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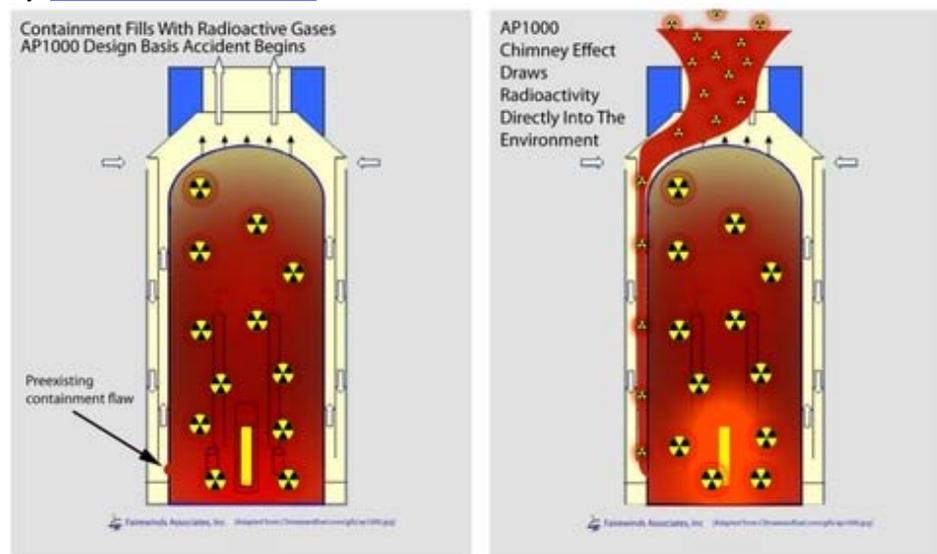
A Blog About Energy and the Environment



April 21, 2010, 3:27 pm

Critics Challenge Safety of New Reactor Design

By [MATTHEW L. WALD](#)



Courtesy Arnold Gundersen,

Fairewinds Associates Illustration of how an accident might unfold in the containment vessel of a Westinghouse AP1000 nuclear reactor.

As [Southern Company](#) and its partners, armed with federal loan guarantees of \$8.3 billion, move toward construction of [two new reactors](#) at a site near Augusta, Ga., opponents are taking aim at the design details.

The reactor, the [Westinghouse AP 1000](#), is also planned for several other locations, but has not yet been fully approved by the [Nuclear Regulatory Commission](#). It is intended to be far safer than existing plants, ensuring that there will be no fuel melting in an accident by relying for its cooling on forces like gravity and natural heat flow instead of pumps, pipes and valves. That concept gives the AP 1000 its name, for Advanced Passive. (The 1,000 refers to the power rating in megawatts, although the actual power output is a less picturesque 1,154.)

A critical feature of the design is an unusual containment structure. One part is a free-standing steel dome, 130 feet high, surrounded by a concrete shield building and topped with a tank of emergency water.

The commission has raised concerns about whether a shield building would be strong enough to survive an earthquake. Westinghouse submitted a detailed report last month and plans another in May to demonstrate that the building is adequate.

But on Wednesday, Arnie Gundersen, a nuclear engineer commissioned by several anti-nuclear groups, [released a report](#) suggesting a different hazard.

In existing plants, he pointed out, the containment consists of a steel liner and a concrete dome, but sometimes the steel liner has rusted through.

In the new Westinghouse design, the liner and the concrete are now separated, to allow air to flow between them, so the temperature inside the steel structure will be kept down by natural forces. But if the steel rusts through, “there is no backup containment behind it,” Mr. Gundersen said.

In the new design, he said, metal baffles bolted to the steel direct the air flow, and those baffles are a spot where moisture from the atmosphere could collect. At coastal plants, salty water could collect, and inland, it would be evaporating water from the cooling towers. Inspection, he said, would be difficult.

If the dome rusted through and an accident occurred, the plant could deliver a dose of radiation to the public that is 10 times higher than the N.R.C. limit, Mr. Gundersen said. Instead of drawing fresh air past the dome through a chimney effect, the design would expel radioactive contaminants.

Vaughn Gilbert, a spokesman for Westinghouse, disputed Mr. Gundersen's assessment.

