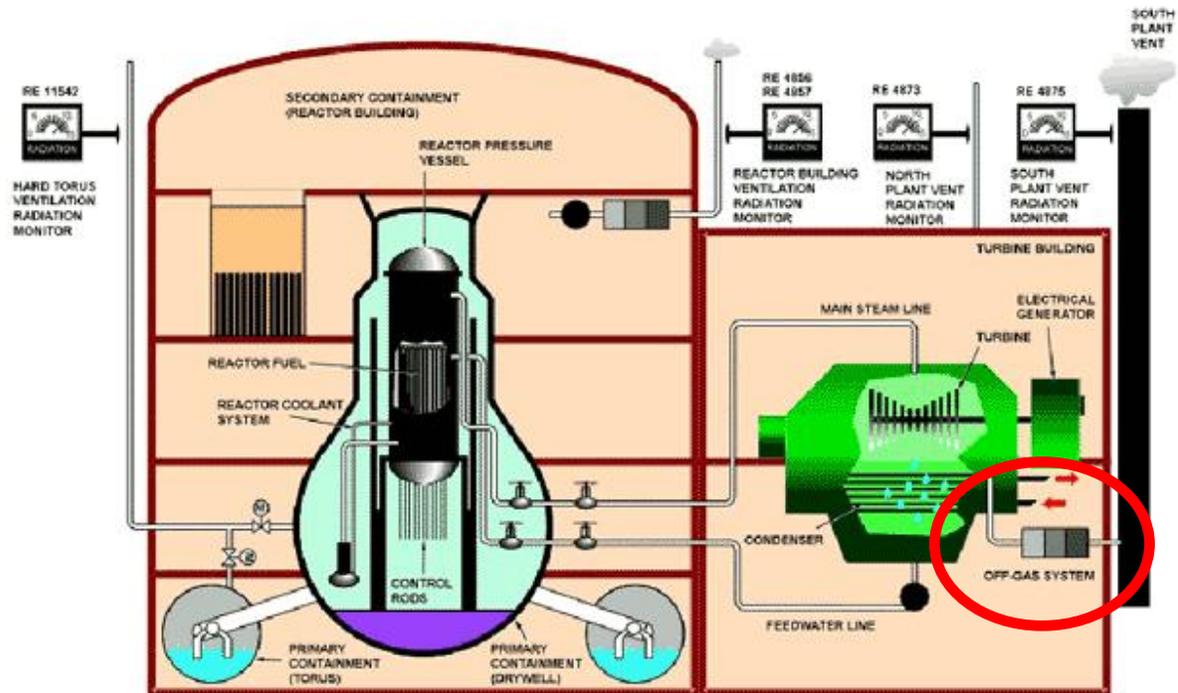
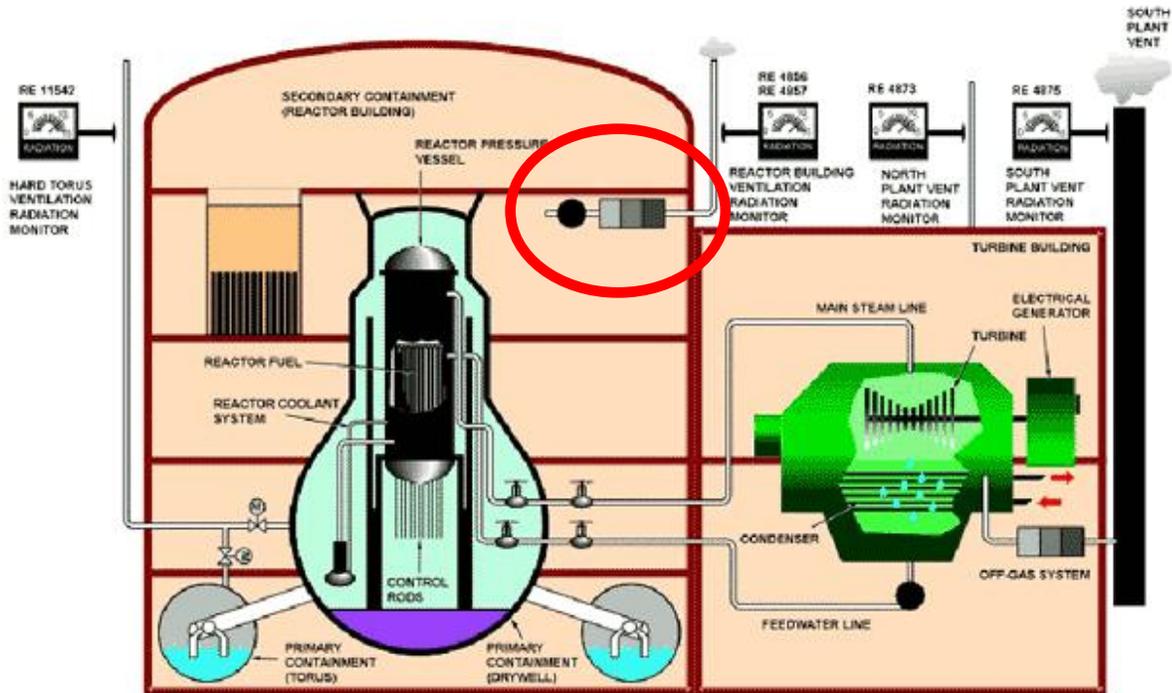




