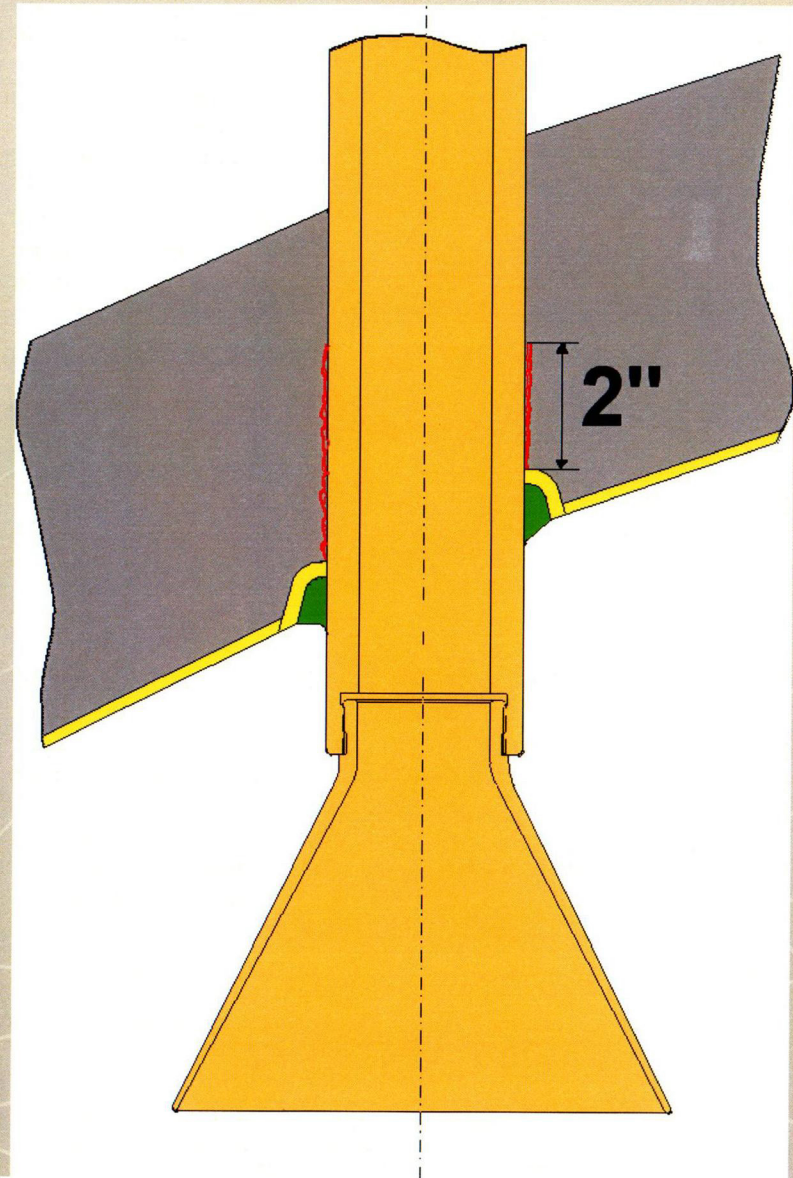
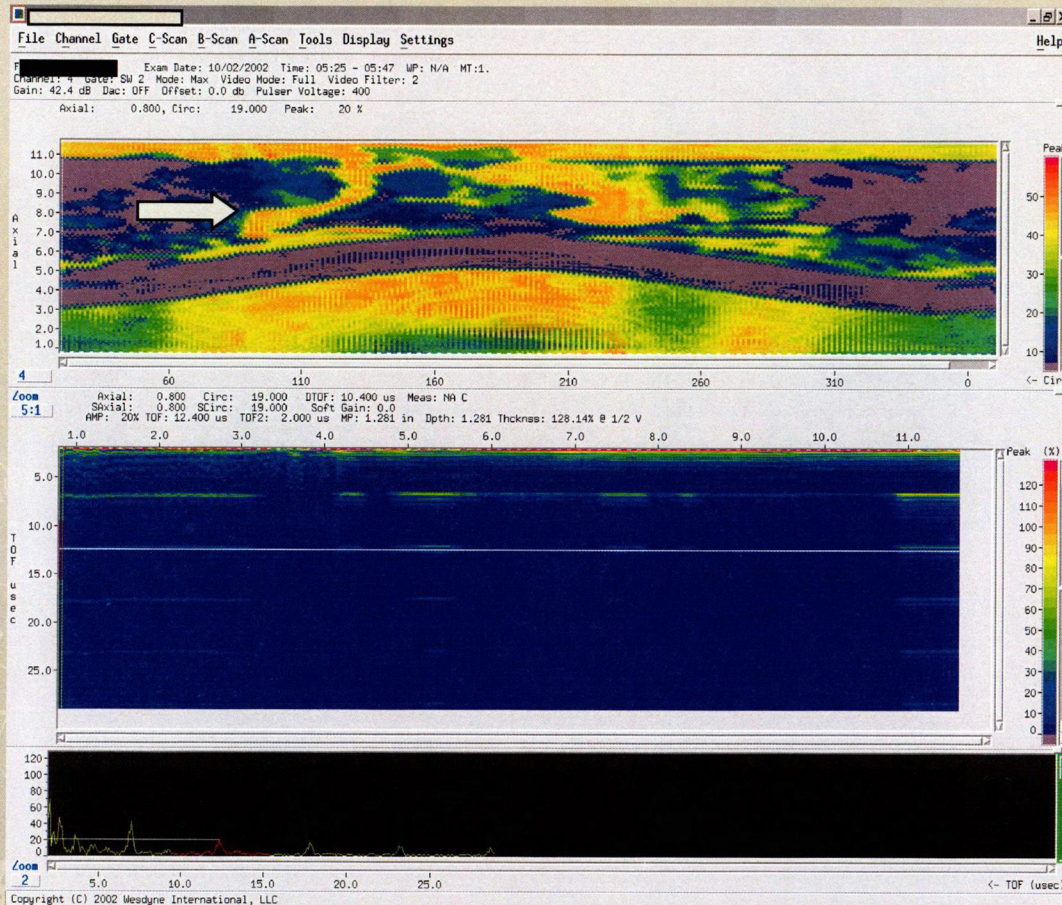


