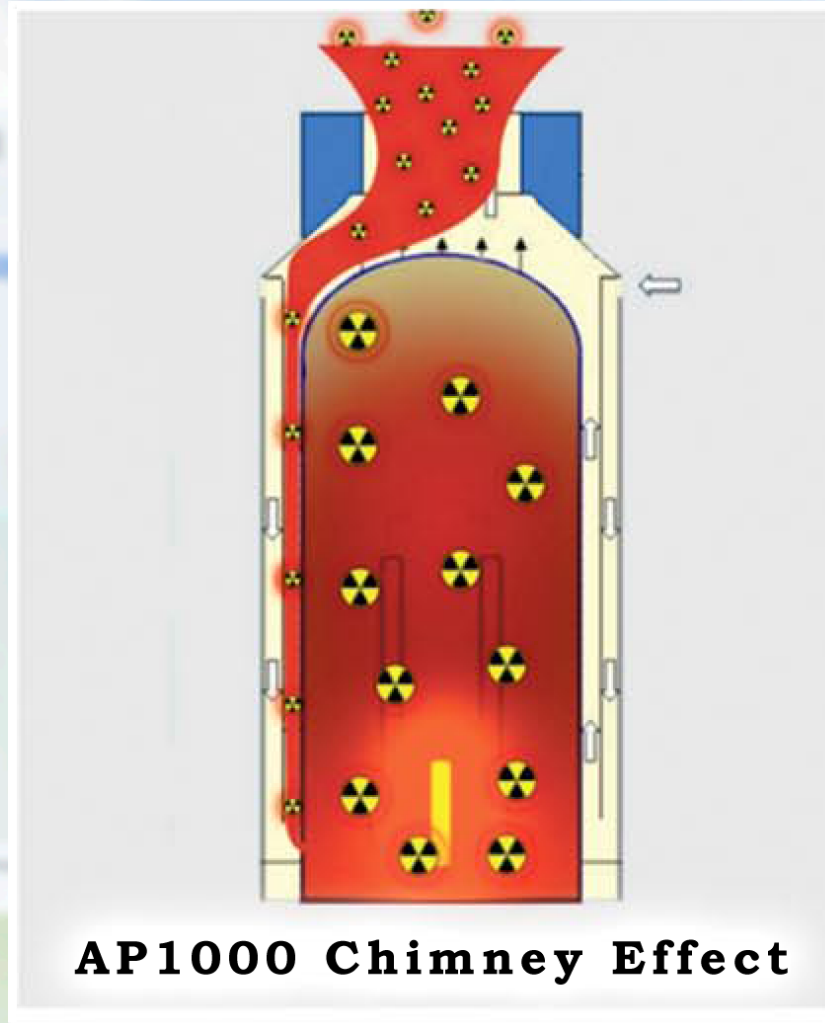


Nuclear Containment Failures

Ramifications for the AP1000 Containment Design



To NRC: Containment Problems Don't Ignore the Elephant in the Room!



