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# Reactor Safety 22.091/22.903

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Professor of the Practice

## Lecture 24 Current Regulatory Safety Issues

# Topics to Be Covered

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- Reactor Vessel Integrity – Embrittlement
- PWR Sump Performance
- Reactor Coolant System Weld Issues
- Davis Besse Head Degradation
- Fire Protection (Hemyc Insulation)
- Plant Security and Terrorism
- Ground water contamination – tritium
- Safety Conscious Work Environment – Safety Culture
  - Human Factors

# Reactor Vessel Integrity

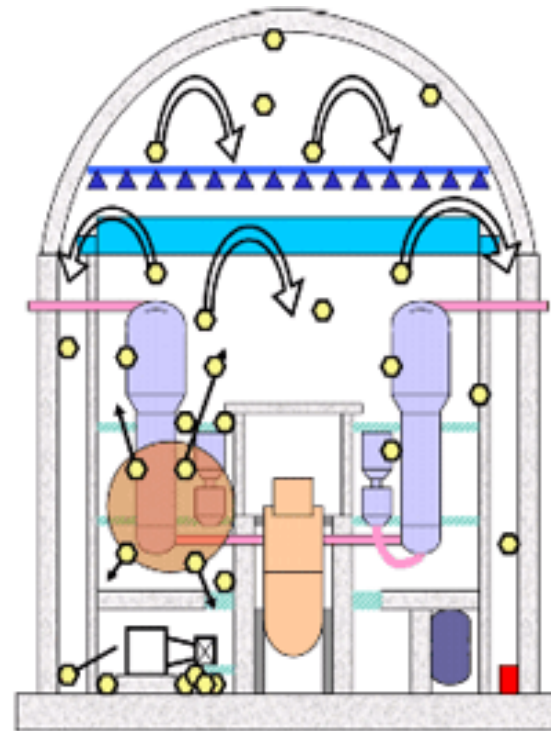
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- Driven in part by Yankee Rowe Vessel Issue
- Depending on weld and metal materials some vessels vulnerable to embrittlement
- Need to have in reactor specimens to gauge degree of embrittlement
- Reactor have chosen to manage fuel differently – low leakage cores
- Only major life limiting component in reactors

# PWR Sump Performance

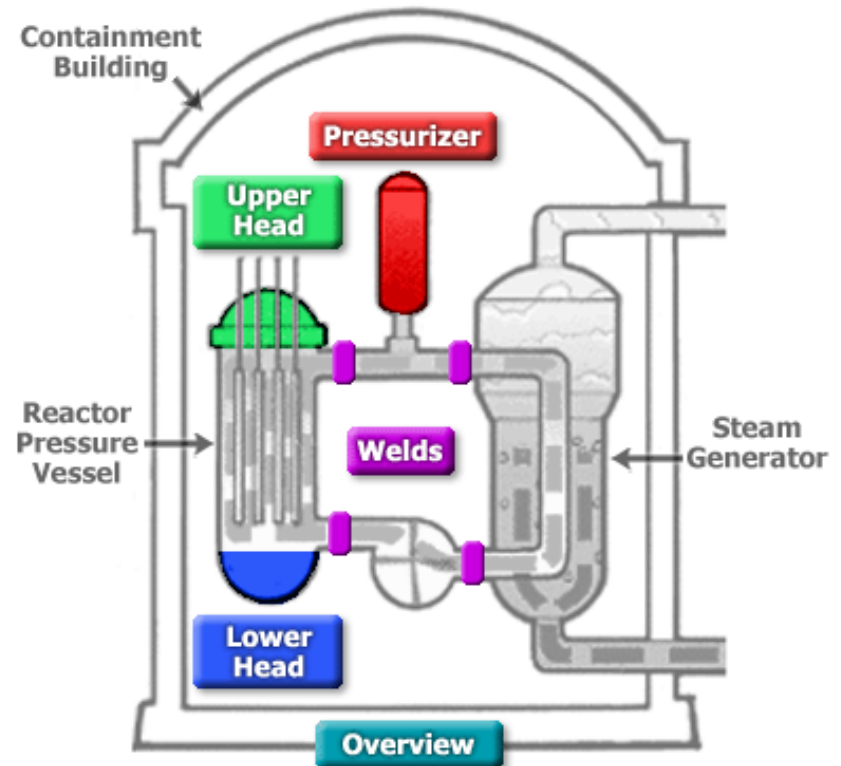
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- During a LOCA debris from paint, insulation and other materials will clog sump screens
- Failing or cavitation recirculation spray
- Net Positive Suction Head insufficient
- Similar to BWR issue



