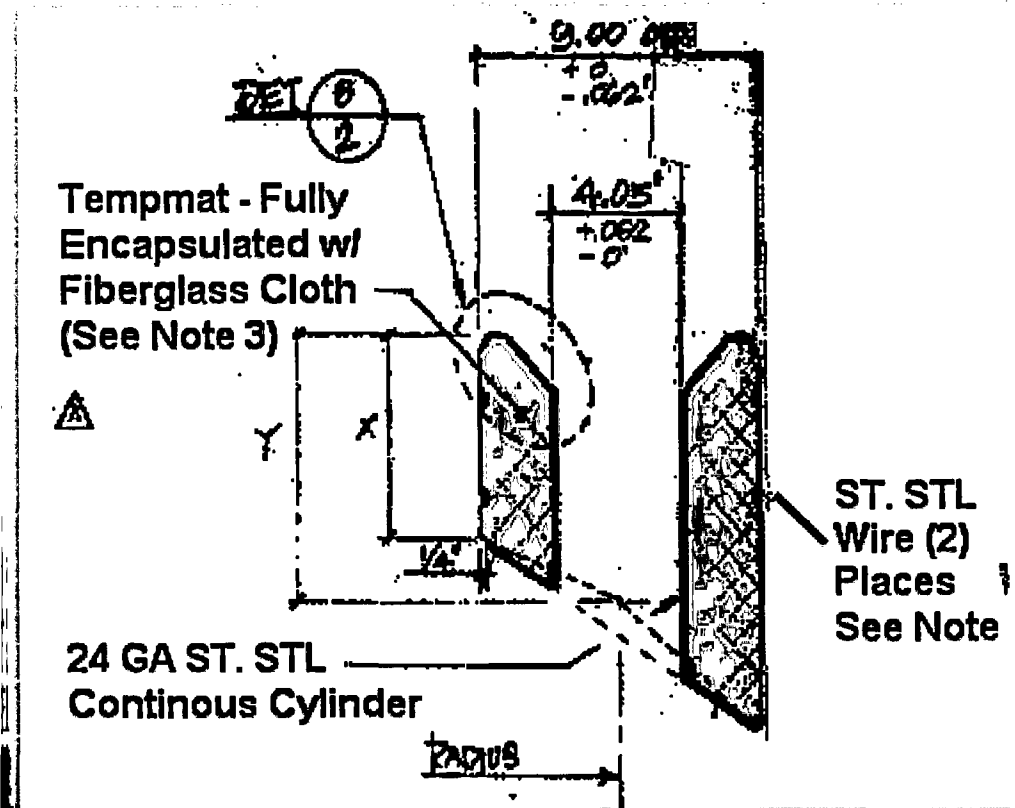


# Nozzle Insulation Collars

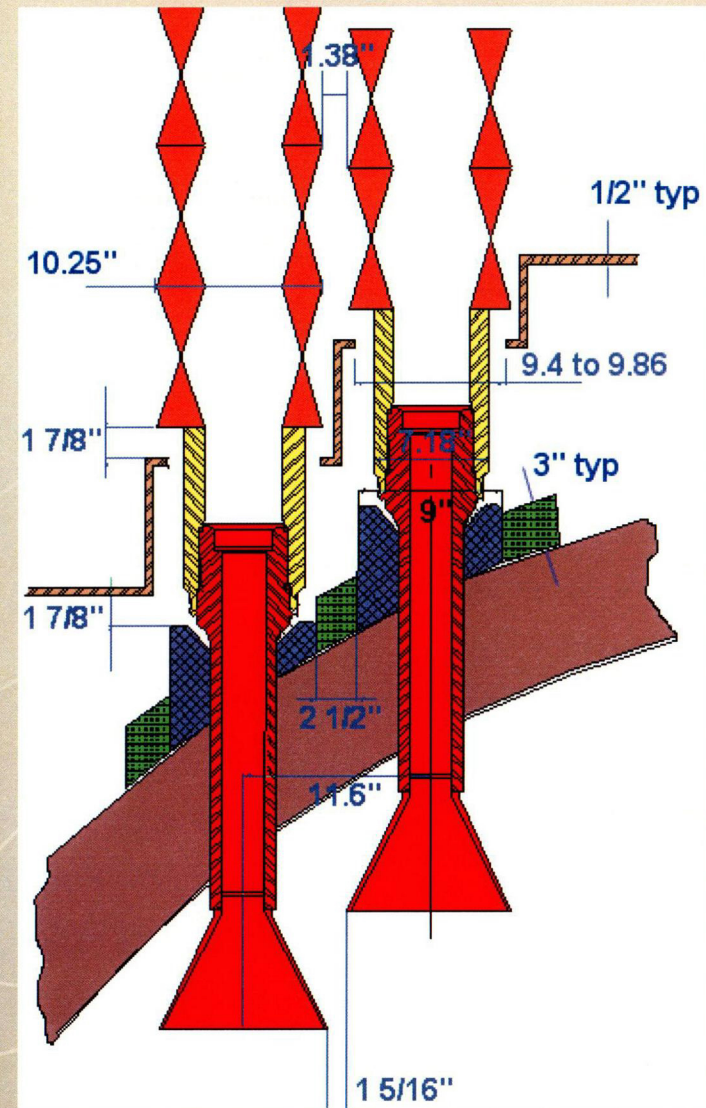
- ▶ 81 CEDM and 8 ICI collars
- ▶ Collars are custom fit to vessel contour
- ▶ Collars are Pittsburgh Corning TempMat insulation covered with fiberglass cloth lagging and held in place by stainless steel (SS) wire.
- ▶ Each collar contains a 24 GA SS Continuous Cylinder





