



North Anna 2 RPV Head CRDM Project

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North Anna 2 RPV Head Project

Presentation Outline

- Background and Program Summary
- Sample Removal
- Sample Decontamination (by NRC Research)
- Non Destructive Examination
 - North Anna site
 - PNNL
- Destructive Examination
- NDE and DE Comparison



North Anna 2 RPV Head Project Background

A600 PWSCC Issues

- Thorough root cause investigations of failed components suffer due to:
 - Outage time constraints
 - Inability to remove sufficient degraded material for examination
 - Key evidence is lost during machining & grinding operations

- Inspection strategies are being developed based on an incomplete understanding of damage mechanisms and accuracy of inspection techniques



North Anna 2 RPV Head Project Program Summary

- Program Objectives:
 - Benchmark NDE techniques for flaw detection/characterization
 - Establish mechanism of failure in base metal and J-groove welds
 - Characterize any boric acid corrosion of RPV head in annulus

- NA 2 Head Offers a Unique Opportunity:
 - True service-induced flaws
 - Extensive NDE database allows informed selection of samples (50% UT of all nozzles; 100% weld ECT)
 - Variety of degradation mechanisms (one-stop shopping)
 - Unique flaw configurations (OD circ flaw without leakage)
 - Utility willing to allow research on a decommissioned component



North Anna 2 RPV Head Project Four Phase Program

- Sample Removal in Utah
 - Planning and mockup testing completed in early May 2003
 - Flame-cut and shipped six nozzles to PNNL end of June 2003
- Sample Decontamination and NDE at PNNL
 - Decontamination of four nozzles completed in November 2003
 - NDE inspection by four vendors completed in early March 2004
- Destructive Examination of Nozzles:
 - Destructive Examination (DE) of nozzle #54 planned in 2004;
 - DE of nozzle #31 deferred at least until 2005
- NDE Benchmarking
 - Comparison of flaw detection from field and PNNL inspections with DE findings



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Sample Removal

- In late 2002, RPV Head arrived at the Envirocare site in Utah for disposal
- Obtained approval from Dominion Generation and issued RFP for sample removal on January 24, 2003
 - Key RFP Points
 - One of a kind components that can not be replaced
 - Temperature must be kept below 600°F
 - Challenging work environment
 - Desolate area
 - High dose rates
 - Airborne contamination expected during cutting
 - No water or oil allowed in disposal cell
- Selected vendor to perform primary project management and subcontracted Envirocare and other support.



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Sample Removal Project Description

- Project Kick-Off Meeting on 4/1/2003
- Mockup Testing
 - Welding Services built two Mockups, one a simple cutting bar and another a large life-size mockup
 - Several test cuts performed over several days
 - EPRI and utility personnel witnessed simulation of cutting one nozzle from large mockup
 - Mockup results:
 - Temperature ~400°F during tests at 3" from cut line.
 - Determined need for a 3rd mockup to test angled cutting. Test completed satisfactorily on 5/2/2003.



Mockup Testing



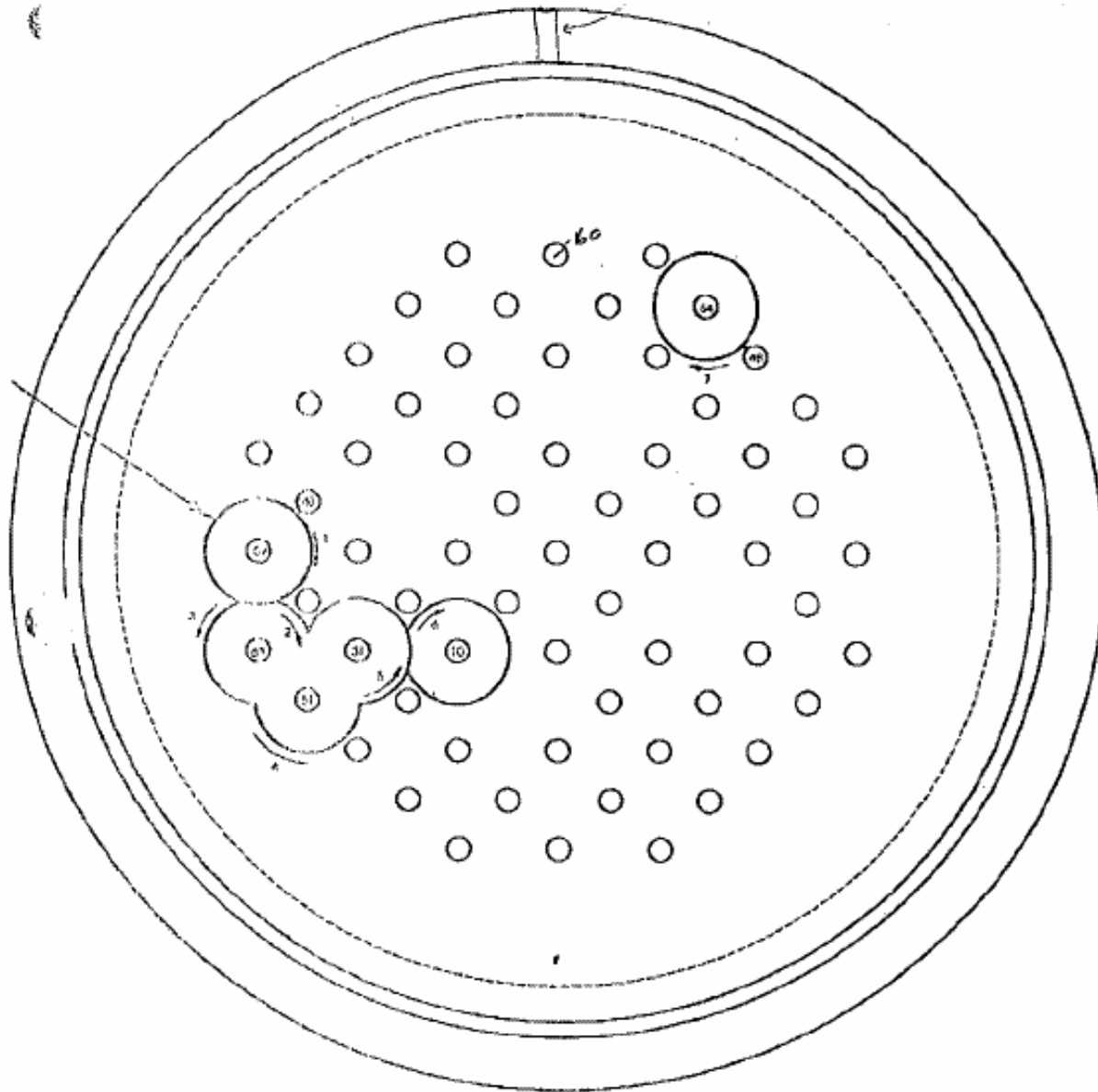
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Sample Removal On-Site Work Plan