# Reactor Coolant System Weld Issues

- Primary Water Stress  
Corrosion Cracking
- Alloy 82/182/600 welds
- Temperature, residual stresses, Nickel based alloys
- Plants: Wolf Creek, V.C. Summer, South Texas Project, Crystal River 3, etc.
- Solution – inspection and weld overlay



# Fire Protection

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- Objective to prevent fires and failures due to fires that affect safety of the plant
- Appendix R – governing regulation
- Required separation of trains
- Insulation – fire doors – fire watches
- Fire PRAs being developed
- Problems with tests of some insulation – Hymec failing to meet NRC fire retardant time issue.

# Security and Terrorism

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Aircraft Crash

Upgrade to physical security

Design Basis Threat – Force on Force



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# Ground Water Contamination

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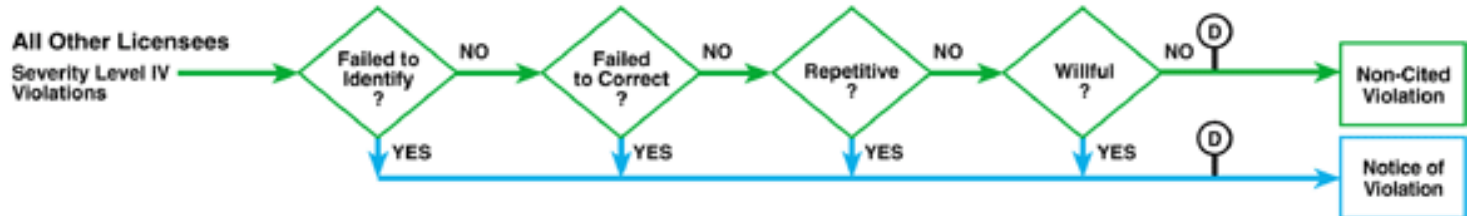
- Water leaks containing tritium
- Big issue at Brookhaven National Lab – changed lab
- Leaks in water systems at Indian Point, Braidwood, Callaway, Dresden, Bryon, Palo Verde, Quad Cities
- Leaks frequently coming from spent fuel pool liners.
- Public outcry
- Reporting requirements refined
- Levels of tritium still low within limits.



