CHEJ Webinar April 16, 2013

Fighting Nuclear Reactors

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The Blue Ridge Environmental Defense League is a regional, community-based, non-profit environmental organization. Our founding principles are earth stewardship, environmental democracy, social justice, and community empowerment. Working in rural and disadvantaged areas, our staff and volunteers put into practice the ideals of love of community and love of neighbor. BREDL is a grassroots organization: each community group solves pressing local problems by developing a citizens' campaign with goals, strategies, activities, and assessments. The issues center on industry's dependence on toxic chemicals, utilities' refusal to adopt sound energy alternatives, industrial development at the expense of public health, and huge waste dumps. These are social problems with devastating environmental and public health effects. They are also the clarion call for community action. Our mission is difficult. But, in the words of BREDL Co-president James Johnson, "We don't quit; we find a way to do it." We maintain working relationships with powerful citizensô groups throughout the country and around the world.

Fukushima

On March 11, 2011, a 9.0-magnitude earthquake struck Japan and was soon followed by a tsunami critically damaging the six nuclear power reactors at TEPCOôs Fukushima Dai-ichi. Yet when the United States Nuclear Regulatory Commissionôs Fukushima Lessons Learned task force issued its report on July 12, 2011, it concluded that there was no imminent risk from continued operation and licensing activities in the US. This is untrue.

The Japanese disaster was more serious than those at Three Mile Island in 1979 and Windscale in 1957, and perhaps second only to Chernobyl in 1986. These four radioactive landmarks serve as warnings marking the continual failure of the most advanced technological societies on the planet to harness nuclear power. Here is the question: What did engineers in Pennsylvania, Great Britain, Russia and Japan overlook while building and managing their power plants? How could they fail to anticipate such accidents in industrial facilities using radioactive fuel operating at 1,400 degrees-F and pressures of 1000 or more pounds per square inch? Fukushima continues to release radioactive poison. The power company will pay $13 billion this year and $11 billion annually for damages.

A case in point: 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 have been centered nearby. For example, in 1886 a quake centered in Charleston, SC: ñThe earthquake had a magnitude of 7.3 and was felt over 2.5 million square miles, from Cuba to New York, and Bermuda to the Mississippi River.ò[i] The Charleston earthquakeôs epicenter was 120 miles from the Vogtle site and caused an estimated impact equal to the NRCôs design standard.[ii]

An earthquake is an unpredictable event. The Fukushima disaster occurred in an area with a known seismic history and to a society well adapted to living on a fault line. Charles Richter, developer of the Richter scale, said: "[Prediction] provides a happy hunting ground for amateurs, cranks, and outright publicity-seeking fakers"[iii]

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.

Water and Air Pollution

Operating nuclear power plants routinely emit radioactive pollution to the air and water. These amounts are known and recorded.

NRC regulations allow the public to be exposed to radiation. The limit for radiation dose to individual members of the public is 100 millirem, a dose which equates to an annual risk of 5 in 100,000 and a lifetime risk of 3.5 in 1,000. This means that 5 persons could die for every 100,000 members of the public exposed the plantôs ionizing radiation for a year; 3 to 4 persons per 1,000 could die if exposed over a lifetime.[iv]

The first long-term study of the full-population health impacts of the closure of a U.S. nuclear reactorð Rancho Secoð found 4,319 fewer cancers over 20 years, with declines in cancer incidence in 28 of 31 categories, including notable drops in cancer for women, Hispanics and children. The study was published in March 2013 in the peer-reviewed medical journal, *Biomedicine International*.[v]

Safety and Reliability

Old Reactors

Ice condensers: Five nuclear power stations rely on baskets of ice to control excess heat and pressure during a nuclear accident: McGuire in North Carolina, Catawba in South Carolina, Watts Bar and Sequoyah in Tennessee and DC Cook in Michigan. This system was designed to save the industry money by reducing the amount of concrete and steel in the nuclear reactorsô containment buildings. The nine nuclear reactors at these are the only such units operating in the United States. They should all be shut down.

GE Mark I Fukushima-style: In 2011 Blue Ridge Environmental Defense League requested that the NRC immediately suspend the operating licenses of General Electric (GE) boiling-water reactor (BWR) Mark I units to protect public health and safety. The Petition focused on the unreliability of the GE BWR Mark I containment system to prevent a severe accident during the loss of emergency power needed to cool high density fuel storage pools and radioactive reactor fuel assemblies.

North Anna: To estimate earthquake risks, nuclear engineers use ñprobabilisticò techniques to describe potential ground motion. That is, they attempt to account for all potential seismic sources in the region around the plant. The standard is ground motion that occurs every 10,000 years on average.[vi] But the 5.8 scale quake in Virginia in 2011 was preceded by a 5.8 quake in 1897; just 114 years separated the two quakes.