Riverbed Exam

- ▶ Proceduralized process
- ▶ Performed with 2.25 MHz, 0 degree Transducer
- ▶ Highly sensitive to amplitude changes in tube backwall signal
- ▶ Effective for detection of leakage in annulus



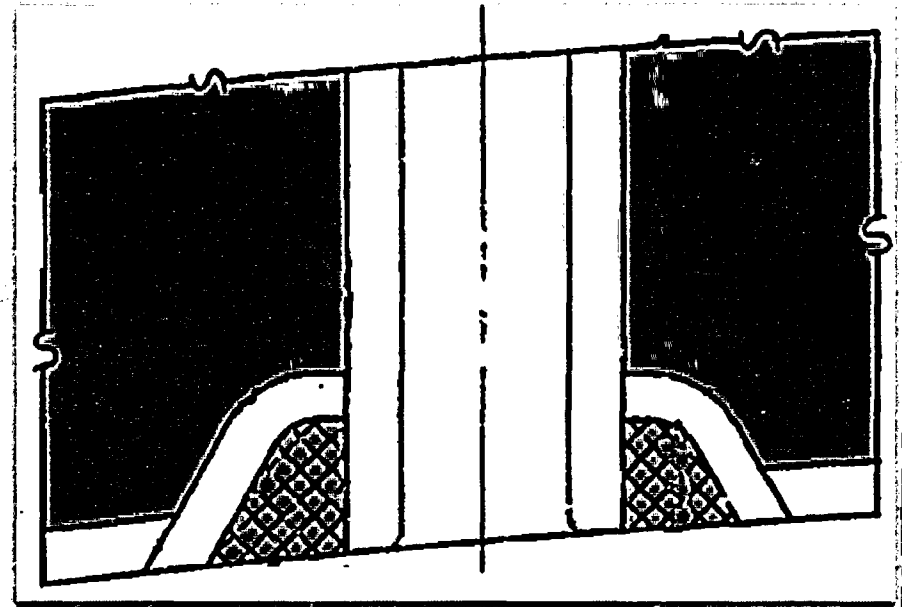
Riverbed Identification



- ▶ Leak path identified with straight beam ultrasonics
- ▶ Leak path leads to loss of shrink fit integrity and a resulting increase in reflectivity

