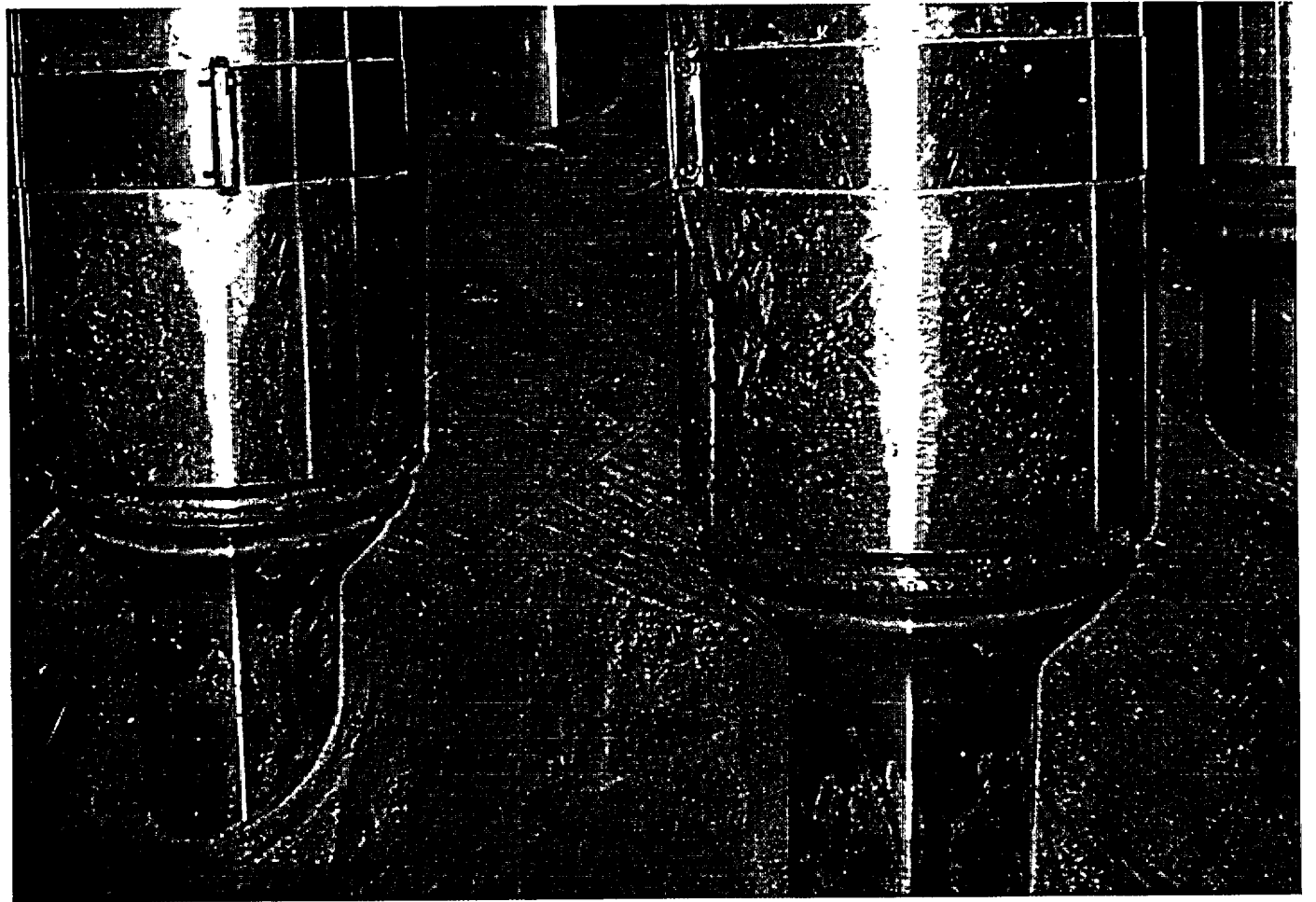


Reactor Vessel Head Inspection Current Status and Future Plans

Calvert Cliffs
Nuclear
Power Plant
Unit 2

March 18,
2003



Enclosure 2

Agenda

- Meeting Objective John Hosmer
- Background-Why we're here John Hosmer
- Inspection Issues/Plans Mike Milbradt
- Safety Case Bob Hardies
- Summary John Hosmer

Objective

- Provide the status of our Reactor Pressure Vessel Head inspection
- Provide our plans and the safety basis for completion of our head inspections

Background

- Important safety issue
- Early engagement with industry and utility inspections
- Best available technology and vendor selected
- Known physical constraints
- Planned in accordance with our October response to Bulletin 02-02

Why We Are Here

- Order issued three days before outage
- Discovered nozzle distortion
- Coverage to date was less than anticipated
- Clarity of the ground rules is necessary to complete our inspections

