested, it mimics potassium, an element vital to all cells in the human body.

The Virginia quake triggered an Emergency Action Level alert, an EAL HA6.1. An HA6.1 level alert indicates an event with substantial degradation of safety, in which releases of radiation are expected to be "small fractions" of the EPA Protective Action Guideline. However, the Protective Action Guideline is high: 1000 millirem total effective dose equivalent (TEDE) or 5000 millirem thyroid committed dose equivalent (TCDE). In other words, people were contaminated.

Conclusion

Federal emergency planning for nuclear power plants is inadequate. An update of the preparedness Criteria is long overdue. Further, the radioactive contaminants from the nuclear accident last year in Japan affected air, water, soil and agricultural products over a much wider area than the Nuclear Regulatory Commission currently acknowledges. FEMA must improve public health and safety measures at nuclear power plants.

Thank you for the opportunity to present these comments. Please inform me of any developments in this matter.

Respectfully,



Louis A. Zeller, Executive Director

Chapters of the Blue Ridge Environmental Defense League supporting this request: Peoples Alliance for Clean Energy in Virginia, Bellefonte Efficiency and Sustainability Team in Alabama/Tennessee, SAFE Carolinas in NC/SC, the Concerned Citizens of Shell Bluff in Georgia and the Neighborhood Environmental Watch in North Carolina.