Safety First

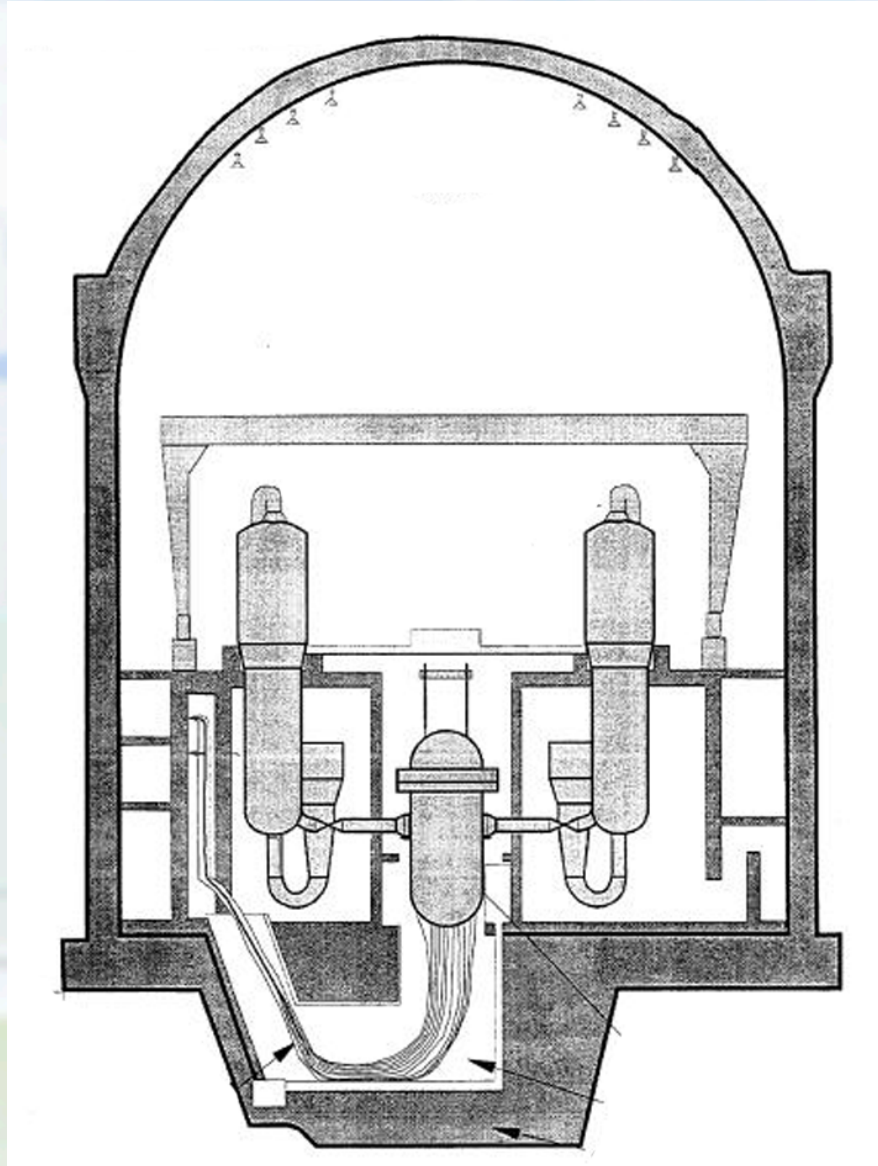
Previous generations of containment systems are single-failure proof and have always done their job. However, recent evidence clearly shows that a significant number of containment systems are failing.

What does this mean to public health and safety and nuclear power operation?

In the event of an accident, containment systems with leaks will not protect the general public, and significant unfiltered radiation will leak into the environment.