- Build temporary building over head
- Disassemble Shipping Package
- Build primary containment
- Remove insulation
- Install work platforms and ventilation systems
- Cut six nozzles using an oxy-fuel torch
 - 3 separately and 3 removed as a large block
- Place 4 sections inside secondary containment
 - Section large block into 3 individual nozzles
- Package nozzles for shipment to PNNL
- Demobilize



NA-2 Cutting Plan



Photos from Site



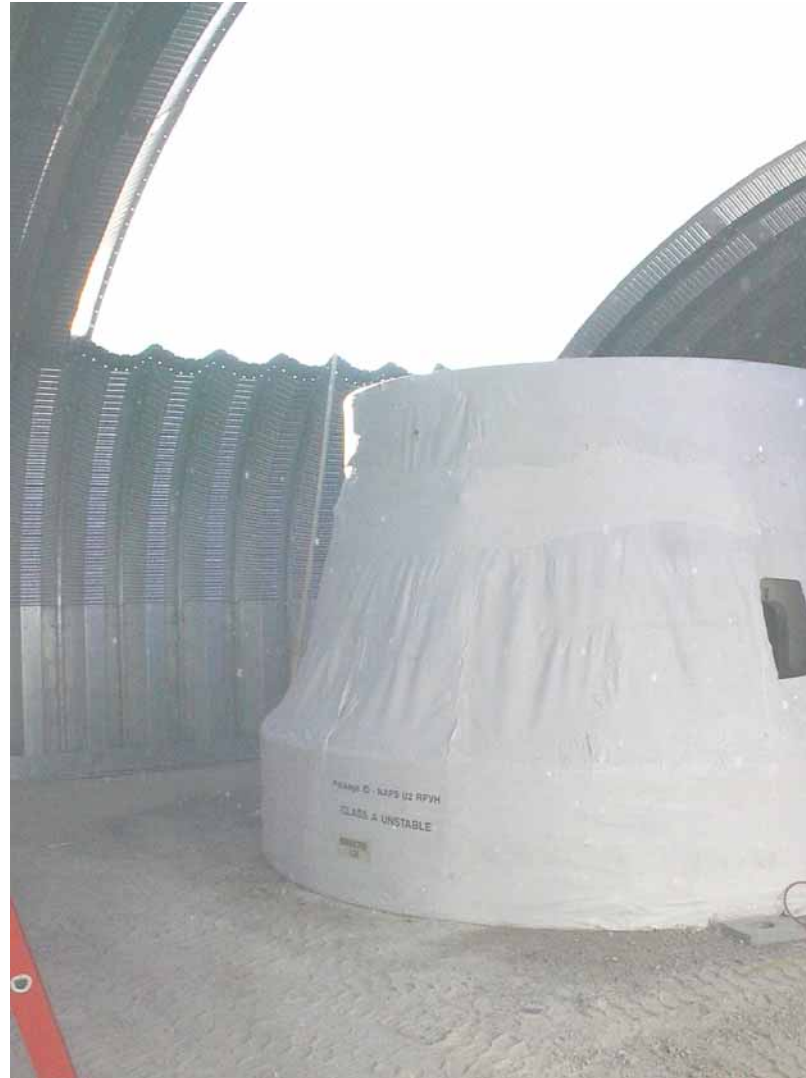
More photos from site



Even more photos from site



More photos from site



More Photos from Site



Last Photo from Site



Nozzle 10



Nozzle 31



Nozzle 51



Nozzle 54