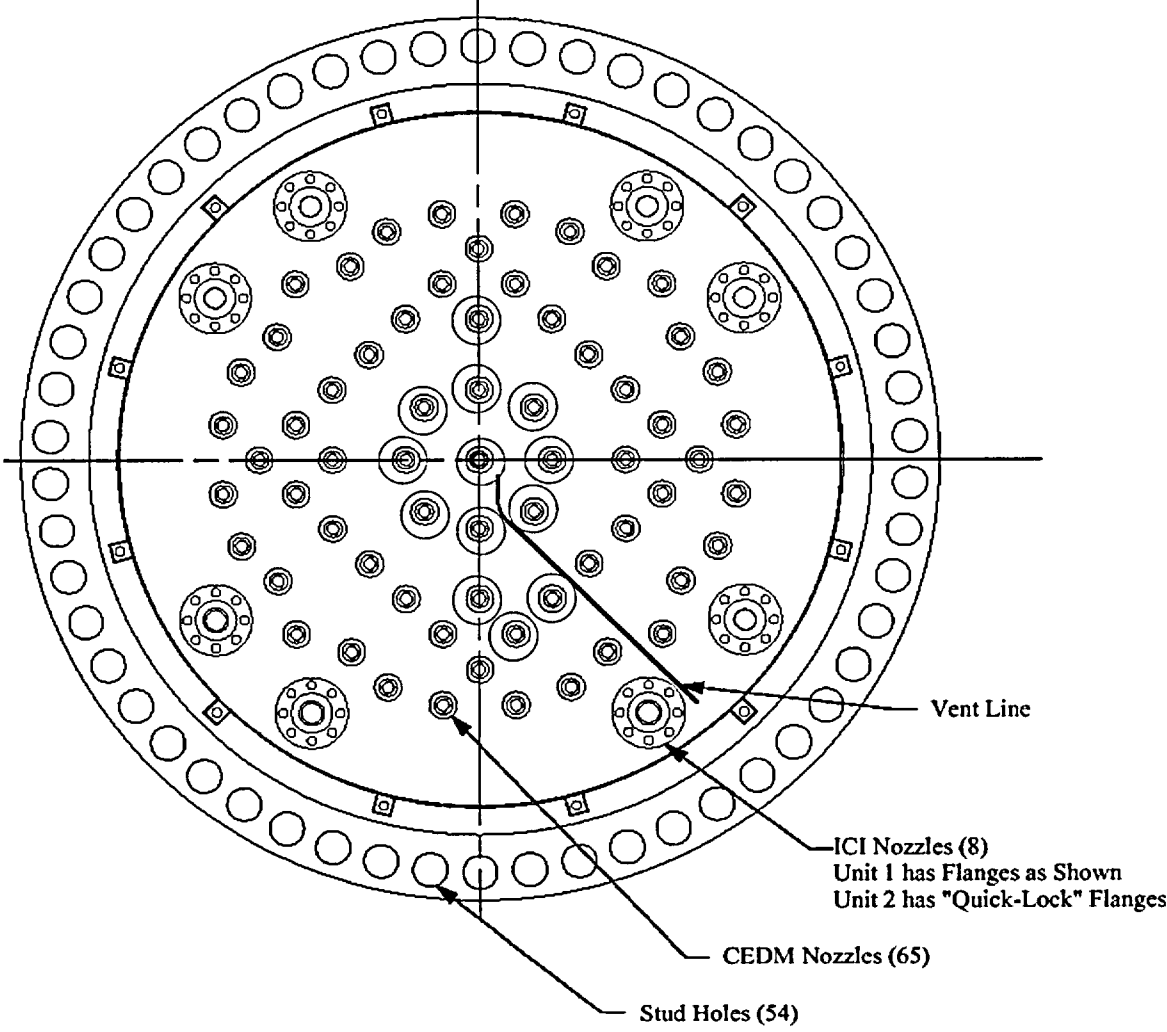
Safety Basis Summary

- Clean bare metal “qualified visual” inspection results for Units 1 and 2
- Low susceptibility material
- Successful leak path assessments
- No UT indications of PWSCC seen in the inspections to date
- Resume inspection using improved methods and tools
- Will seek endorsement for our current direction