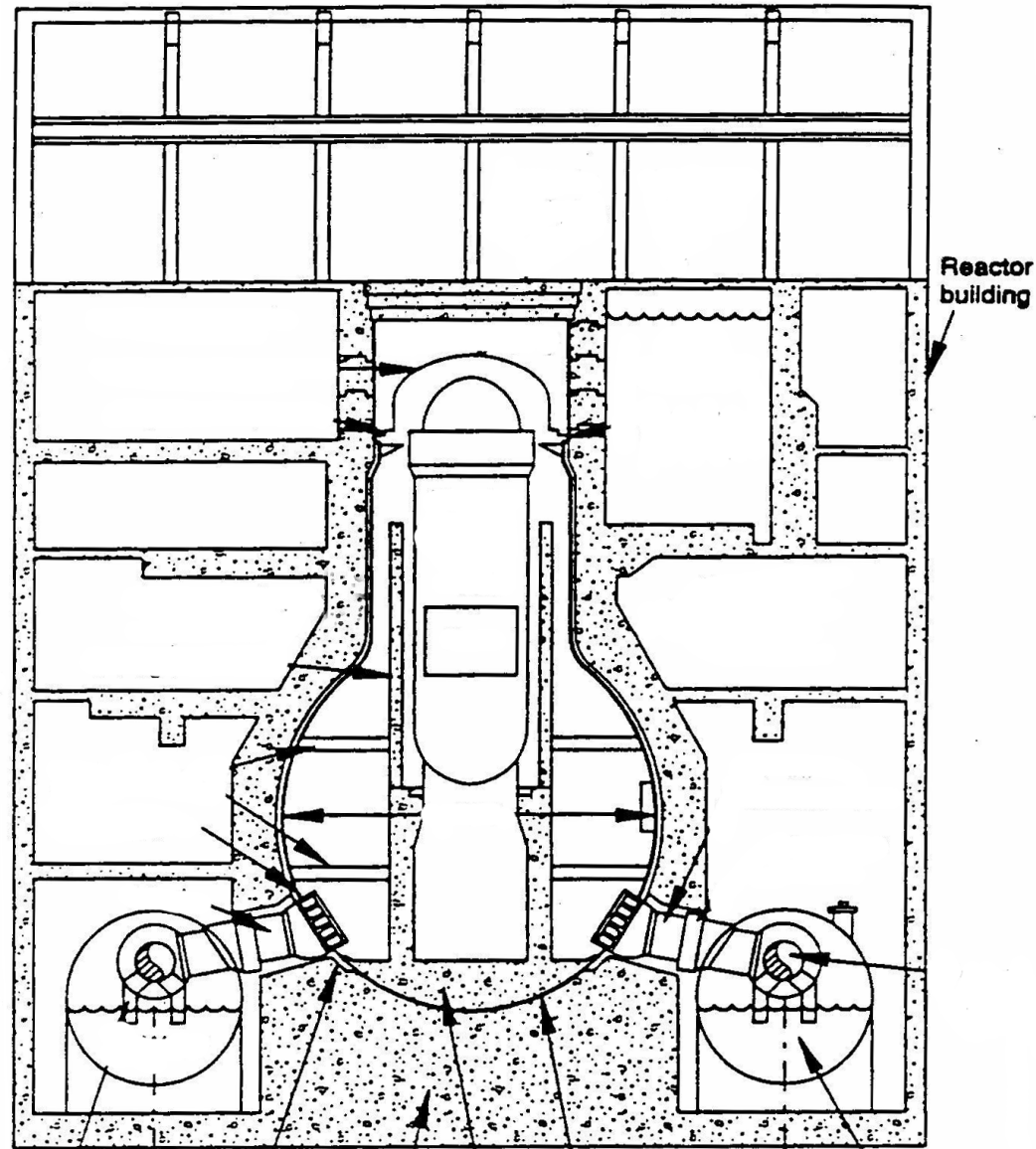
Typical PWR Dry Containment

(Beaver Valley - Note the double barrier)