Mr. Gilbert said that the dome would be made of high-quality steel that is 1.75 inches thick. (Most existing domes have a steel liner three-eighths or half an inch thick.)

The containment structure "is designed to preclude and avoid corrosion," Mr. Gilbert said. "In the unlikely event that there would be some corrosion, it would be readily determined in inspections, and remedied."

Mr. Gundersen's report was paid for by [a combination of local and national groups](#), including Friends of the Earth, the Blue Ridge Environmental Defense League, the Green Party of Florida and the South Carolina chapter of the [Sierra Club](#).

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[1.](#)

robert c

Oakland CA

April 22nd, 2010

5:06 am

I trust the NRC much, much more than some cast-off nuclear engineer paid by anti-nuclear groups. This study has about as much chance of being unbiased as tobacco studies paid for by RJ Reynolds.

The statement that corrosion would be hard to detect using inspections is probably a red herring, particularly if it refers to visual inspections. Visual inspections are not the only means of detecting corrosion; companies have been doing this for quite some time using ultrasound and, more recently, x-rays.

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[2.](#)

[Chris Dudley](#)

Maryland

April 22nd, 2010

5:08 am

Wow, zero defense in depth.... This is very sad. We can't use old designs because we know they are not safe and now the new designs have even worse failure modes. This is an industry that needs to be shut down.

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[3.](#)

Wang Suya

Japan

April 22nd, 2010

5:09 am

As we are needing energy growth and renewable energy can not offer us all the energy needed. Safe nuclear

power have to be built. I hope when all the energy can be offered by renewable energy, we stop the nuclear energy.

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4.

[doug l](#)

indiana

April 22nd, 2010

5:44 am

It may turn out that this design needs to address some additional concern, and then again it may not, but the process in which design competence can be questioned by interested and qualified parties is one that should not be ignored or denied.

In the mean time I hope that newer, safer designs that are inherently less prone to problems are being designed and evaluated so that a genuine standard can be adopted and applied, while we keep in mind that our technology will always be improving and that supporting a civilization that depends on energy intensive technologies that are moving towards safer, cheaper and more abundant access to energy which will one day find us harvesting energy and other materials from outside the planet's gravity well.

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5.

sefarkas

Brooklyn

April 22nd, 2010

4:47 pm

It is common to have a free standing 3/8" steel welded building surrounded by a thick concrete shield wall with an annulus between them (~3ft). The steel building is so airtight that we have to have a small diameter filtered vent to relieve pressure built up by things like nitrogen from valve operators. NRC regulations (10CFR Part 50, Appendix J) is quite rigorous in terms of monitoring and testing the containment that it is always leak tight when all the valves are closed. For example, last April (2009), "On April 21, 2009 during the Beaver Valley Power Station Unit No.1 (BVPS-1) refueling outage, an ASME XI Section IWE General Visual examination was performed on the interior containment liner. A suspect area was identified at the 738 foot elevation level of containment. This area was approximately 3 inches in diameter and exhibited blistered paint and a protruding rust product. At approximately 1015 hours on April 23, 2009 after cleaning the area and removal of the corrosion products, a rectangular area approximately 1 inch (horizontal) by 3/8 inch (vertical) was discovered that penetrated through the containment steel liner plate (nominal .375 inch thickness). The BVPS-1 containment design consists of an internal steel liner that is surrounded by reinforced concrete." See <http://www.nrc.gov...> Such a defect in a building that has a nominal free volume of 2 million cubic feet is simply inconsequential to the function of the building and fluid mechanics. Tests such as those at Beaver Valley are frequent and done while the plant is shutdown. Because of technical specifications -- given by NRC to the plant giving criteria for when operations may commence -- the plant would not start up until such a defect was corrected and the building returned to its as-new capability.

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6.

AR

United States

April 23rd, 2010

7:24 am

There are very simple measures that can be taken to avoid corrosion of large-scale steel structures (cathodic protection, either of the sacrificial anode type, or the impressed-current type), and corrosion can very easily be detected. These sorts of concerns are nothing but propaganda and fearmongering of the most speculative type, by people who fail to remember that Three Mile Island - the so-called "worst nuclear disaster in US history", had a death toll of guess how many people - ZERO, that's right, ZERO, and this is with a partial so-called "meltdown".