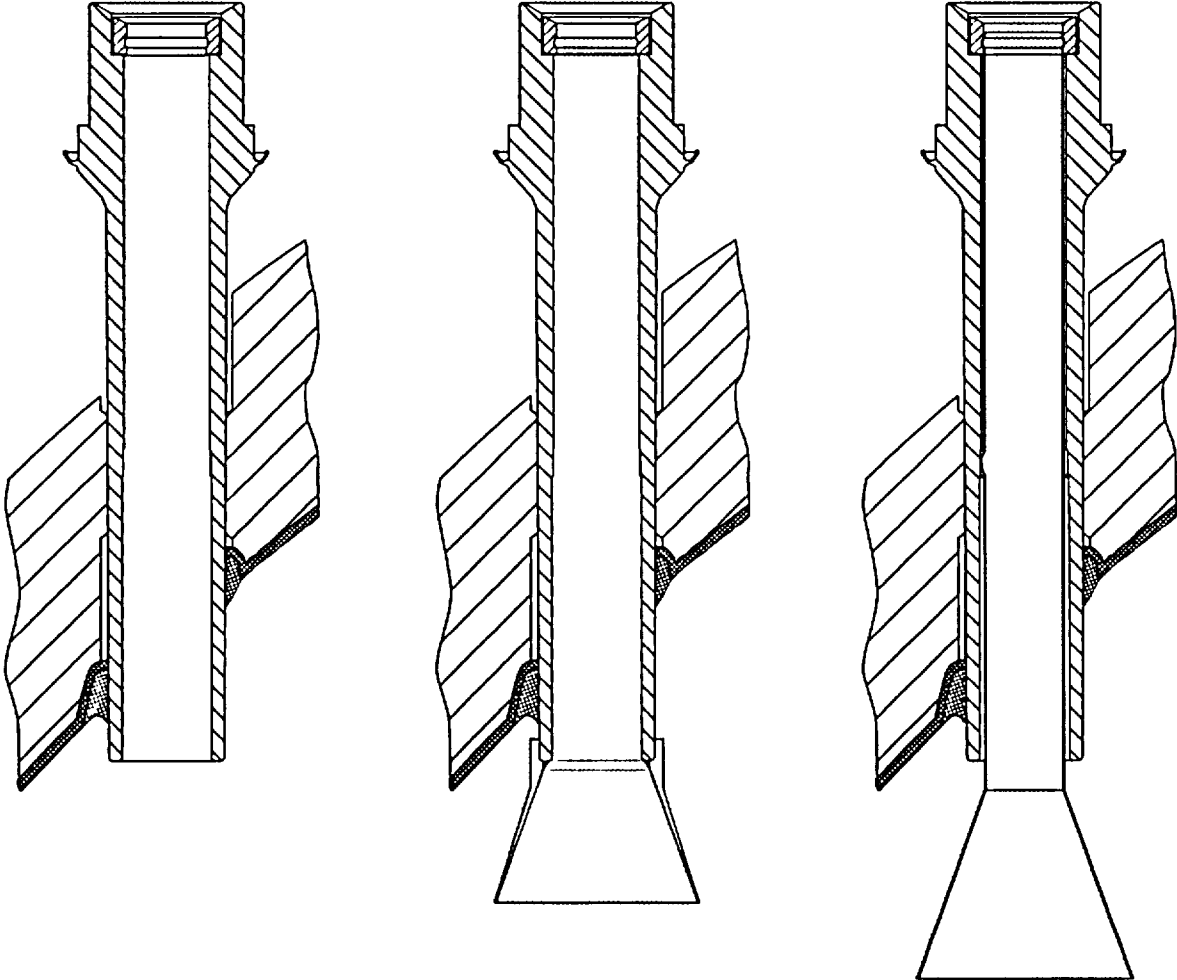
Inspection Issues/Plans

- Inspection Project Goals
 - To ensure safe operation of Unit 2
 - Maximize data collection
 - Utilize best resources
 - Utilize best available technology
- Inspection elements
 - Bare metal qualified visual
 - Volumetric examination
 - Assessment of leakage

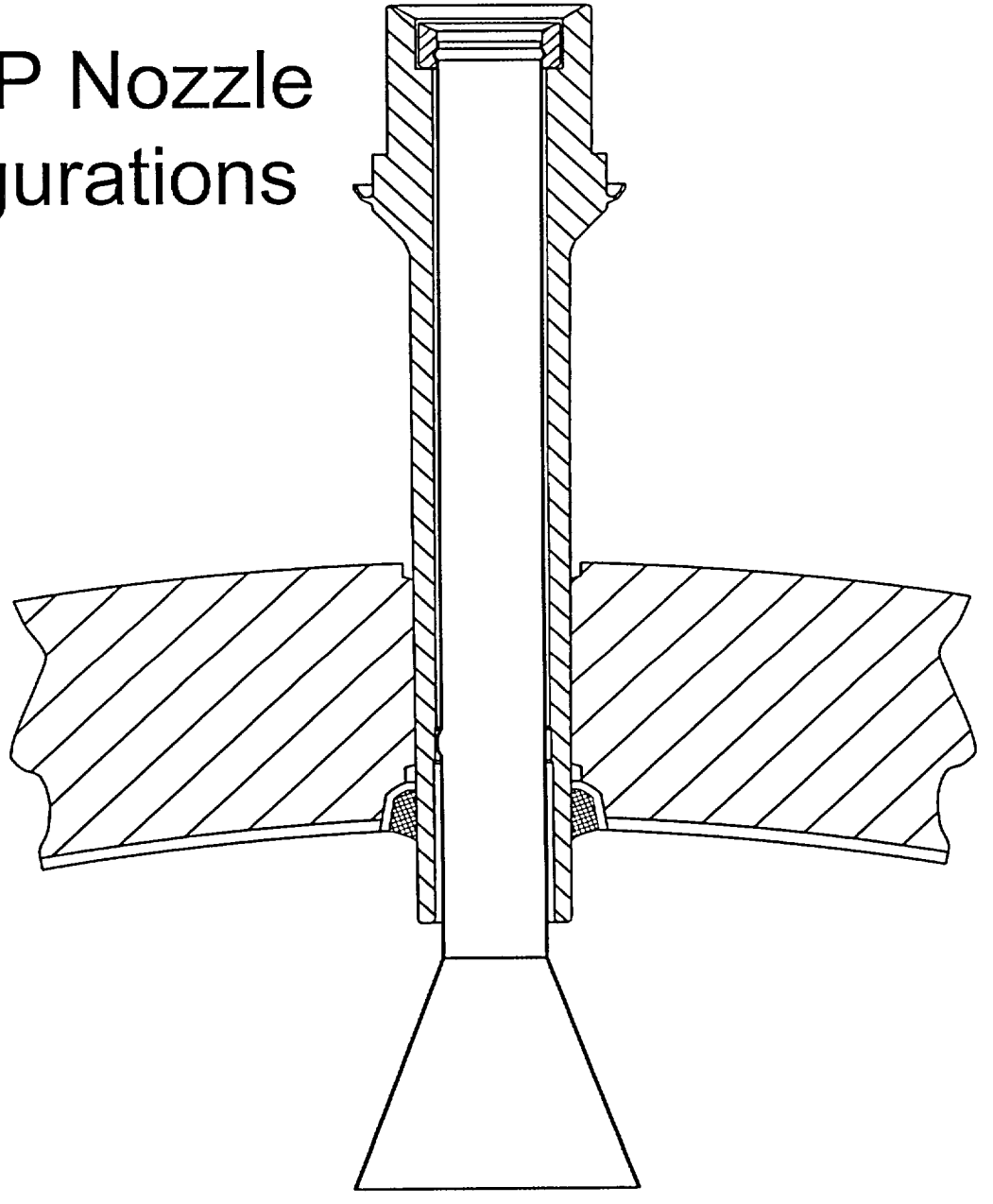
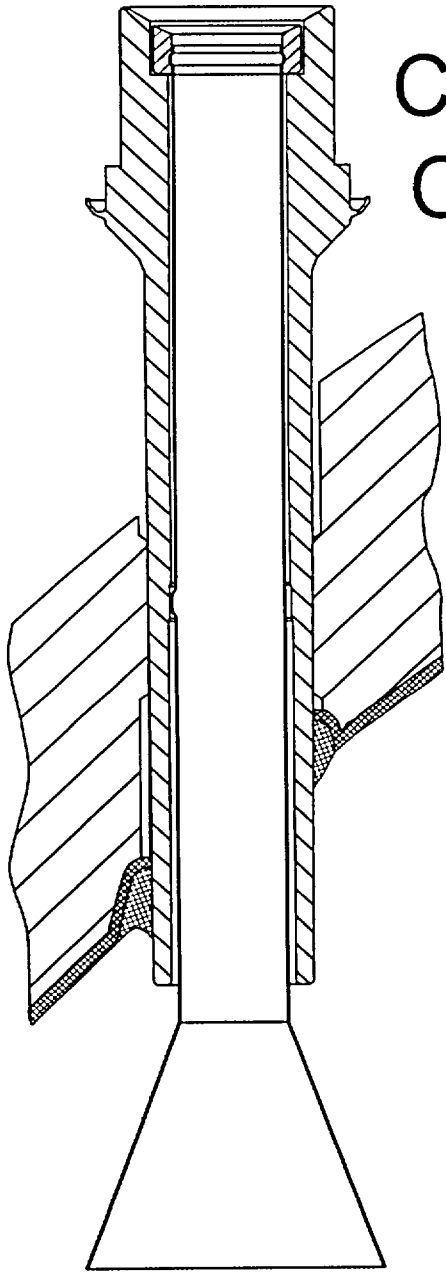
CCNPP Head Configuration