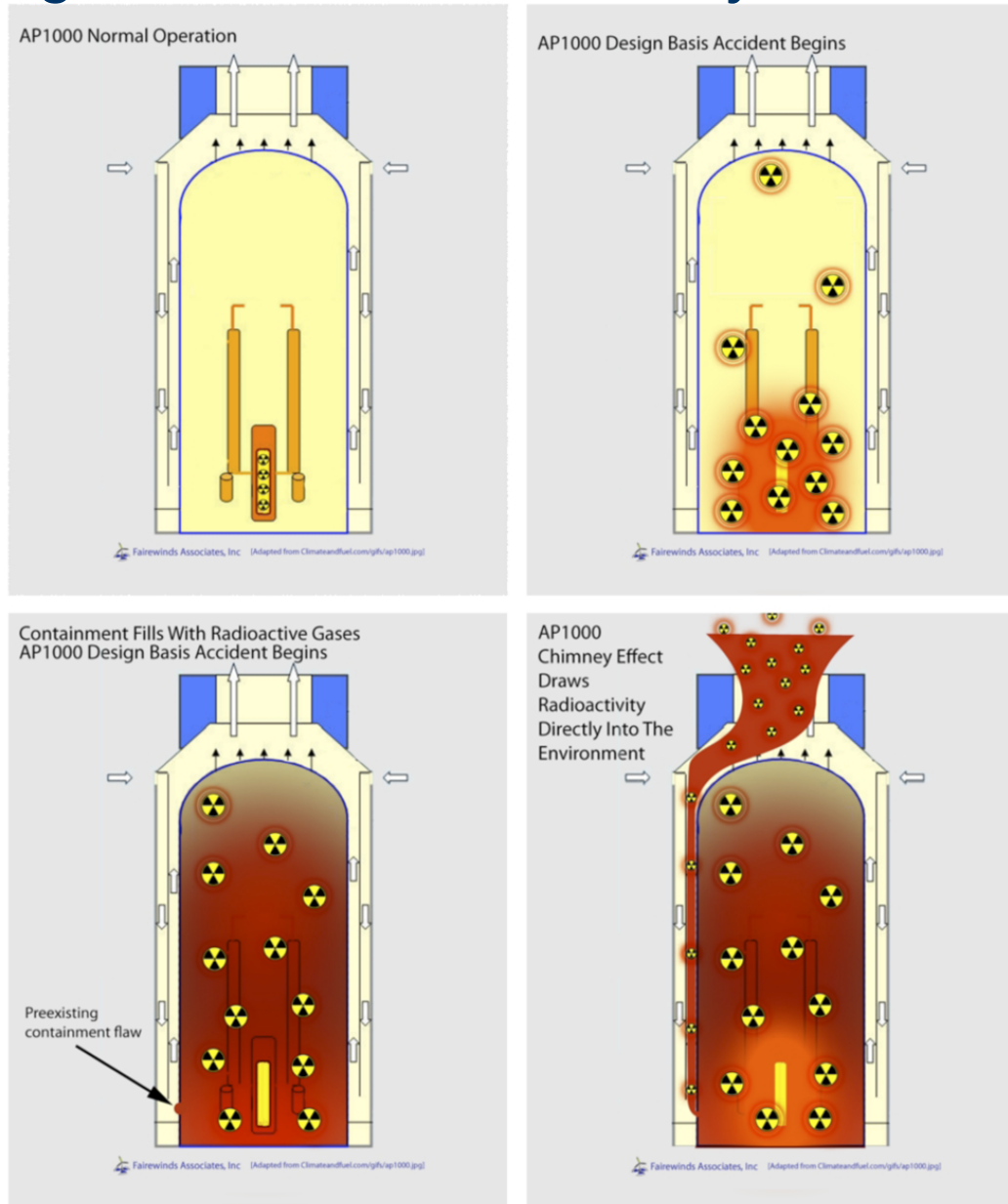
Typical BWR Containment

(Fitzpatrick - Note the double barrier)



AP1000 Containment System Chimney Effect

Note the single barrier containment system in the AP1000



Focus on the Issues

Fairewinds Associates' Concern: The next slide was created in October by the NRC Staff in a presentation to the NRC Advisory Committee on Reactor Safeguards (ACRS).

In this slide the NRC has fixated on liner corrosion, rather than dealing with numerous and varied containment system failures in the current generation of nuclear power plants.

Containment system failures are the elephant in the room.

Fast tracking the AP1000 in order to grab federal nuclear loan guarantees or to meet an arbitrary timeline predicated upon reactor sales simply does not fulfill the NRC's mission to protect public health and safety.

NRC glosses over critical safety flaws, by ignoring numerous types of containment system failure.



Expert Panel – Preliminary Insights

- Construction defects (i.e., foreign objects) create the localized conditions that result in corrosion of the liner
- Local environment at liner, not global conditions (e.g., plant operation, climate) determine corrosion susceptibility
- Reinforced concrete containment construction more prone to have foreign materials left in place due to rebar congestion
- Current NDE methods not capable of detecting foreign objects at the liner/concrete interface
- Aging and concrete degradation have not been important factors in liner corrosion events to date
- No condition found resulted in the containment failing to meet the 10CFR50 Appendix J integrated leak rate test

Glossing over safety flaws, the NRC has fixated on Liner Corrosion.