# Interferences to BMV

- ▶ CEDM collars cannot be removed with panels installed
- ▶ Cooling Shroud to Coil Stack Interference
- ▶ Openings in Cooling Shroud are part of the cooling system design
- ▶ Nozzle spacing limits access
- ▶ Limited access between cooling shroud and insulation





# What's Unique About ANO-2

- ▶ **CEDM Motor Housings follows the RVH contour**
- ▶ **Stepped shroud design severely limits access for BMV**
- ▶ **All Coil Stack/RSPTs must be removed to support a BMV**

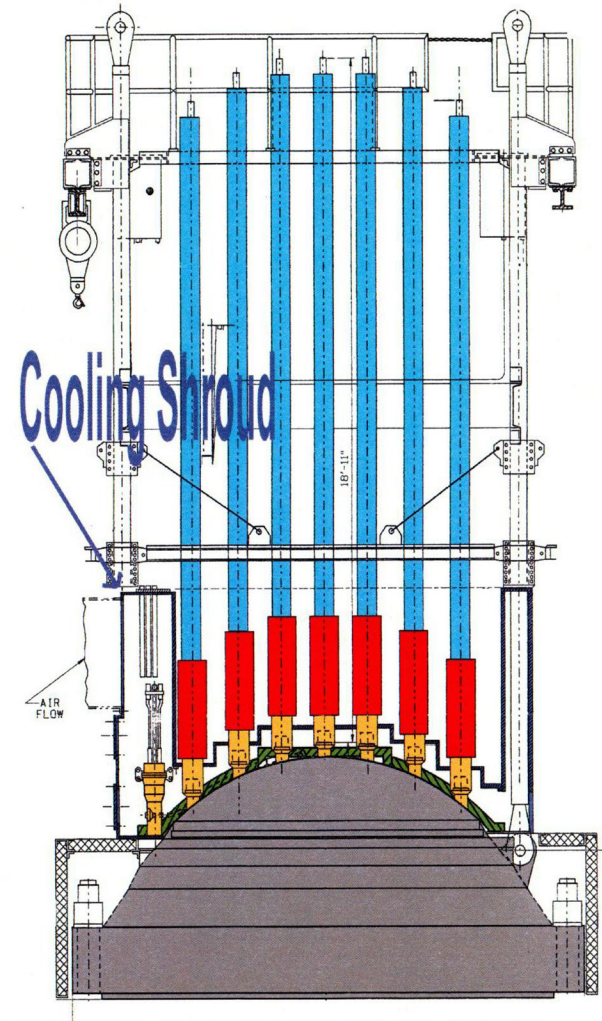


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# Disassembly Sequence

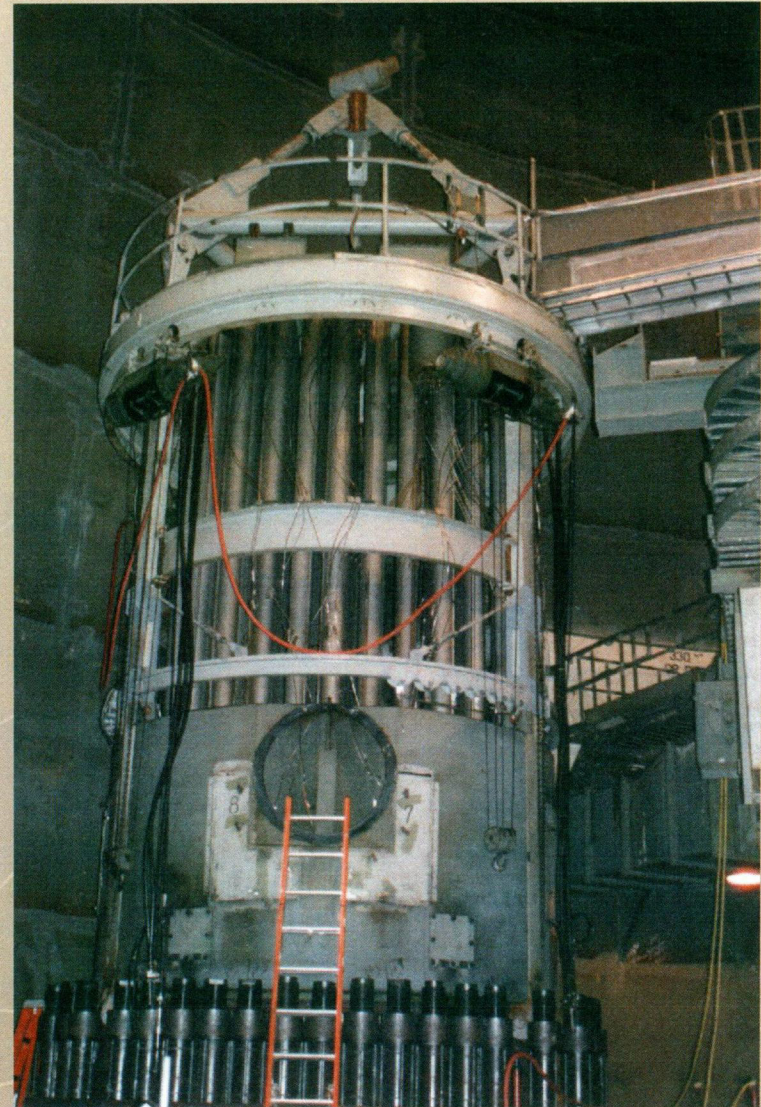
- ▶ **Remove & Store 162 RSPTs**
- ▶ **Remove & Store 81 CEDM Coil Stacks**
- ▶ **Disconnect, Rig and Store Superstructure**
- ▶ **Remove 17 Insulation Panels**
- ▶ **Remove 81 CEDM Insulation Collars**





# Assembly Sequence

- ▶ **Install 81 re-designed Insulation Collars**
- ▶ **Re-install insulation Panels**
- ▶ **Re-install superstructure**
- ▶ **Re-install and test 81 CEDM coils stacks**
- ▶ **Re-install and test 162 RSPTs**



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# Risk Summary