Industry Nozzle Configurations



CCNPP Nozzle Configurations



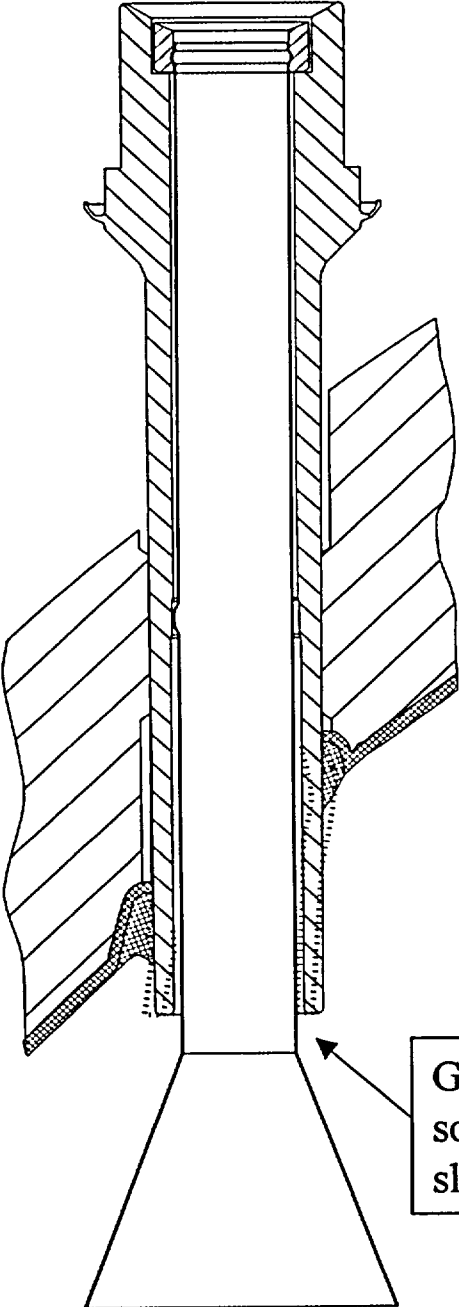
Inspection Results to Date

- 100% “qualified visual” bare metal examination of reactor vessel head
 - No evidence of nozzle leakage
- Volumetric examinations (22 penetrations)
 - No evidence of PWSCC