Further narrowing the evidence, NRC focuses on Outside Diameter (OD) Liner Corrosion.



OD Liner Corrosion History

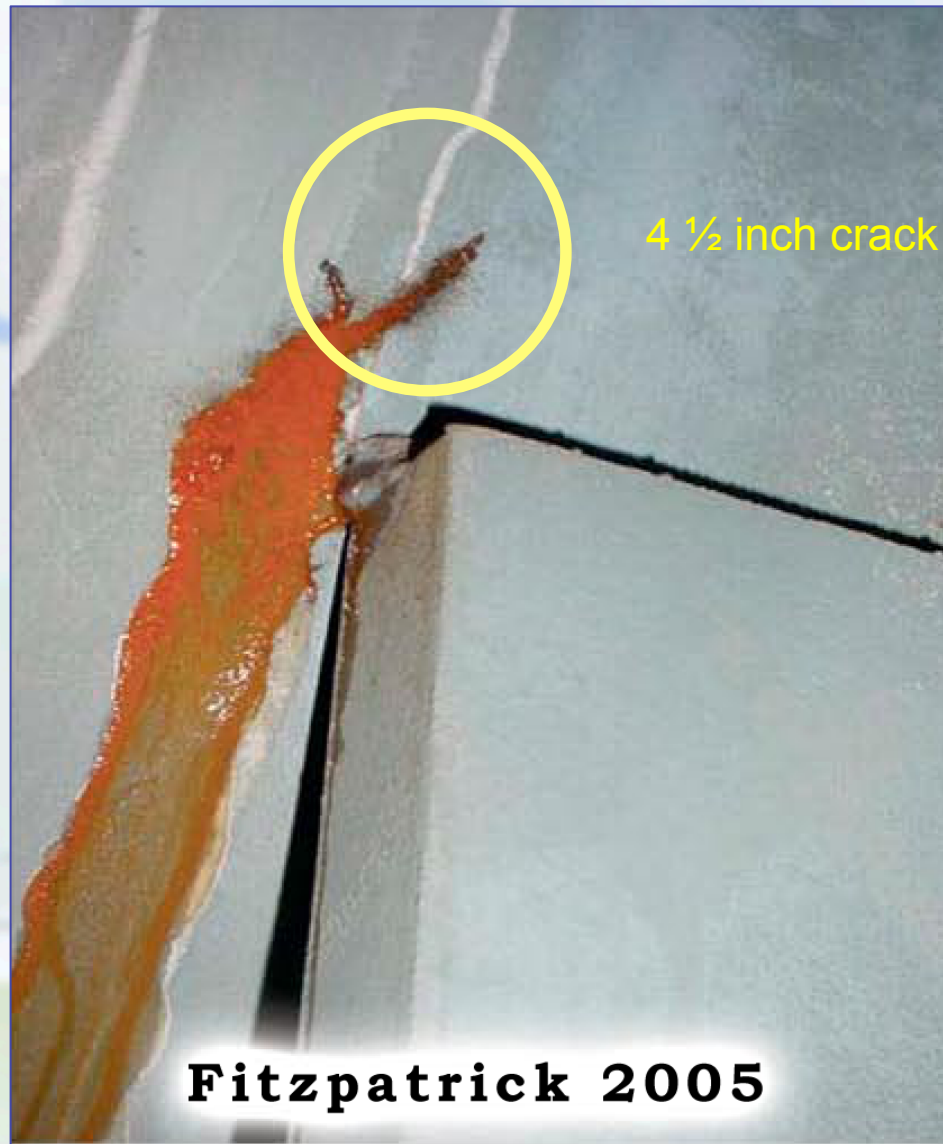
reactor-unit	year of incident	age at time of incident	construction	liner/metal thickness	corrosion penetration	average corrosion rate	observations
Barsebeck-2 BWR Sweden	1993	16	reinforced concrete	7 mm 0.275"	7 mm 0.275"	0.44 mm/yr [17 mpy]	void in the concrete from initial construction and water accumulation
Brunswick 2 BWR Mark 1 GE 4	1999	24	reinforced concrete	8 mm 0.312"	8 mm 0.312"	0.33 mm/yr [13 mpy]	foreign materials in concrete
North Anna-2 PWR W-3LP	1999	19	reinforced concrete sub-atmospheric	10 mm 0.375"	10 mm 0.375"	0.5 mm/yr [20 mpy]	foreign material in concrete
D.C. Cook 2 PWR W-4LP	2000	22	reinforced concrete ice condenser	10 mm 0.375"	10 mm 0.375"	0.43 mm/yr [17 mpy]	foreign material in concrete. unclear if penetration was exclusively from corrosion
Beaver Valley-1 PWR W-3LP	2006	30	reinforced concrete sub-atmospheric	10 mm 0.375"	1.1 - 5.8 mm 0.045 - 0.227 in	0.04 - 0.2 mm/yr [1.5 - 7.5 mpy]	3 areas of corrosion concrete pH < 11
Beaver Valley-1 PWR W-3LP	2009	33	reinforced concrete sub-atmospheric	10 mm 0.375"	10 mm 0.375"	0.29 mm/yr [11 mpy]	foreign material in concrete