- ▶ **Damage to RSPTs**
- ▶ **Damage to CEDM Coil Stacks**
- ▶ **Damage to the CEDM Motor Housings  
During Removal of Lift Rig (Blind Lift /  
Tight Clearances)**
- ▶ **No qualified CEDM motor or pressure  
housing repair available**



# Hardship Summary

- ▶ The CEDM Cooling/Insulation System was not designed to allow access to RV head nozzles
- ▶ ANO-2 Cooling System Design is unique
- ▶ Significant Dose (23 Rem) impact
- ▶ Risk of damage to equipment



# Inspection Plans

William Sims

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# Last Outage - 2R15

## Volumetric Inspection Results

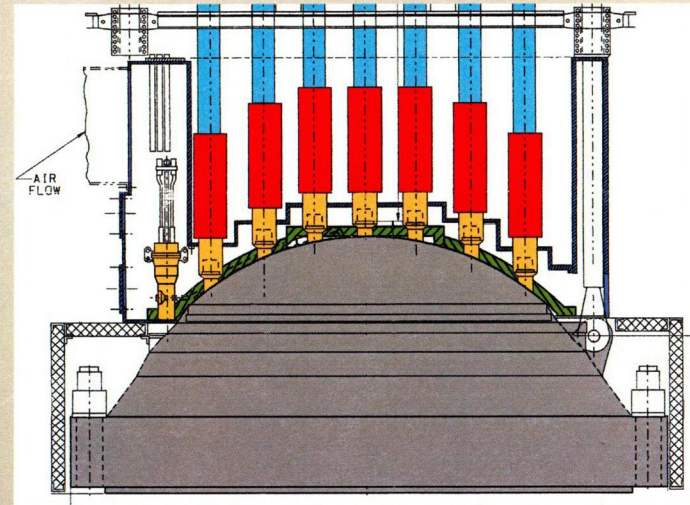
- ▶ 90 reactor vessel head penetrations examined by Ultrasonic techniques
- ▶ 81 CEDM, 8 ICI Nozzles
  - UT through wall of the nozzle, J-weld fusion area including the triple point, and Riverbed.
- ▶ 1 Vent
  - UT 45 degree shear waves looking in axial and circ directions
- ▶ Special interest examinations
  - CEDM 43 & 59 Liquid Penetrant of portions of J-weld. No indications identified. *res. PT*
  - CEDM 30 Eddy Current of portion of nozzle OD. No indications identified.