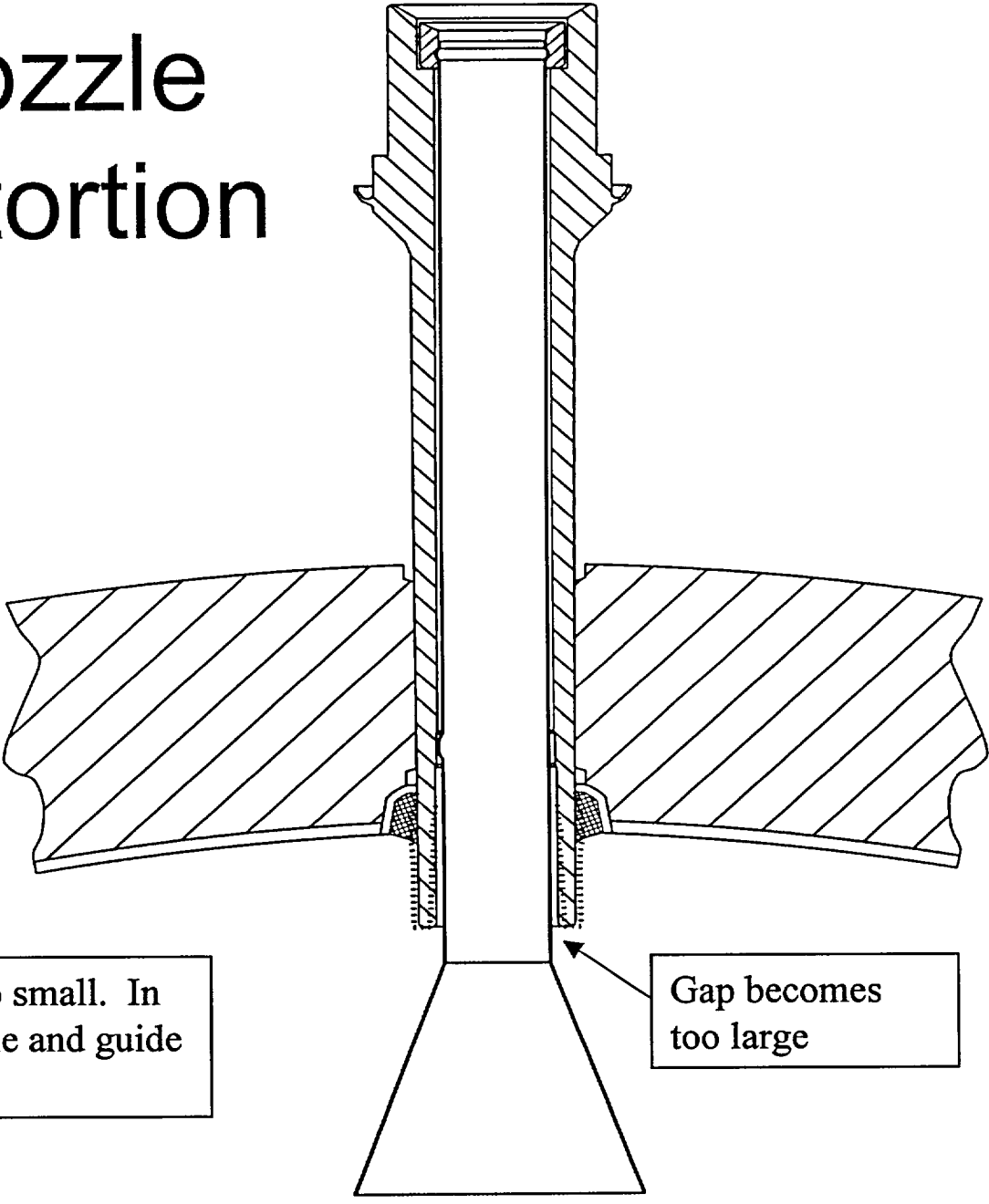
First Window Inspection Issues

- Nozzle distortion
 - Probe coupling
 - Probe access

Nozzle Distortion



Gap becomes too small. In some cases nozzle and guide sleeve touch.



Gap becomes too large

Current Project Activities

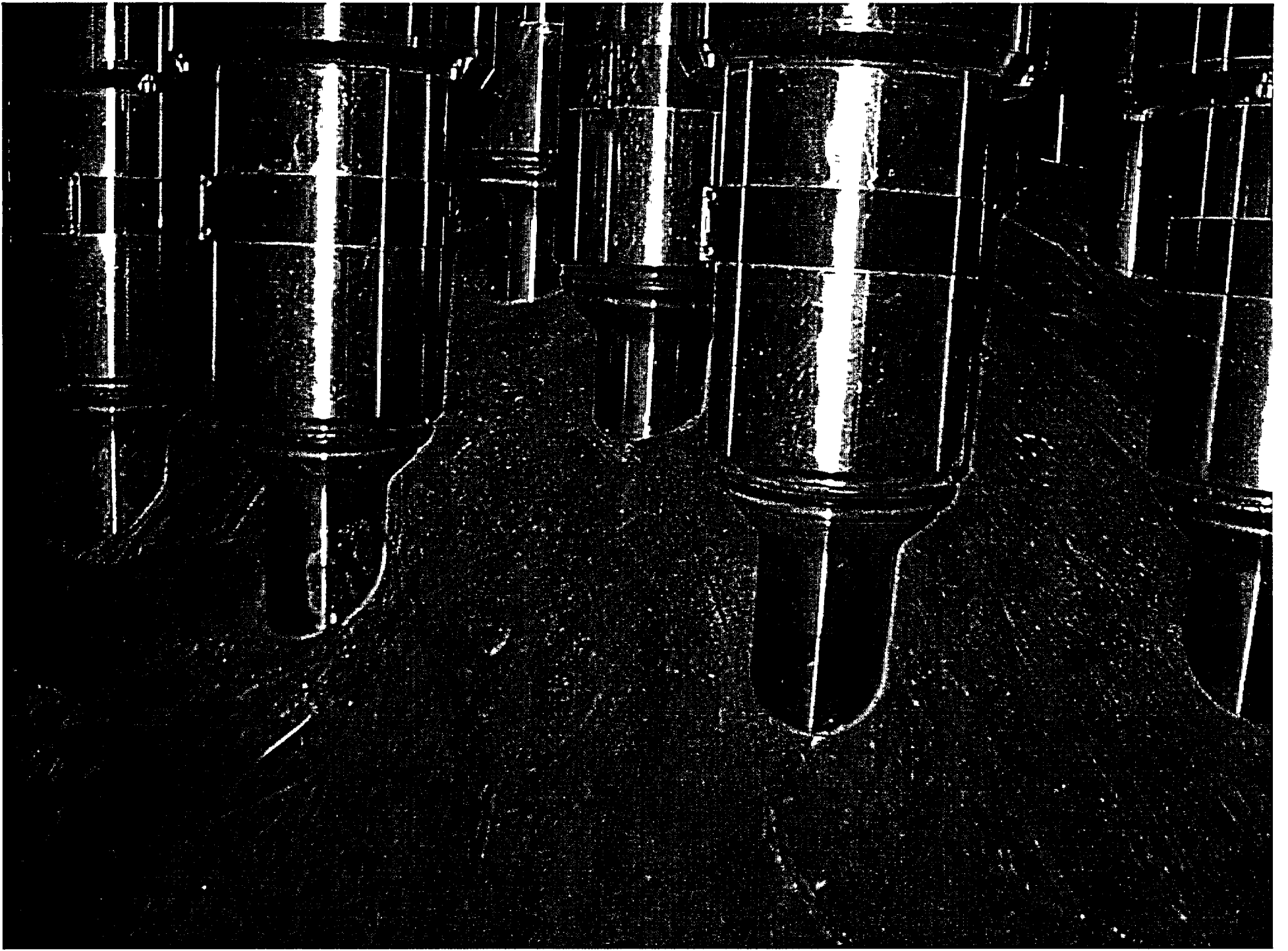
- Working with vendor to improve probe design, mockup/testing
- Assessed removal of guide sleeves
 - Acceptable level of quality and safety without removal
 - Dose and new residual stress considerations