October 8, 2010

Advisory Committee on Reactor Safeguards

20

When will the NRC properly analyze through-wall cracks?



NRC discounts coating degradation.

“OIG’s* analysis of this corrective action program indicates that the coatings aging management program had not been implemented consistent with the statements in the Oconee license renewal Application.”

“...the staff did not offer any indication of having conducted an independent look at coatings operating Experience.”

This condition existed for 10-years.



Photo from: OIG-07-A-15

*** Office of Inspector General**

Following DOL ruling, NRC forced to protect coatings applications' whistleblowers.



[Home](#) > [News & Events](#) > [News Article](#)

U.S. Nuclear Regulatory Commission Orders Shaw Group to Protect Whistleblowers After KMB Client James Speegle Wins Whistleblower Ruling

September 21, 2010

In an important victory for nuclear whistleblowers, the Nuclear Regulatory Commission ("NRC") has ordered the Shaw Group, a Fortune 500 corporation with over 28,000 employees, to institute sweeping improvements in how it responds to workers' safety complaints throughout its U.S. nuclear operations. The NRC's order follows a U.S. Department of Labor ("DOL") ruling that a Shaw Group company broke federal law when it fired James Speegle, a painter foreman at the Tennessee Valley Authority's Browns Ferry Nuclear Plant near Florence, Alabama, in May 2004. Speegle is represented by KMB attorneys [David J. Marshall](#), [Debra S. Katz](#) and [Matthew S. Stiff](#).

On September 24, 2009, a DOL appeals panel found that Stone & Webster Construction, Inc., a Shaw Group subsidiary, violated Speegle's rights under federal whistleblower-protection law by terminating him at Browns Ferry. In September 2010, Speegle's successful suit prompted the NRC take action against the Shaw Group under the commission's power to enforce whistleblower-protection regulations at U.S. nuclear plants. The resulting NRC order requires the Shaw Group to take numerous safety improvement actions across its entire U.S. nuclear operations, and threatens the company with civil and criminal penalties if it fails to implement these measures.

Read the NRC's order directing the Shaw Group to institute changes: [Nuclear Regulatory Commission Order Against The Shaw Group](#).

Related Links

- [TVA nuclear plant whistleblower incident followed by changes](#)
- [Whistle-blowers protected](#)

The NRC Ignores Corrosion from the Inside Out.



June 18, 2010

“...heavy corrosion on the containment liner within 6 inches of the concrete floor...The licensee had not inspected the containment liner...because ASME Code Section XI allowed an exemption.”