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# 2R15 - Supplemental Visual Inspection Above Insulation

- ▶ Performed visual exam above shroud, around all ICI nozzles, and some outboard CEDM nozzles
- ▶ No boron found



**Lower Head  
and  
Flange Visual  
Inspection**



# 2R15 Inspection Results

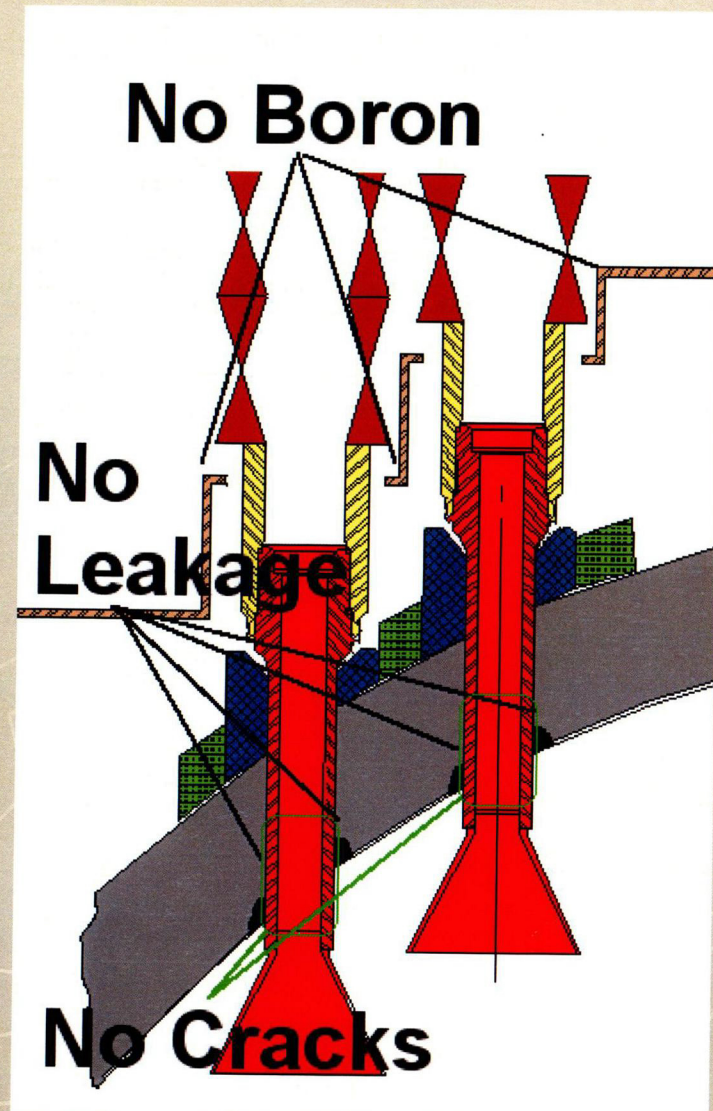
- ▶ **NO LEAK PATH THROUGH TRIPLE POINT**
- ▶ **NO LEAKAGE PATH INDICATIONS FOUND IN ANNULUS**
- ▶ **NO PWSCC INDICATIONS FOUND IN NOZZLE OR WELD**
- ▶ **NO BORON FOUND ON HEAD PERIPHERY, INSULATION, OR SHROUD**

**ANO-2 Head Integrity Verified**



# 2R16 Inspection Plan

- ▶ CEDM/ICI nozzles
  - UT Through wall
  - Triple point
  - Riverbed
  - Supplemental Visual
  - **BMV ICI**
  - **Low Frequency Eddy Current Vessel Exam (CEDM)**
- ▶ Vent Line
  - Wetted Surface Inspection
  - Supplemental Visual
  - **Low Frequency Eddy Current Vessel Exam**





# Demonstration of Triple Point

## Entergy Demonstration

- ▶ Demonstrated detection of flat-bottomed holes up to 0.200" in depth, on Entergy/MRP Mock-up in 2002.
- ▶ Detected Circ Flaws extending to approximately 0.050" deep in Entergy/MRP Mock-up in 2002.

## Phase 2 MRP Demonstration

- ▶ Detected a pure axial/radial squeezed notch that extended thru-weld to the Triple Point (0.060").