Future Plans

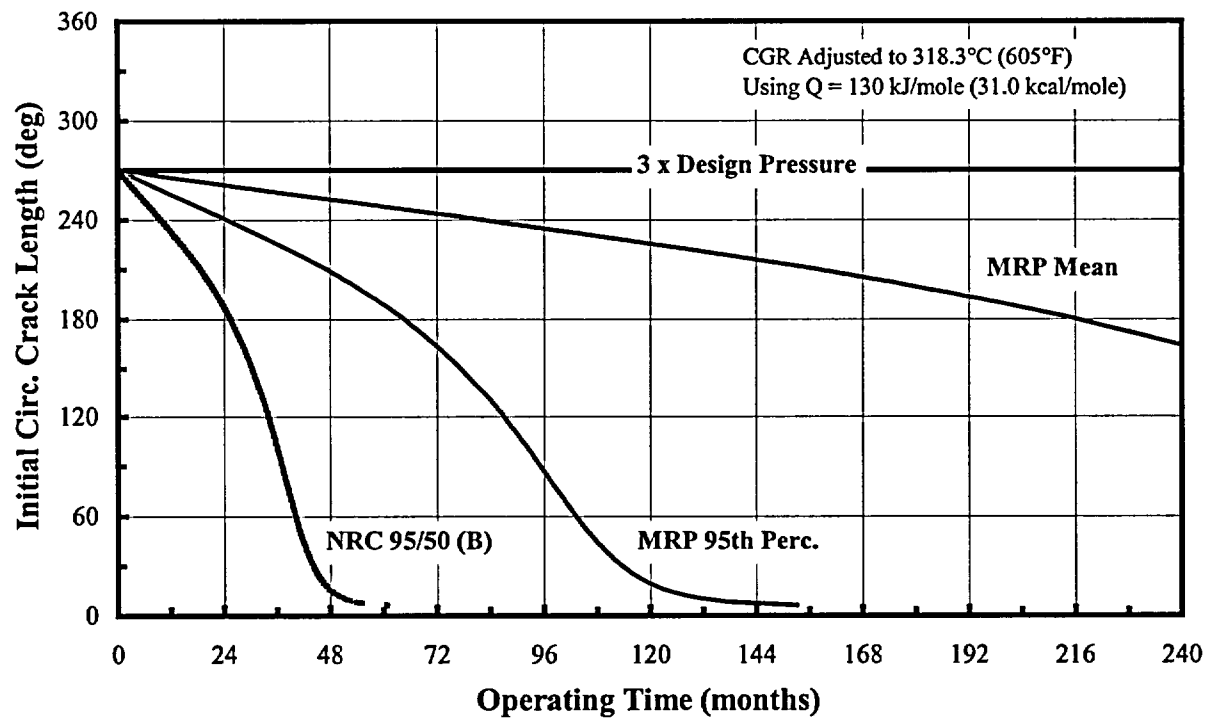
- Plans for 2nd inspection window:
 - Use modified probe to increase coverage
 - Examination of all nozzles
 - Coverage consistent with physical constraints
- Future refueling outages:
 - Refine inspection equipment to maximize inspection coverage and minimize dose to personnel