IN 2010-12

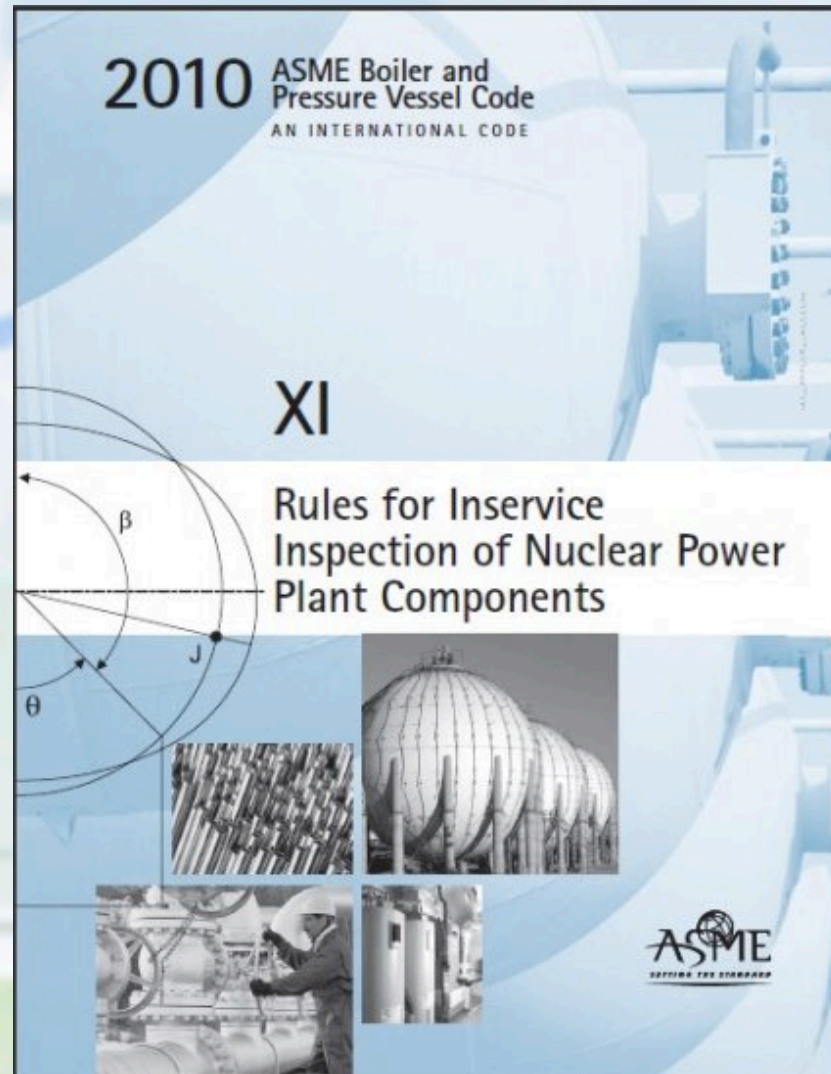


October 25, 2010

“A condition resulting in serious degradation of the containment liner...Corrosion was found in the containment sump liner on Unit 3.”

EN 46362

The NRC has ignored ASME XI Visual Inspection Failures



More Visual Inspection Breakdowns



Donald C. Cook Nuclear Plant Unit 2 LICENSEE EVENT REPORT 316/2010-002-00 CONTAINMENT DIVIDER BARRIER SEAL MOUNTING BOLTS NOT PROPERLY INSTALLED

