



RIC 2003

Region II Breakout – Session F1

North Anna Unit 2

Reactor Vessel Head Replacement

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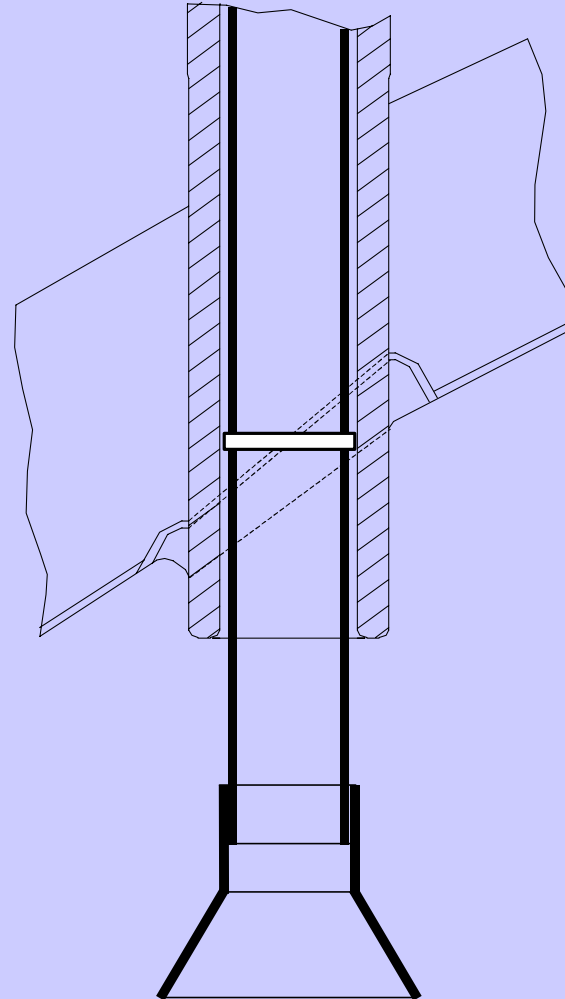
Site Vice President

April 18, 2003

Agenda

- Unit 2 CRDM Issue
- Design and Licensing
- Challenges
- Lessons Learned
- Regulatory Interface

Typical Penetration



North Anna Pent 53 Indications



Design and Licensing

- Reconcile code of record - RCC-M to Owner's Requirements
 - NAPS-2 not a Code Stamped Vessel
 - Friction weld on CRDM penetration tubes
 - Acceptability of French QA program
 - Assemble reconciliation package
 - Assemble code data package
 - Perform stress analyses

Design and Licensing

- Develop design engineering packages
 - Engr. Transmittal to allow Head Set
 - DCP for new RV Head
 - DCP for modified Service Structure
 - 3 DCPs in phases for Access Opening
- Obtain concurrence from NRC:
 - 50.59 approach for replacement head
 - Containment testing approach
 - NRC Final Review of documentation packages