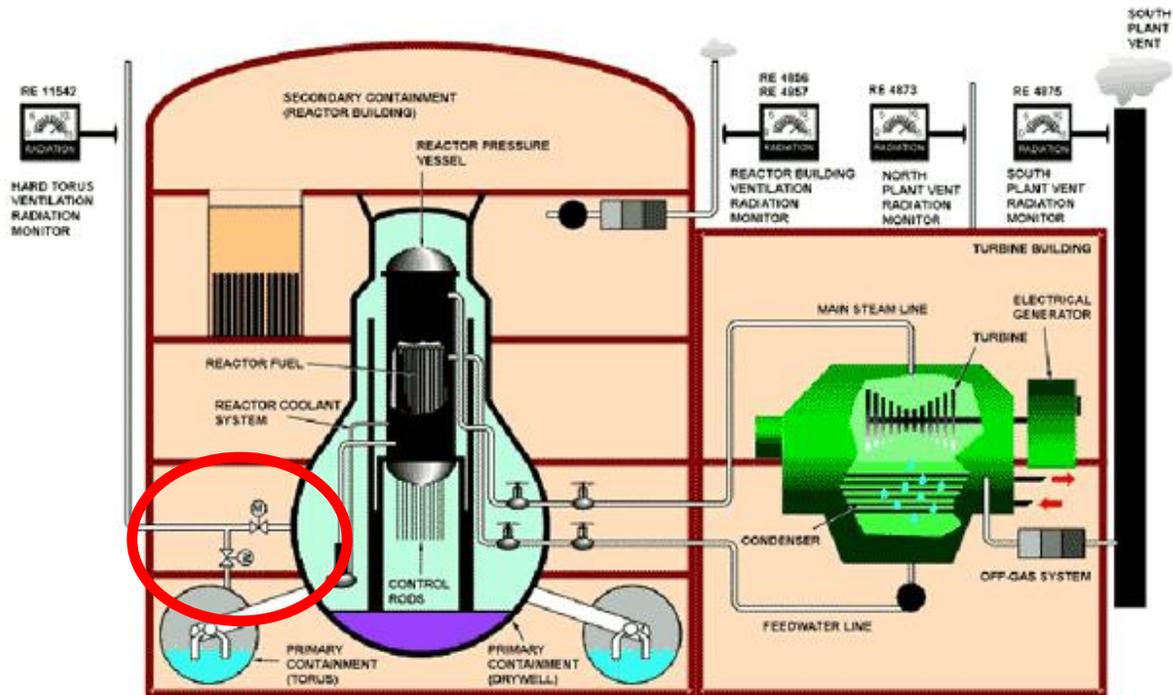
Filtered Containment Vents During Beyond Design Basis Events



When the boiling water reactors are operating above five percent power, radioactively contaminated gases are processed through the offgas system before being released to the atmosphere. The offgas system features HEPA and charcoal filters that significantly reduce the amount of radioactivity released to the environment. Even though filtered, the flow out of the offgas system is discharged through a tall chimney that helps to further dilute the radioactive concentration and better protect the public.



During design basis accidents, gases from the reactor building are processed through what is commonly called the standby gas treatment system before being released to the atmosphere. The standby gas treatment system features HEPA and charcoal filters that significantly reduce the amount of radioactivity released to the environment. Even though filtered, the flow out of the standby gas treatment system is discharged from an elevated point that helps to further dilute the radioactive concentration and better protect the public and the plant's workers.



During beyond design basis accidents (which were called severe accidents until sometime last year and were called Class 9 Accidents before that), gases from the containment may be discharged from the torus and/or drywell. The drywell pathway is unfiltered. The torus pathway is unfiltered, except for whatever radioactivity is “scrubbed” from the gas as it passes through the water inside the torus. Thus, when the amount of radioactivity (e.g., source term) is likely to be at its highest, the public and workers receive the least protection against it.

Relative Scale	Normal Operation	Design Basis Accidents	Severe Accidents
Amount of Radioactivity	Smallest	Medium	Largest
Amount of Filtering	Highest	Highest	Lowest
Threat to the Public and Workers	Smallest	Medium	Largest

Regardless of whether water “scrubbing” has the same value as HEPA and charcoal filters in reducing the amount of radioactivity released to the environment or not, the fact remains that severe accident procedures sometimes call for venting using the drywell pathway which is unfiltered. Unfiltered releases of radioactive gases are not allowed during normal operation and during design basis accidents – it’s foolhardy and unacceptable to allow unfiltered releases when the hazard is even greater.

Modeling releases from torus vents during beyond design basis accidents is more fiction than fact. During routine operation, the range of parameters (e.g., reactor vessel pressure, torus water temperature, heat load within containment, etc.) is fairly narrow. Despite this narrow range, computer modeling of design basis transients still comes out non-conservative as recent 10 CFR Part 21 reports involving Minimum Critical Power Ratio (MCPR) penalties clearly attest.