RV Head Materials

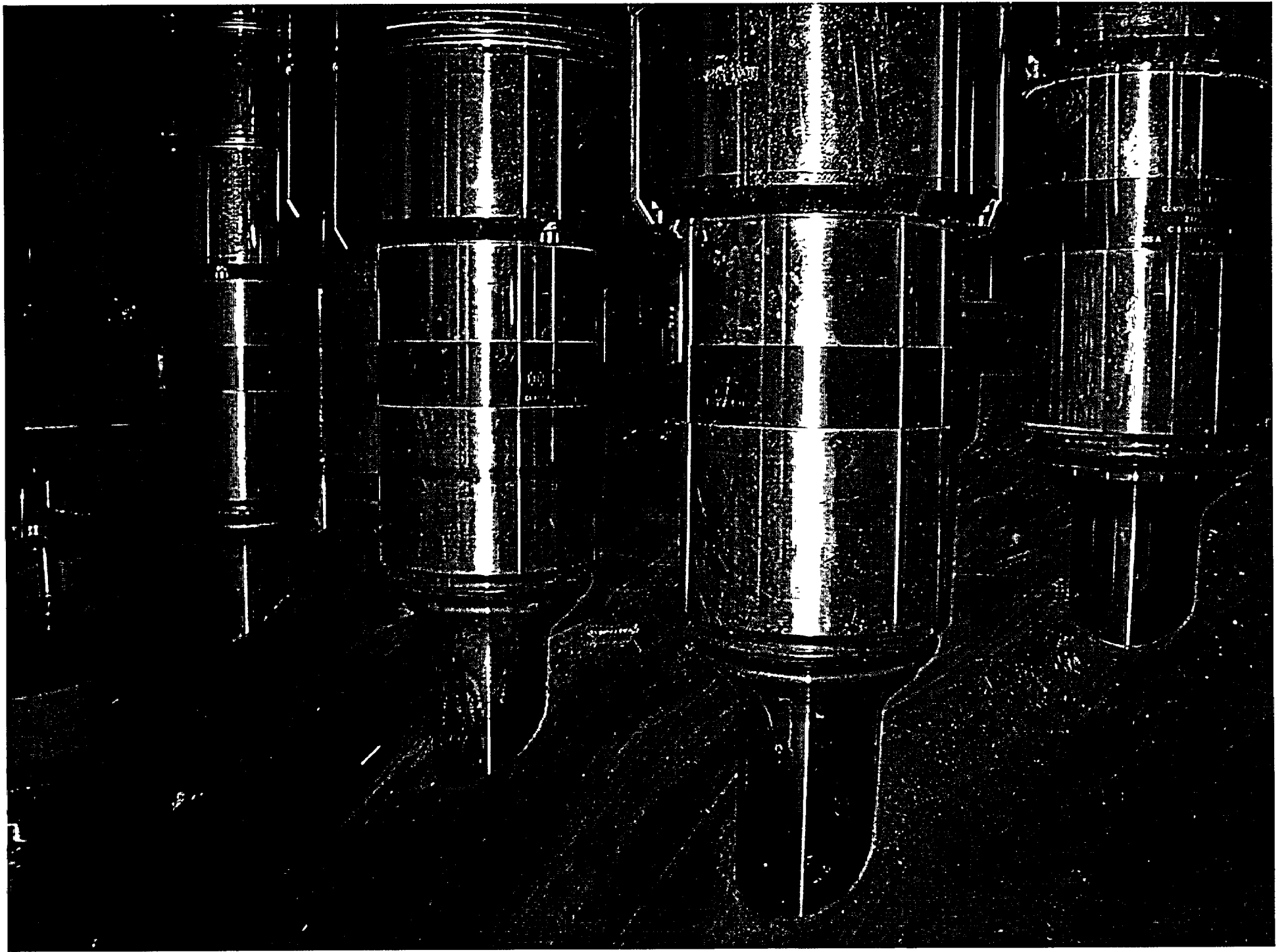
- PWSCC driven by stress
 - Lower yield strength results in lower driving force for cracking
 - PWSCC also driven by time at temperature
- All CEDM nozzles consist of only 2 heats



Postulated Crack Growth



Calculated Remaining Operating Time for a Circumferential Crack to Grow to the 3× Limit Load Condition at the Maximum U.S. Head Temp of 605°F



Bare Metal Visual Examination

- Basis for conclusion of structural integrity and safety for ensuing cycle
 - No evidence of leakage, therefore, no through wall cracks that will threaten structural integrity
 - Empirical basis