READY FOR LIFT TO TRANSPORTER

TRANSPORTER ARRIVAL AT NAPS



SETTING CUTTING
EQUIPMENT ON
PLATFORM



CUTTING EQUIPMENT
IN OPERATION



CUTTING EQUIPMENT IN OPERATION



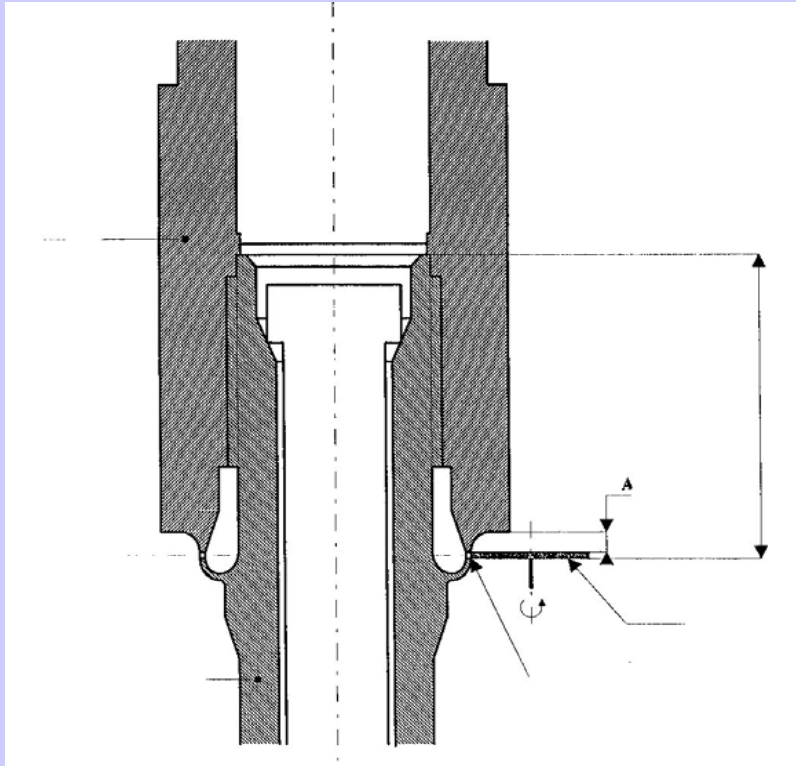
EXPOSED REBAR



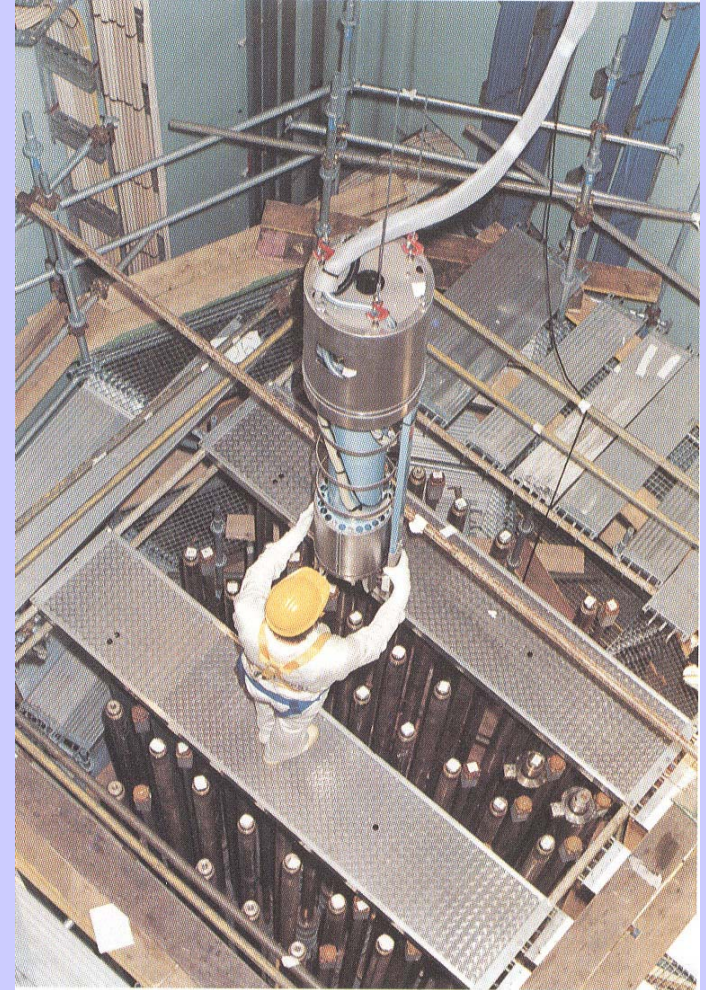
**FIRST CUT COMPLETE - WAITING
FOR REBAR REMOVAL**



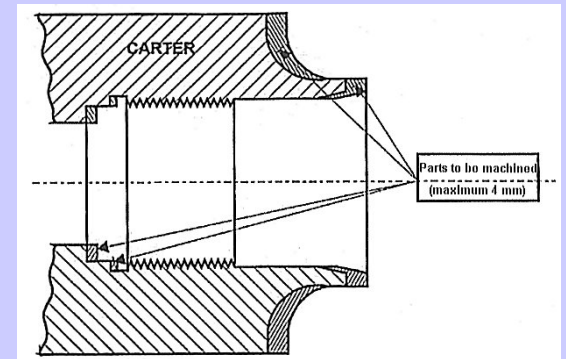
LATCH HOUSING MECHANICAL CUTTING AND CRDM REMOVAL