Compare that to a recent coal mine accident that claimed 29 lives, the 5 workers killed in an exploding

Connecticut natural gas plant just a few months ago, or the Iraq War (for Oil), which has claimed thousands of American lives, and hundreds of thousands of Iraqi lives, or the 25,000 deaths a year coal power causes - in the US alone - through lung disease, and you see that this sort of hyperbole is really silly, if not self-serving.

I wonder who had an interest in funding anti-nuclear groups that use this sort of propaganda? Perhaps we can look to the coal, oil, and gas industries for an answer? Perhaps the Times should investigate the link between fossil interests and the anti-nuclear movement, rather than utterly hypothetical safety concerns about new reactor designs that have been under regulatory review for decades, literally, and will only be built and operated with the highest standards for worker, public, and environmental safety in mind.

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7.

AR

United States

April 23rd, 2010

7:25 am

Oh, yeah, and by the way, this type of reactor is being built in tens-of-units quantities in China as a US export. The first Chinese versions of the AP1000 will be online very soon - and China will soon surpass the US in nuclear power capacity. Hundreds of units are planned by the Chinese of all types of nuclear plants, allowing them to achieve true carbon-free growth. Similarly, the Indians are busy designing and building nuclear plants using even more advanced technologies - including thorium, a new highly plentiful, and even safer nuclear fuel that both India and the US have the largest stocks of in the world - and will probably surpass the US in several decades.

It will be a sad day when the quantity of Chinese reactors exceeds that of the US, because the US could have done it here, and perhaps, two decades ago. But it is inevitable when we have a media in the US that gives generous press space to hyperbolic fearmongerers with entirely hypothetical concerns funded by questionable interests to attack the nuclear industry with no context or comparison between the worst risks of nuclear power and the routine risks of fossil power.

Here's the context you're missing. With fossil fuels, human deaths are the inevitable result of their use, environmental destruction is the inevitable result of their use, even when safety is paramount; they are "included" in the cost of power. With nuclear power, human deaths - and environmental destruction are not inevitable consequences. Who benefits, then, from hindering nuclear power?

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8.

Paxus Calta

Twin Oaks Community, Virginia

April 25th, 2010

8:57 am

One reader asks "Who benefits from hindering nuclear power?" The clear answer is we all do. As a climate solution, independent experts have dismissed it as too expensive and too slow (see Amory Lovins critique at tinyurl.com/forgetnuclear).

As for plans which get us to climate friendly energy solutions without new reactors, there are a myriad to choose from. Google has one, T. Boone Pickens has one, Al Gore has one with RepowerAmerica.org, The Rocky Mountain Institute has one (see oilendgame.org). We just task the political will to take this on.

As for the idea that the fossil fuel industries are supporting anti-nuclear groups, this idea is just laughable. Fossil interests are fighting these climate protection groups as hard as the reactor companies.

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9.

robert c

Oakland CA

April 26th, 2010

12:46 pm

@Paxus

Lovins' article (the link to which is broken, BTW), is not particularly balanced. Like most proponents of wind, solar and other non-nuclear sources of carbon-free power, the authors neglect real problems in scaling those sources up.

Nuclear doesn't suffer from this problem.

The problem nuclear does suffer from is the slow pace of building plants in this country. The longer we delay, the more of a problem we will have in the long run. I argue that we need to build as many as we can in the next decade. Now, anti-nuc people will tell you that those nuc plants will not provide the kind of reductions in carbon emissions that we need by 2025. So what? That's only because they take years to build. In the long run, nuclear is the only way to go in getting large amounts of carbon-free power. Delaying will only make the problem worse.

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[10.](#)

[Jennifer](#)

North Carolina

June 16th, 2010

7:57 am

Nuclear is an excellent solution, both because of its safety and its stability. A single nuclear plant provides energy for decades at pennies per KWh. However, as long as fear-mongering financed by the fossil-fuel industries is allowed to profligate, nuclear power will be slow to resume its place along solar and wind energy.

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