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## Disputed Reactor Design Moves Forward

By [MATTHEW L. WALD](#)



Westinghouse appears to have won an important first round in a battle with critics over the radical design of the containment system for its new [AP1000 reactor](#). A panel of senior safety advisers has told the Nuclear Regulatory Commission that with a few additional procedures and analyses, the design should be approved.

The Southern Company hopes to get a license this fall to build two of the units, which are meant to have a far lower chance of meltdown because of “advanced passive” features. But one of those features, the containment, has become a focus of critics.

Like existing Westinghouse units, the AP1000 uses a steel and concrete shell to protect the reactor and vital related parts from external hazards and to hold in any radioactive material released. But the new design is very different from the old.

In current reactors, a concrete building several feet thick is lined with a thin steel liner, and the combination is a bit like a thermos bottle, so that if an accident were to interrupt the process of removing heat, emergency systems would have to kick in to prevent the core from melting.

Yet the AP1000’s design philosophy is to avoid relying on pumps, valves and human operators any more than absolutely necessary and rather on natural factors like gravity and the fact that heat rises and dissipates. A free-standing steel shell surrounds the reactor and associated parts, and a concrete building surrounds that, with an air gap in between.

If an accident were to occur, the steel in the shell would transmit the heat to the air gap, where a naturally occurring chimney effect would carry it away. And a giant water tank on the roof can provide emergency cooling water, using gravity instead of pumps.

In existing reactors, the steel liners have sometimes been found to have rusted through. Critics of the AP1000 argue that [this could happen](#) with this design as well if debris and water became trapped in the air gap.

Arnie Gundersen, a nuclear engineer with long experience in containment, testified last year before the Nuclear Regulatory Commission’s Advisory Committee on Reactor Safeguards that [if a hole appeared](#), the chimney effect would disperse radioactive material far and wide.

But last week the advisory committee sent a letter to the commission recommending the licensing of the first two units, Vogtle 3 & 4, which are being built near Augusta, Ga., by the Southern Company and partners.

In a letter dated Jan. 24, the committee, using standard parlance, said there was “reasonable assurance” that the reactors “can be built and operated without undue risk to the health and safety of the public.”

The committee did call for a few changes, though. For one, the rooftop tank delivers its emergency water when its “squib valves” are activated. To open these valves, operators would detonate small explosive charges built into them.

Such valves are common in small applications but not at the scale to be used in the AP1000, according to the commission’s staff. The advisory committee recommended special precautions to assure that these valves, which in normal operation are never used, remain capable of being activated.

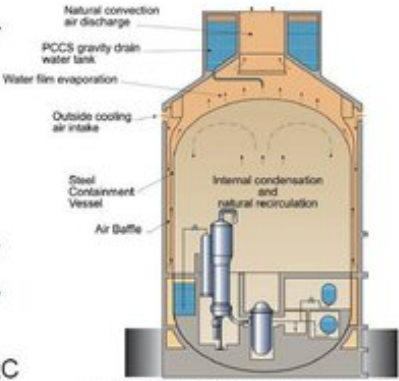
Mr. Gundersen, who has been developing a database of containment failures in existing reactors, said: “There’s no discussion of our concerns.”

“Perhaps they’ve just discounted it and decided not to memorialize it in writing,” he said.

Mr. Gundersen’s report was sponsored by the [AP1000 Oversight Group](#), a group in Chapel Hill, N.C., that is trying to halt construction of the reactors.

## Passive Safety Design

- Reactor safety functions are achieved without using any safety-related AC power
  - Battery-powered valve actuation
  - Compressed gasses (nitrogen, air)
  - Condensation
  - Natural Circulation
  - Evaporation
- Actuation of Passive Safety Systems is by simple, reliable changes in valve positions
- System performance has been proven by extensive testing and review by the USNRC



AP1000 Passive Containment Cooling System

Westinghouse The design for the containment system of the AP1000 reactor, which has been faulted by some critics.

The group’s lawyer, John D. Runkle, said that with the advisory committee’s having given its blessing, the next step was formal rule-making by the commission on the reactor design. His organization would oppose it there, he said. “We will use every forum,” he said.

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