- **Key points:**
 - **Preserve latch housing integrity**
 - **Prevent damage to latch housing thread**

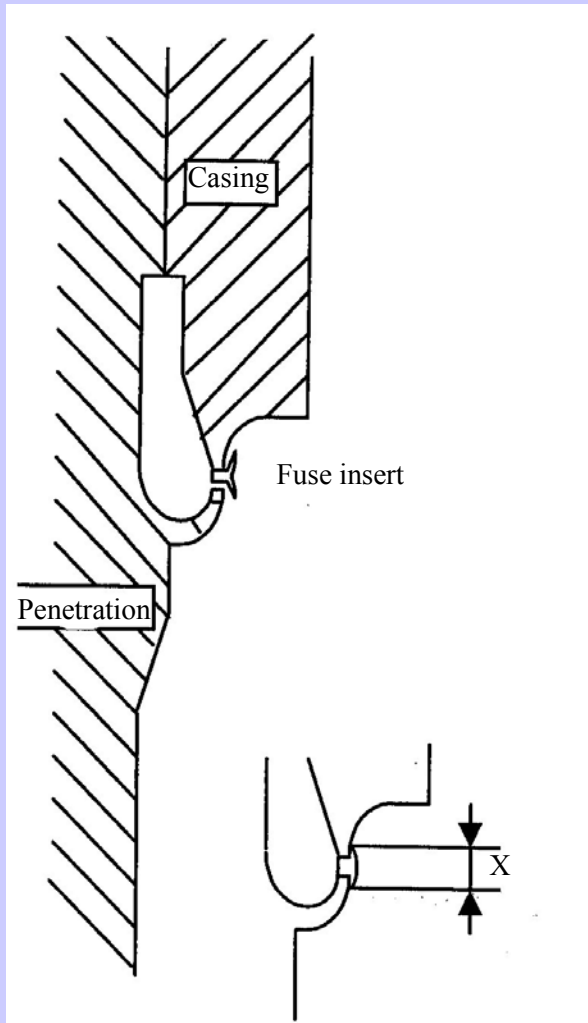


MACHINING & LIQUID PENETRANT TEST



- Key points to insure weld quality:
 - to remachine the weld edge
 - to meet the base metal