New Reactors

The new Westinghouse so-called Advanced Passive 1000 reactor is the state-of-the-art, with 50% fewer valves, 35% fewer pumps and 80% less plumbing. However, a cost-cutting measure in the AP-1000 is modular construction, assembling the reactor containment structure from many pieces instead of casting the concrete as a unit. This reduces structural integrity. Also, the AP-1000 shield building supports a water tank containing eight hundred thousand gallons of water. Relying on gravity to bring emergency cooling water may reduce reliance on pumps, but suspending 3,334 tons of water above the reactor core introduces instability not present in older designs. For comparison, the total weight of the nuclear reactor vessel itself is only 417 tons.[vii] Finally, the AP-1000 suffers from a design flaw which during an accident could siphon radioactive gases from the reactor directly into the air.[viii] A nuclear reactorôs containment structure is supposed to shield the reactor from outside events and protect the outside world from radiation releases. If the dome rusted through, the design would release radioactive contaminants to the public 10 times higher than the NRC limit, according to Arnie Gundersen. Fourteen AP-1000ôs are planned in the US in Florida, Georgia, Alabama, South Carolina and North Carolina.

Shearon Harris Nuclear Power Plant	North Carolina
William States Lee III Nuclear Generating Station	South Carolina
Virgil C. Summer Nuclear Generating Station	South Carolina
Vogtle Electric Generating Plant	Georgia
Levy County Nuclear Power Plant	Florida
Turkey Point Nuclear Generating Station	Florida
Bellefonte Nuclear Generating Station	Alabama

In 2010 Dr. John Ma, NRCôs Senior Structural Engineer leading the review of the AP-1000 project, filed a formal disagreement regarding the plantôs shield building. Dr. Ma challenged the safety report (SER) for the AP1000, saying that a lack of flexibility in the containment building could lead to failure during an earthquake or external impact.[ix] Despite Dr. Maôs concerns, the NRC approved the design.

Rep. Ed Markey (D-MA) identified Dr. Maôs concerns in a letter to NRC, saying: ñThe AP 1000 shield building failed physical tests which showed it to be brittle, leading Dr. Ma to conclude that it could shatter ólike a glass cupô upon impact.ò Subsequently, the AP1000 Oversight Group, a national coalition of citizensô groups including the Blue Ridge Environmental Defense League, filed a legal challenge opposing the approval process for the Westinghouse AP1000 reactor, asking that the design be declared ñnull and void.ò Oral arguments in the District of Columbia Court of Appeals were heard in November 2012. Presently, we are awaiting that decision.

Fundamental Problem

The NRC uses ñprobabilistic risk assessmentò to determine what can go wrong, how bad it could be and how likely it is to occur *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:

ñThe 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.ò[x]

Environmental Justice

Georgia Powerôs Plant Vogtle is a commercial nuclear power station located in the Burke County community of Shell Bluff on the banks of the Savannah River. Vogtleôs two nuclear reactors came on line in 1987 and 1989, fifteen years after breaking ground and 1,300% over budget. Areas within 40 miles of Plant Vogtle are persistently distressed by unemployment and poverty. The community surrounding the plant has an exceptionally high percentage of both African American and low-income households.[xi] The plant routinely releases radioactive poison into the environment.[xii] A landmark study published in 2009 examined environmental injustice in the siting of nuclear plants with a particular focus on Plant Vogtle. The study was based on negative health factors.[xiii] The study concluded, ñdata suggest reactor-related environmental injustice may threaten poor people ($p<0.001$), at least in the southeastern United States.ò[xiv]

Conflicts Within America's Nuclear Agency

Our legal interventions are generally opposed in lockstep by both nuclear industry attorneys and the NRC legal staff. This dogmatic approach by NRC opens the door wide to its nuclear customers but slams it shut to others.

For example, hydrology affects the movement and level of water which reactors need. The League and others have challenged outdated information at Atomic Safety and License Board hearings, but the Nuclear Regulatory Commission appears to be deaf to these safety concerns. Critical issues include ground motion, seismically induced floods and waves, soil and rock stability, and cooling water supply.

So in 2008 we intervened in the license process at the Bellefonte site in Alabama. In 2010 Joseph Williams, a member of the NRC professional staff, stated, ñBellefonte Unit 3 and 4 hydrology review calls into question the fundamental acceptability of the Bellefonte site.ò For this Mr. Williams suffered ill treatment. He reports, ñI have also endured deliberate attempts to restrict my participation in the decision making process.ò ñThroughout my experience, I have met significant resistance to even acknowledging issues exist, much less participating in any constructive discussion of their merit, and receiving constructive feedback.ò[xv] Here, by misdirection and deception, even the advice of the NRCôs own staff expert was set aside.

In 2011 the Nuclear Regulatory Commissionôs Fukushima Lessons Learned Task Force concluded that enhancements to safety and emergency preparedness were warranted and made a dozen recommendations for Commission consideration. The NRC staff subsequently prioritized and expanded upon the task force recommendations (October 3, 2011 in SECY-11-0137). However, these recommendations were ignored when the Commission approved the Plant Vogtle construction and operation license in February 2012, the first such license issued in 30 years.

