Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

Keynote Speech at Know Nukes Y'all Summit in Chattanooga, Tennessee

I have some good news and bad news to share with you about the tragic accident that happened last year at Fukushima in Japan.

First, the good news.

Can Fukushima happen here?

I don't care what anyone tells you, the answer is absolutely not.

According to the Nuclear Regulatory Commission's Information Digest, no U.S. nuclear power reactor is named Fukushima.

According to Rand McNally, no U.S. city or county is named Fukushima.

Fukushima cannot happen here because we don't have anything named Fukushima.

Now for the bad news.

Can an accident like Fukushima happen here?

I still don't care what anyone, or to be precise, anyone else, tells you, the answer is absolutely yes.

The primary problem at Fukushima was a loss of electrical power. The earthquake disconnected the plant from its offsite electrical power grid. As designed, emergency diesel generators started automatically and supplied electricity to vital equipment. Then the tsunami disabled the emergency diesel generators. As designed, banks of batteries automatically supplied electricity to a smaller subset of vital equipment needed to cool the reactor cores. Then the batteries were depleted. Workers were left, in the dark, with dozens of pumps that could not move a drop of water because they lacked electricity. Three reactor cores were severely damaged.

That sequence is called a station blackout in the nuclear industry.

The NRC has been concerned about station blackouts for decades. The nuclear industry minimized their concerns, contending that the offsite power grid and the emergency diesel generators are each so highly reliable that the chances of both failing are so small as to ignore the threat entirely.

Then a station blackout occurred on March 20, 1990, at the Vogtle plant in Georgia. A utility track backed into the base of a transmission line pole in the plant's switchyard, disconnecting the plant from the power grid. The emergency diesel generator automatically started, but then failed

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to supply electricity to vital equipment due to a faulty switch. Luckily, workers repaired the emergency diesel generator's problem before the batteries conked out, too.

Station blackout remains a concern. In December 2005, the NRC issued a report following its re-evaluation of the station blackout risk at U.S. reactors. The NRC determined that station blackout represents 17.5% of the risk of core meltdown at the average U.S. nuclear power reactor. For U.S. reactors designed like the Unit 1 reactor at Fukushima, the risk is even higher – over 28% of the meltdown risk. For reactors like Sequoyah, the closest operating nuclear power reactor to us, station blackout is 23 percent of the core meltdown risk.

The pathway to station blackout at U.S. reactors might not be the same taken last year at Fukushima. In other words, it doesn't only take a one-two punch from an earthquake and tsunami to put a U.S. reactor into a station blackout. Vogtle got into one without either an earthquake or a tsunami. Theirs was a self-inflicted station blackout.

At U.S. reactors, as at Fukushima, it has always been assumed that offsite power would be restored or an emergency diesel generator would be repaired to end the station blackout before the batteries were exhausted. Fukushima had banks of batteries designed to last for 8 hours. Most U.S. reactors only have 4 hour battery supplies. Only 11 of the nation's 104 operating reactors have batteries designed to last longer than 4 hours.

The NRC is seeking to fix that situation. It is proposing that plant owners be able to adequately cool the reactor core and spent fuel pool at a reactor experiencing a station blackout of indefinite length. For the first 8 hours, the NRC wants owners to only rely on permanently installed equipment. From 8 hours to 3 days, the NRC will permit owners to also rely on temporary equipment – like mobile generators and portable pumps – if that equipment is already at the plant site and is likely to survive whatever plunged the plant into the station blackout. Beyond three days, the NRC will allow owners to rely on offsite resources if it can be shown that the resources are available and can be transported to the site in time.

Two differences between U.S. reactors and Fukushima give us some time to implement the NRC's upgrades. Following the March 1979 accident at Three Mile Island, the NRC revised its regulations to require emergency exercises be conducted at every nuclear plant site at least once every two years. Such emergency planning measures aren't bulletproof against all nuclear plant disasters, they offer some bullet resistance. In addition, after the 9/11 tragedy the NRC required plant owners to upgrade measures intended to enable reactors to better withstand a suicide aircraft. Again, these upgrades do not provide absolute protection, but they give workers at U.S. reactors more options than existed at Fukushima last year.

The NRC's lessons from Fukushima today are merely safety IOUs, As an engineer, I deal with many equations. In this case, the equation is: All the plans plus all the promises plus all the pledges equals zero protection. The "To Do" list merely makes it easier for the lawyers to sue if a nuclear plant accident happens before the lessons learned are transformed into lessons implemented.

I want to share with you the biggest secret from Fukushima.

Fuel in three reactor cores has been severely damaged. That's no secret.

Fuel in four spent fuel pools may have escaped damage due to the heroic actions of helicopter crews dumping tons of cooling water from above and first responders shooting tons of cooling water from below. That's no secret – it was repeatedly shown on TV and YouTube.

Fuel in dry storage at the site escaped damage all by itself. That's the secret.

It didn't need cooling systems powered from the offsite power grid or onsite emergency diesel generators or batteries. It didn't need dousing from helicopters or spraying from fire hoses. It came through all the challenges just fine. There's a lesson to be learned here.

There were nearly 400 fuel bundles stored in dry casks when the earthquake and tsunami struck Fukushima last year. They were housed inside a building by the sea between Units 1 to 4 and Units 5 and 6. The tsunami waters inundated the dry casks for awhile before receding.

Kind of like Russian dolls, fuel bundles are placed inside steel canisters. The decay heat generated by the fuel bundles passes through the metal walls of the canisters to get carried away by air flow – the chimney effect. It is truly a passive safety system.

When the tsunami flooded the building, the chimney effect was blocked. But the water performed the heat removal function that the air was no longer doing. When the flood waters receded, air took back over the chore without any worker interaction required.

The spent fuel pools at U.S. reactors are overcrowded. If water drains from a pool or boils away, the spent fuel can be damaged by overheating. The typical U.S. reactor has nearly three times as much fuel in its spent fuel pool as in its reactor.

Why tempt fate?

The proper way to manage the spent fuel risk is to transfer it from pools to dry storage. The dry storage methods available in the U.S. today can accept fuel that has been out of the reactor core for at least five years. If we transferred all that fuel into dry casks, which by the way, can also be moved offsite if and when a spent fuel repository opens, there would be about one reactor core's worth of spent fuel remaining in each pool. If something were to happen to a pool, the smaller inventory gives workers more time to add water or restore cooling to prevent fuel damage. And if workers fail, the smaller inventory results in a smaller radioactive cloud and less hazard to workers and the public.

This solution is a no-brainer. Shame on us for not taking this prudent public health step.

Keeping pools filled with spent fuel is like keeping a loaded gun aimed at our heads. If it goes off, the no-brainer solution becomes the no-brainer tragedy.

And it'll lead to a gathering like this in Tokyo or Yokohama where some speaker will pose the question, "Can Sequoyah or Browns Ferry or Watts Bar or Hatch really happen here?"

And that answer will be yes. But it shouldn't happen here, or there.

I opened by talking about good news and bad news.

I left the best news until last.

We are here this evening. It's all up to us. They, whoever they are, won't fix this. It's up to us. Even though there's many of us here this evening, we still don't outnumber them.

That's okay. We out-horsepower them.

I have seen what people in this room have achieved in the past. I know what we can do in the future. I look forward to working with you to fix not only the no-brainers, but even some that may require a little thinking.