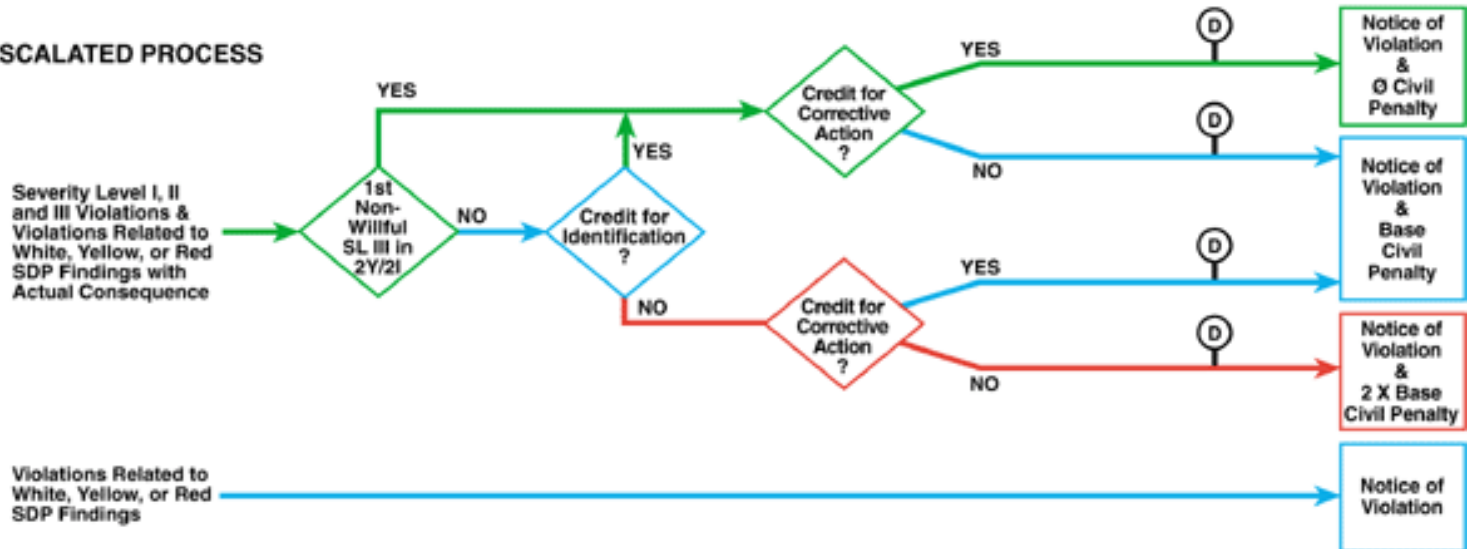
# NRC ENFORCEMENT PROCESS



## NON-ESCALATED PROCESS



## ESCALATED PROCESS



(D) Discretion

# Recent Enforcement Actions

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## Reactor Actions

### Exelon Generation Company, LLC (Byron Station) EA-08-046

On April 1, 2008, a Notice of Violation (NOV) was issued for violations associated with a White Significance Determination Finding. The NOV involved violations of 10 CFR Part 50, Appendix B Criterion XVI, "Corrective Actions", and 10 CFR Part 50, Appendix B, Criterion III, "Design Control". Specifically, the licensee failed to take timely corrective actions after the identification of extensive corrosion on essential service water riser pipes and failed to verify the adequacy of the methodology and design inputs in calculations that supported the decision to accept three degraded essential service water riser pipes for continued service.

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## Appendix B violation – Quality

# Enforcement Action

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Luminant Generation Company, LLC (Comanche Peak Steam Electric Station) EA-08-028

On February 29, 2008, a Notice of Violation was issued for a violation associated with a White Significance Determination Finding involving a violation of the Unit 1 Technical Specification (TS) 3.8.1, "AC Sources - Operating," which requires that while the plant is in Modes 1, 2, 3, or 4, two diesel generators (DGs) capable of supplying the onsite Class 1E power distribution subsystem(s) shall be operable. From November 1, 2007, through November 21, 2007, while the plant was in Mode 1, one of the two DGs capable of supplying the onsite Class 1E power distribution subsystem(s) was inoperable, and action was not taken to either restore the DG to an operable status within 72 hours or be in Mode 3 within 6 hours and Mode 5 within 36 hours

Specifically, Emergency Diesel Generator (EDG) 1-02 was made inoperable as a result of painting activities due to paint having been deposited and remaining on at least one fuel rack in a location that prevented motion required to support the operation of the EDG. This condition caused EDG 1-02 to fail to start during a surveillance test on November 21, 2007

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# Summary

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- Even though nuclear plants are performing to high capacity levels for the last 5 years - issues remain.
- Safe operation requires constant vigilance, attention to detail and strong NRC oversight to assure that complacency does not set in.
- Role of industry NEI and EPRI are important to resolution of generic issues to assure balance.

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