America's Quake-Proof Nukes

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By Roger Witherspoon

As the Japanese struggle to prevent a widening disaster in its nuclear fleet from adding to the natural disaster facing that country, America's nuclear proponents are struggling to show that such a calamity could not happen here.

One Gannett newspaper trumpeted that the local, Indian Point nuclear power plant was designed to withstand earthquakes and would not suffer the same fate as the Fukushima Daiichi plants. The implication was that it could withstand an earthquake similar to the one which struck Japan – though the biggest quakes in the Northeast barely hit 4.0 on the Richter scale and most are of negligible impact.

But for journalists dealing with the subject, it is important to keep two facts in mind:

- America's nuclear plants were designed to withstand known or anticipated natural disasters. But those plans were made using the technology of the 1950s and early 60s, when they were designed. The science of earthquakes, the advances in engineering, and the analysis of soil mechanics necessary to make modern, earthquake-proof skyscrapers did not exist back in the era of Eisenhower, bobby socks and the Atoms for Peace program. They do not, therefore, meet modern earthquake standards.
- The Nuclear Regulatory Commission does not require a modern analysis of the ability of its 104 power plants to withstand earthquakes. One of the many unsuccessful challenges to the relicensing of the Salem and Hope Creek nuclear power plants on Artificial Island in New Jersey contended that a new, earthquake analysis should be conducted before the plants were granted 20 to 40-year license extensions. The NRC, however, ruled that the issue was settled with the original license and did not need to be revisited.

That is *not* to state that modern nuclear power plants are vulnerable to the type of unfolding tragedy taking place across the Pacific. Several years ago, at least one electrical conduit at the Indian Point nuclear plant 30 miles north of Manhattan was disrupted by an earthquake, though the shift in the earth's crust was undetectable by the walking public. Repairs were quick and relatively minor. Nuclear power plants are not fragile structures.

But they are man-made and old. Nearly all of them have buried pipes and conduits which have leaked in recent years. To what extent some of those leaks may have been created or exacerbated by years of low level shifts in the earth is not known. But that should be considered and definitely ruled in or out before a blanket grant of earthquake immunity is conferred on the power plant above it.

The same, regularly rumbling Wappinger's Fault is believed responsible for the tracery of cracks in the Delaware Aqueduct, the water tunnel 800 feet underground which brings up to

70 percent of the drinking water used in New York City and Westchester County from the reservoirs in the Catskill Mountain region. It should be noted that this is a man made fault, caused by the extensive surface mining of a rock quarry which, in time, altered the tension of local geological formations.

Journalists should pause before buying the line that “it can’t happen here” and quoting it uncritically, particularly considering the earthquake-prone regions of the far west and Alaska. Proponents of nuclear power are on firmer ground stating it is not likely to happen here for both geological and sociological reasons.

In the former case, the number of regions in the U.S. with major known earth quake faults and the presence of a nuclear power plant is small. But with climate change and an increase in hydrofracking, there are new, unmeasured stresses added to the earth – just ask folks in Alabama’s new earthquake zone – which might reasonably deserve a thorough, modern look before any new power plant is built there.

In the latter case, dealing with sociology and risk perception, questions are already being raised about the Japanese decision making process as crutical events unfolded at Daiichi Unit 1 and its nuclear cohorts. Crucial decisions are affected by cultural differences in the perception of risk. Would American reactor operators have ignored possible public criticism and discharged into the air large, continuous amounts of highly contaminated vapor from the reactor rather than let dangerous amounts of hydrogen gas build up? Was it more important to the Japanese operators to try and manage the gas buildup rather than deliberately dump radioactive material into the public air? Is there a significant, practical difference between making a bad decision to protect the public, and making a bad decision to protect corporate profits?

It will take long, thoughtful, after-action analysis by experts in human factors in complex systems to answer such questions and determine how to incorporate the lessons learned into the NRC’s training program for reactor operators. The NRC is one of the best public agencies when it comes to conducting lessons learned analysis, even if its record of following its lessons is spotty. Any long term consensus needs outside input from academic think tanks such as the Center for Human Performance and Risk Analysis at the University of Wisconsin (http://www.chpra.wisc.edu/index.php).

When they are done, Americans will be in a better position to know just how safe our nuclear industry really is.