Volumetric Examination

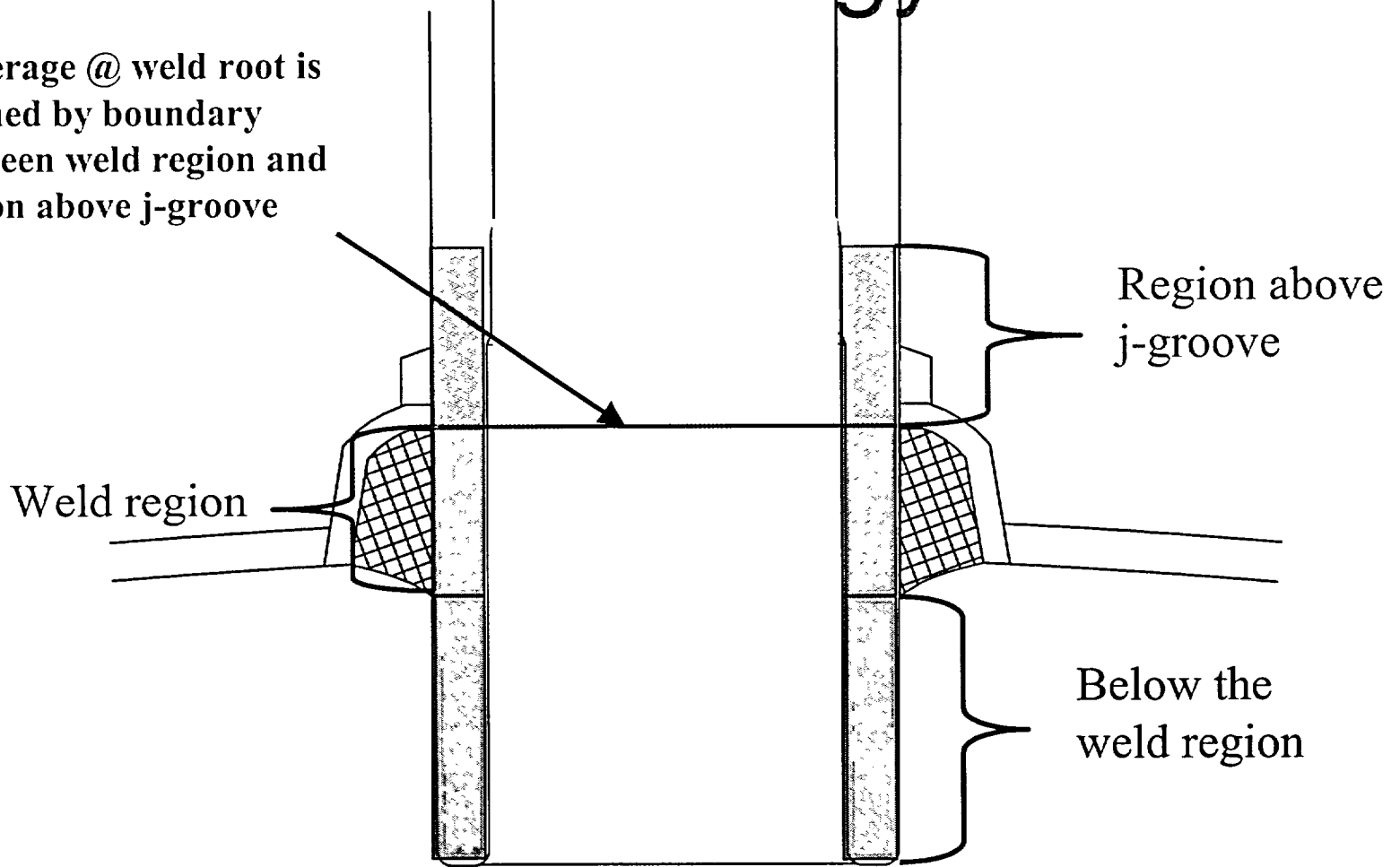
- Volumetric examination of nozzle material provides defense in depth
 - Volumetric examination identifies part through wall cracks
 - No part through wall cracks ensure no precursors to structural integrity exist

Volumetric Examination

- Achieve greatest coverage possible within physical and other limitations
- ICI and RV head vent line
 - Rotating probe
 - 100% coverage complete
 - Clean
- CEDM nozzles have guide sleeves that prevent access with a rotating probe

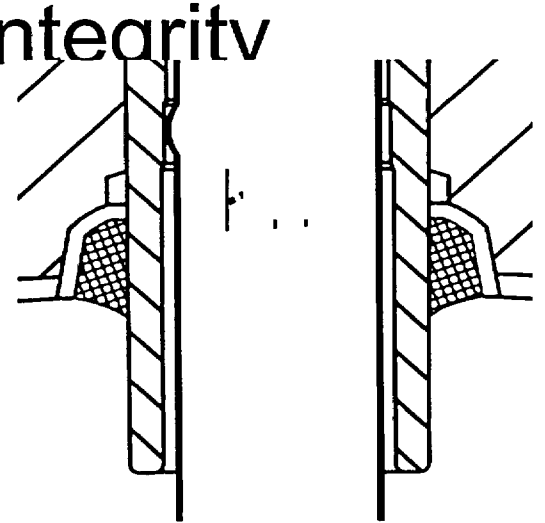
Nozzle Exam Coverage Terminology

Coverage @ weld root is defined by boundary between weld region and region above j-groove weld



Coverage Above Weld Region

- Have achieved examination of approximately 214 of 227 in²
- Unavailable azimuths assessed deterministically for structural integrity
 - 11 nozzles have 360° coverage
 - One has 355° coverage
 - One has 117° coverage

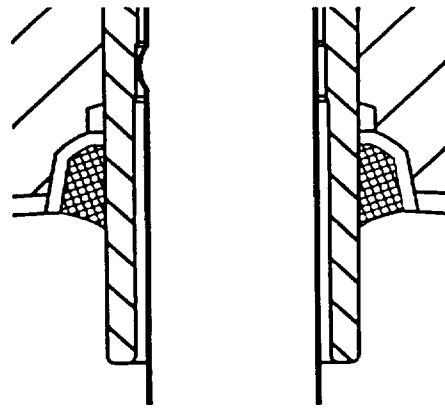


Coverage at Weld Root

- Have examined approximately 6 of 10 total in²
- Unavailable azimuths can be assessed deterministically for structural integrity
- Several nozzles 0° coverage

Material Adjacent to Weld Region

- Have examined approximately 37 of 117 total in²
- Fewer structural integrity concerns for unavailable azimuths in welds



Material Below Weld Region

- Have examined approximately 92 of 229 total in²
- No structural integrity concerns for unavailable azimuths below weld

Assessment of Leakage

- Accomplished for 20 of 22 nozzles with no degradation identified
- We will complete assessment on every nozzle

Current Data

- Unit 2 head does not have leaks
- UT has yielded no evidence of PWSCC
- Unit 2 is safe for an additional cycle of operation

Summary

- Inspection results
- Plan for remaining inspection
- Safety basis

Safety Basis Summary

- Clean bare metal “qualified visual” inspection results for Units 1 and 2
- Low susceptibility material
- Successful leak path assessments
- No UT indications of PWSCC seen in the inspections to date
- Resume inspection using improved methods and tools
- Will seek endorsement for our current direction

Conclusion

- Approach provides reasonable assurance of adequate protection of public health and safety