LATCH HOUSING WELD INSERT TACK WELDING





**OLD HEAD ON PLATFORM
READY FOR LIFT**





NEW HEAD ON PLATFORM



TOP HAT BEING REMOVED



NEW HEAD READY FOR MOVE INTO CONTAINMENT



ReBar Being Reinstalled



Building Concrete Forms

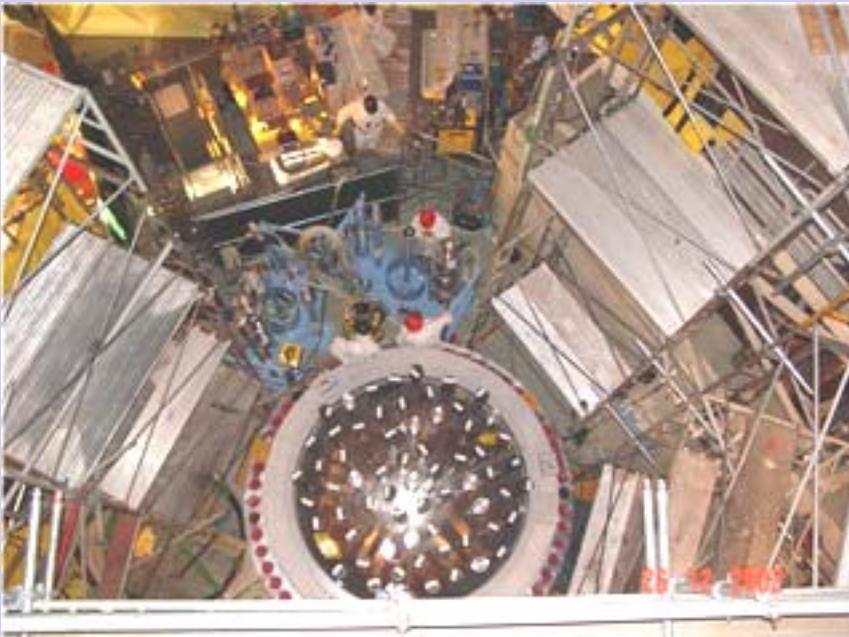
**ReBar Installation
Complete**



Concrete Forms Complete



New Head Assembly





Moving New Head to Cavity

Transportation

- 30 days required for submitting transportation plan in France and U.S.
- U.S. Customs pre-staged for clearance
- Russian heavy-lift aircraft retained to move head from Lyon to Richmond
- Specialized trucks used to move head in France and the U.S.



50.59 Determination

- NAPS-2 is not a Code Stamped Vessel
- It was designed and licensed to “Owner’s Requirements”
- Replacement head has been evaluated to conform to Owner’s Requirements, hence --
- The project was performed under 50.59
- No formal NRC approval was required



50.59 Determination

- Approach discussed with NRR in early October in a series of telecons
- Public Meeting held at Dominion on October 29, 2002
- NRC concurred with approach, but ---
- NRC formally requested an opportunity to review the documentation packages
- NRC also visited French regulator and mfgr

50.59 Determination

- NRC advised that the main challenges would be related to:
 - QA Program reconciliation
 - Use of friction welding specifically excluded by ASME Section III
 - Reconciliation of RCC-M Code to Owner's requirements



QA Program

- QA Audit team dispatched to France from 10-21 to 10-31
- Mapping from French QA program to 10CFR50 App. B program was direct
- French program derived from US program
- QA audit report concluded that French QA program was satisfactory (met App. B)

Friction Weld

- Penetration tube to CRDM adapter weld used friction welding process
- Basically, hold one piece still; spin the other very fast; push them together and they fuse
- Used successfully in over 40 French vessel heads; significant history with no events
- French code and process requirements very well refined

Friction Weld

- Basis of reconciliation was effectiveness of French program
- US Codes not well-defined as a basis of comparison (Sect III N/A; Sect IX weak)
- Backed up reconciliation with extensive pre-service examinations (UT and LP)

Code Reconciliation

- Identified all applicable ASME manufacturing and pre-service requirements that define “Owner’s Requirements”
 - Applicable portions of ASME III (‘68) and special provisions of design specification
- Mapped all documentation into those requirements and identified deltas
 - Used ASME 95 with 96 addenda as basis
 - Performed a reconciliation to ASME III (‘68)

Code Reconciliation

- Reconciliation basis was then developed for each delta
- NOTE: French code was developed from ASME.
- There was a high degree of correlation between the codes
- The factory does both RCC-M and ASME work so parallel quals existed for workers

Stress Analyses

- Westinghouse provided inputs for dead load, seismic and LOCA loads
- Westinghouse provided design inputs on physical interface equipment
- Framatome developed stress analyses
 - Vessel Head
 - Lifting Ring



Stress Analyses

- French approach relies on acceptability of the computer code and focuses on outputs
- U.S. approach expects documentation of methodology to create a stand-alone report



Disposal

- Envirocare contracted to take possession of old RV head
- WMG provided truck transportation across the U.S. to Utah
- Costs to store on site or dispose were fairly close
- Need to consider capital vs. O&M

Lessons Learned

- Do not attempt to do this job this way !!!
- Take firm control of your documentation packages; special attention to resources and planning of engineering efforts is necessary.
- Use of experienced company personnel is a must
- Use of experienced prime contractors is a must

Lessons Learned

- Define the lines of communication among the project team members and to the Station
- Strong and flexible project planning - coordinate the prime contractors and outage planning
- Establish a presence in the prime contractor's offices including the mfr.
- Clear communications with the regulator

Regulatory Interface

- Constant and effective communications from NRC
- Efficient NRC Task Team documentation reconciliation reviews
- Prompt turn-around on exemption requests
- On-site NRC inspection activities well coordinated
- Excellent cooperation by the NRC



Comments or Questions?