Global Warming

In the August 2004 issue of *Science*, Stephen Pacala and Robert Socolow of Princeton Universityôs Carbon Mitigation Initiative published a paper identifying existing technologies that could each reduce carbon emissions by mid-century. They divided the problem into seven 1 billion-ton-per-year ñwedgesò which are required to halt the rise in greenhouse gas emissions. One of the wedges was nuclear, however Dr. Pacala said, ñIf you try to solve even one wedge of this problem with nuclear, it would require a doubling in the amount of nuclear power deployed.ò Today there are 437 nuclear power plants in operation and another 68 under construction. Therefore, it would require roughly 1000 nuclear reactors to address one-seventh of the global warming problem. At $9 billion each, that would mean an investment of $9 trillion to reduce greenhouse gas by 14%. Meanwhile, 40,000 megawatts of new wind power capacity was commissioned worldwide in 2011 alone, equal to 13 nuclear power plants. Contrary to the promise of too cheap to meter, nuclear power has become too expensive to matter.

Ongoing Opposition

On February 18, 2011, the Blue Ridge Environmental Defense League, Riverkeeper, Inc. and the Southern Alliance for Clean Energy filed a petition in US District Court to reverse decisions by the US Nuclear Regulatory Commission on high-level radioactive waste from nuclear reactors. Attorney Diane Curran based the challenge on violations of the National Environmental Policy Act and the Atomic Energy Act. At issue is the fact that the NRC licensed the first generation of nuclear reactors, allowing thousands of tons of highly radioactive irradiated fuel to pile up at reactor sites, without having any means of disposing of it. Our petition called for a halt in nuclear power plant construction until this issue is resolved.

(see factsheet at: http://www.bredl.org/pdf4/fact_sheet_EIS_Scoping_2013_04.pdf)

In conclusion, for all types of thermo-electric power plants fully two-thirds of the heat produce is flushed down the drain as heated water, unusable. Meanwhile, high river water temperatures and falling reservoir levels are creating unsafe conditions for nuclear power plants because they have no off switch, they must have water to avoid overheating. And a single plant may consume more than the largest cities in a given state combined. What if we were to put the water hogs on a diet? We should call for a ñWater Budget.ò The highest and best use for water in every state is to use this limited natural resource as if people matter; that is, for public health and agriculture, not generating electricity which can be done better other ways. It is time to make business as usual too costly.

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Founded in 1984, BREDL has chapters in Alabama, Tennessee, Georgia, South Carolina, North Carolina, Virginia and Maryland.

End Notes

[i] US Geological Survey, Charleston Earthquake, http://neic.usgs.gov/neis/eqlists/USA/1886_09_01_iso.html
[ii] 10 CFR Part 50 Appendix Sð Earthquake Engineering Criteria for Nuclear Power Plants (IV)(a)(1)(i)
[iii] Geller RJ et al, ñEarthquakes Cannot Be Predicted,ò Volume 275, Number 5306, pp. 1616, 1996, The American Association for the Advancement of Science, http://scec.ess.ucla.edu/~ykagan/perspective.html
[iv] *Table of Fatal Cancer Risk from Ionizing Radiation,* NRC Below Regulatory Concern Policy, 22 June 1990
[v] *"Long-term Local Cancer Reductions Following Nuclear Plant Shutdown,"* Joseph Mangano, MPH MBA and Janette Sherman, MD
[vi] 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
[vii] AP1000 Design Control Document Reactor Coolant System and Connected Systems 5.3.4.1, Revision 15
[viii] *League Line*, Spring 2010 issue, ñInherently Dangerousò
[ix] US NRC Non-concurrance, ñDissenting View of the AP-1000 Shield Building Safety Evaluation Report With Respect to the Acceptance of Brittle Structural Module to be used for the Cylindrical Shield Building Wall,ò Redacted, December 3, 2010, ADAMS Accession No. ML102630229
[x] Ramana, NV, ñBeyond our imagination: Fukushima and the problem of assessing risk,ò *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.
[xi] Senate Resolution 598, Senator Thomas (2007) 07 LC 25 4926ER
http://www.legis.ga.gov/legis/2007_08/fulltext/sr598.htm
[xii] Resolution of Generic Safety Issues: Issue 153: Loss of Essential Service Water in LWRs (Rev. 2) (NUREG-0933, Main Report with Supplements 1ï 32)
[xiii] The study was based on the following: 1) significant increases in infant and fetal mortality near nuclear reactors, 2) increased lung cancer and leukemia after the accident at Three Mile Island, and 3) higher percentages of women and children who are more sensitive to radiation in minority and poverty-level communities.
[xiv] *Environmental Injustice in Siting Nuclear Plants*, Mary Alldred and Kristin Shrader-Frechette, ENVIRONMENTAL JUSTICE, Volume 2, Number 2, 2009 © Mary Ann Liebert, Inc. DOI: 10.1089/env.2008.0544
[xv] Joseph Williams Limited Appearance Statement, 5 March 2010, ADAMS Accession Number ML100700411