During design basis accidents, the ranges increase as the number of variables increase – the location and size of postulated pipe breaks affect compartment pressurization and heatup rates. Computer modeling of design basis accidents becomes far more uncertain as mistaken assumptions about what happens when yields the equivalent of “garbage in, garbage out.”

During severe accidents, so many things – by definition – have gone wrong that the range of parameters and their associated timelines grow to almost infinite proportions. If the range during normal operation was represented by a few lights in the dark and the range during design basis accidents represented by President Bush’s Thousand Points of Light, the range during severe accidents would be more like Carl Sagan’s billions and billions of twinkling stars. Even the most adept, dedicated, and sincere modeler faces daunting challenges trying to bound infinity. Instead of virtual reality, it is virtually impossible to adequately model all the realities that can occur during severe accidents.

If containment venting were always and only through the torus vent pathway, perhaps the cyber analyses with all their uncertainties would be justified. But drywell venting is also an option during severe accidents. Because filters are needed to handle the flow through the drywell vent pathway, installing the filters downstream of the point where the drywell vent pathway connects to the torus vent pathway kills two birds with one stone – or, more importantly, avoids killing lots of birds with lots of unfiltered radioactive stones.

The NRC must require that all – not just some – containment vents be through filtered pathways to address the unintended consequences from federal actions, namely the Price-Anderson Act as amended. Price-Anderson provides liability protection for offsite damages from nuclear plant accidents. Unlike vehicle and home owners’ liability insurance, the Price-Anderson protections are independent of risk. By purchasing hand-held fire extinguishers and installing dead-bolt locks on all exterior doors, my annual homeowner’s insurance rates dropped. In fact, the reduction the first year more than paid for the fire extinguishers and locks, so every year since has been money in my pocket. But if a nuclear plant owner spends \$100 to install a filter in the containment vent path, that owner’s Price-Anderson liability premium is unchanged. And because the NRC and the industry actually perform probability studies rather than real risk studies, whatever benefits are derived from the containment vent now being filtered do not affect the probability studies. So, it’s \$100 down the drain with zero payback in either liability protection or core damage frequency space.

The industry spends far more than \$100 on gambits like FLEX that provide better protection against damaging reactor cores. Such expenditures protect their billion dollar investments while also providing protection for people living around those investments. But \$100 for a filter to reduce the amount of radioactivity inside containment from a damaged core (a.k.a., the radioactive ashes of a billion dollar asset) getting vented to the atmosphere only benefits the public – it provides no return on investment at all for the plant owners.

The point is that filters cost more than \$100. Filters only benefit the public. Filters do not reduce liability insurance premiums by even a nickel. And filters do not lower core damage frequencies by even 10^{-8} . Thus, owners are unlikely to voluntarily pay for the filters and are very likely to vociferously resist your making them install filters. But to cross-train Nike and nuke, the public needs the NRC to tell the industry to just do it.

And if better protecting millions of Americans isn't enough incentive for the NRC, consider the dozens, perhaps even hundreds, of plant workers that filtered containment vents would also better protect. Although not the only hazard confronting workers, but radiation released and/or escaping from containments at Fukushima complicated an already very complicated situation. Workers abandoned control rooms due to radiation levels. Workers aborted recovery efforts inside the reactor building due to radiation levels. Workers delayed recovery efforts outside the reactor buildings due to radiation levels. Workers would have fared better had radioactivity stayed within filters installed in the containment vent lines rather than going, as Lennon and McCartney wrote, here, there and everywhere.

Today's meeting and the associated pondering and ciphering may all just be a charade. There might not even be an open question to vote on. During her speech at the NRC's Regulatory Information Conference in March 2012, Commission Kristine Svinicki said that she had already decided that filtered vents are unnecessary because all the other safety equipment and procedures will successfully obviate even the need for venting. The Commissioner conceded that the NRC had ordered plant owners to install reliable hardened vents, but essentially stated that there would never be a need for any plant to ever open them.

If two or more other Commissioners have also pre-judged the filter issue, then a lot of people are wasting a lot of time discussing a moot point.

But a majority of the Commission already voted to order plant owners to install reliable hardened vents. This order strongly suggests that the majority of Commissioners cannot rule out the need to someday actually open the vents at some reactor. Otherwise, the unreliable hardened vents that we've had since the 1980s would continue to be insufficient, but unnecessary and therefore legally sufficient. In fact, ordering the old hardened vents to become the new reliable hardened vents increased the chances that someday the vents will open.

Thirty years ago, the NRC mandated hardened vents be installed as a Three Mile Island lesson learned.

Six months ago, the NRC mandated that the hardened vents now be made reliable as a Fukushima lesson learned.

Please, don't wait for another nuclear disaster and another lessons learned safari before mandating that the soon-to-be-made-reliable hardened vents also have filters to protect millions of Americans and dozens of plant workers.

David Lochbaum
Director, Nuclear Safety Project
PO Box 15316
Chattanooga, TN 37415
(423) 468-9272, office
(423) 488-8318, cell