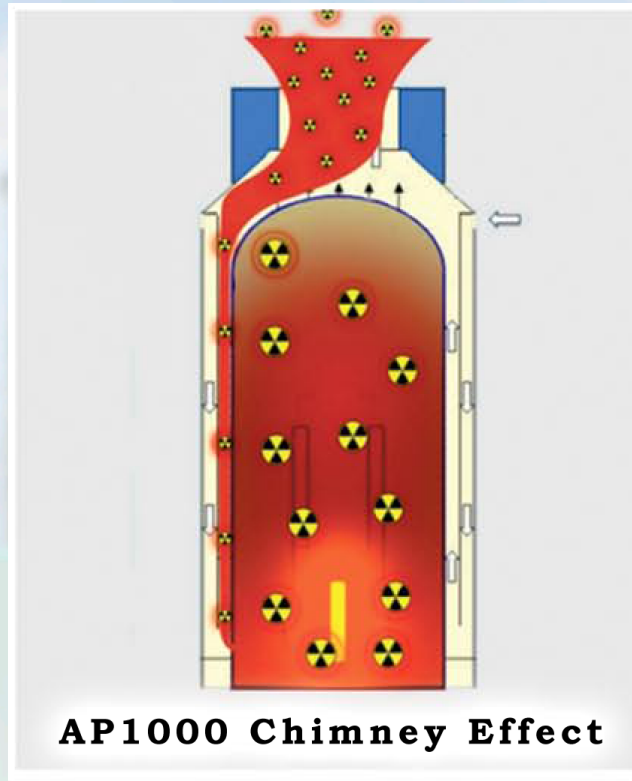
"... personnel identified two divider barrier seal retaining bolts missing, one retaining bolt with a loose nut and one retaining bolt missing its nut. Investigation of the condition concluded that the nut has been missing for the duration of the recently completed operating cycle, the bolts have been presumed missing since replacement of the divider barrier seal in 1990 and the loose nut was not properly tightened following removal of a seal sample coupon during a previous outage."

The same problem occurred on DC Cook Unit 1 in 2006 and was not implemented.

"The condition evaluation for this issue prescribed a corrective action to conduct training. However, a corrective action to conduct training was not developed due to human error."

Nuclear Containment Failures

Ramifications for the AP1000 Containment Design



**“Sooner or later, in any foolproof system, the
fools are going to exceed the proofs”**

-Arnie Gunderson

Fairewinds Associates' Supplemental Report Nuclear Containment Failures Ramifications for the AP1000 Design

“A large body of work indicates that radiation releases from containment failures in the AP1000 could exceed federal safety limits by up to 1000-fold. But the NRC staff chose to ignore five key areas of containment failures in their rush to fast-track the design approval process - in a clear capitulation to industry pressure.”

-Arnie Gundersen 1-10-11

www.fairewinds.com

Fairewinds Associates' Recommendation

In order to rectify the problems that Fairewinds has identified, Westinghouse and the NRC Staff must revise the AP1000 Severe Accident Mitigation Design Alternatives (SAMDA) analysis that presently ignores the large number of existing containment failures.

Industry failure data does not substantiate the erroneous assumption that there is not a possibility that leakage from the AP1000 could exceed one-tenth of one-percent. The SAMDA analysis must include a realistic containment failure rate in conjunction with its associated increase in radiation exposure to the public.

Arnie Gundersen, Chief Engineer, MSNE
Fairewinds Associates, Inc
www.fairewinds.com

Arnie Gundersen has 39-years of nuclear power engineering experience. He is a former nuclear industry senior vice president who earned his Bachelor's Degree cum laude where he was first in RPI's nuclear engineering department. He also has a Master's Degree in nuclear engineering from RPI, holds a nuclear safety patent, and was a licensed reactor operator.

During his career, Mr. Gundersen has managed and coordinated projects at 70-nuclear power plants around the country. In addition to his current work as chief engineer and a nuclear engineering, management, and safety expert witness with Fairewinds Associates, Inc, Mr. Gundersen currently speaks on television, radio, and at public meetings regarding the lack of adherence to nuclear safety regulations.

Maggie Gundersen, President
Fairewinds Associates, Inc
www.fairewinds.com

Maggie Gundersen is a paralegal specializing in nuclear safety and reliability in federal and state administrative hearings who founded Fairewinds Associates Paralegal Services and Expert Witness Testimony in 2003. She earned her BS in Law and Society, a Paralegal Certificate, and is currently pursuing a Master's Degree in Mediation at Champlain College.

Mrs. Gundersen is well-versed in nuclear power terminology from her experience as a nuclear industry PR rep and an engineering assistant in nuclear fuel reload core design for Pressurized Water Reactors (PWR's). A professional print journalist, for 5-years, she also blogs and appears regularly on TV and radio to discuss: nuclear safety, nuclear reliability, decommissioning issues, and women in the media and politics.