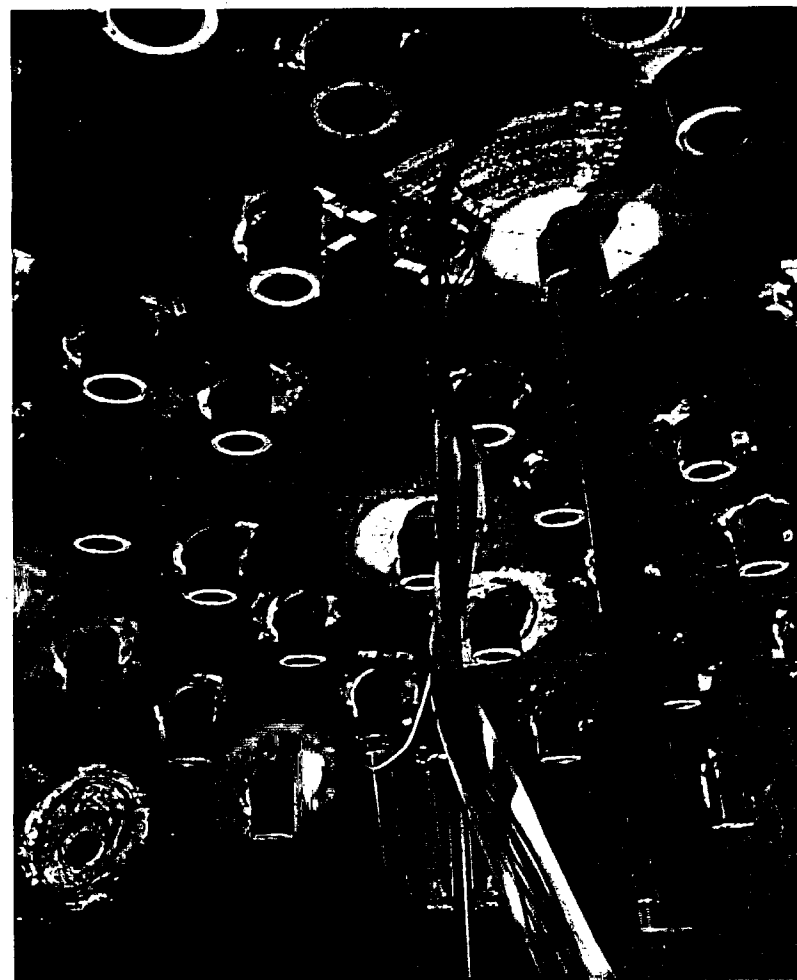
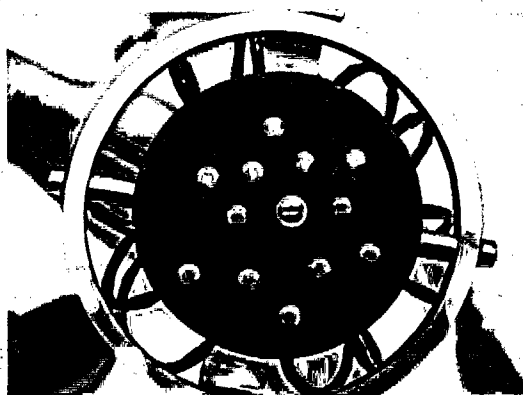
Vent Line Wetted Surface Exam

- ▶ Complete wetted surfaces examination
 - ECT examination at tube ID surface
 - ECT array examination of J-weld surface



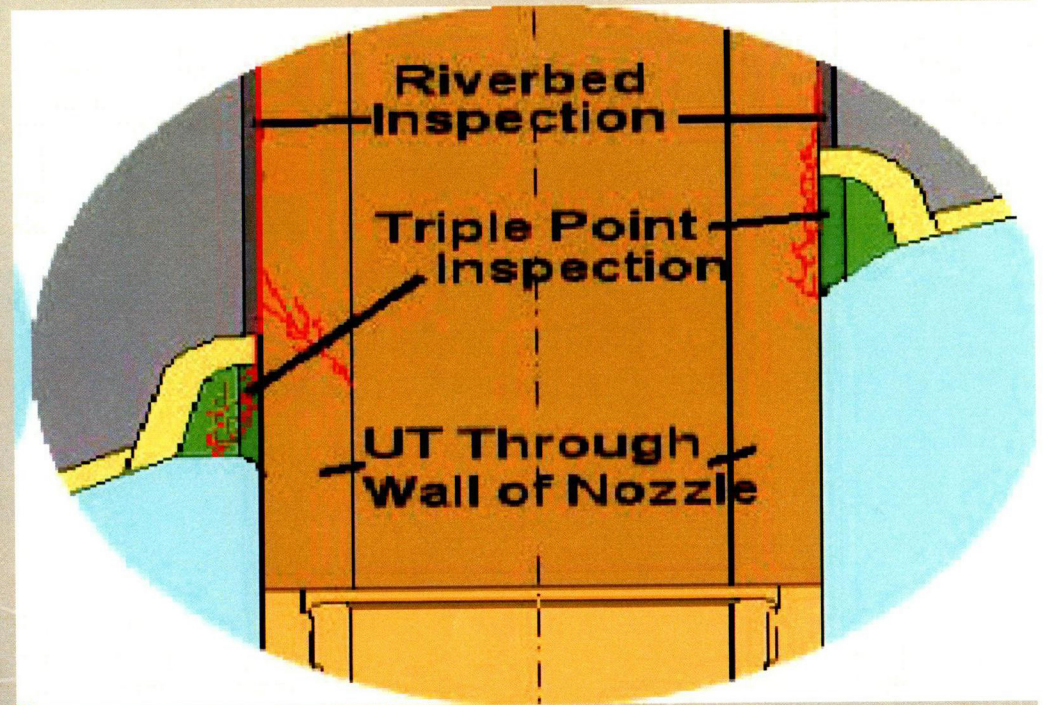
Reactor Vessel Vent Line J- Groove Weld ECT Examination

- ▶ Manual delivery, low dose
- ▶ 12-coil array
 - 100, 250 and 600 kHz
- ▶ Coils offset to provide coverage in one rotation



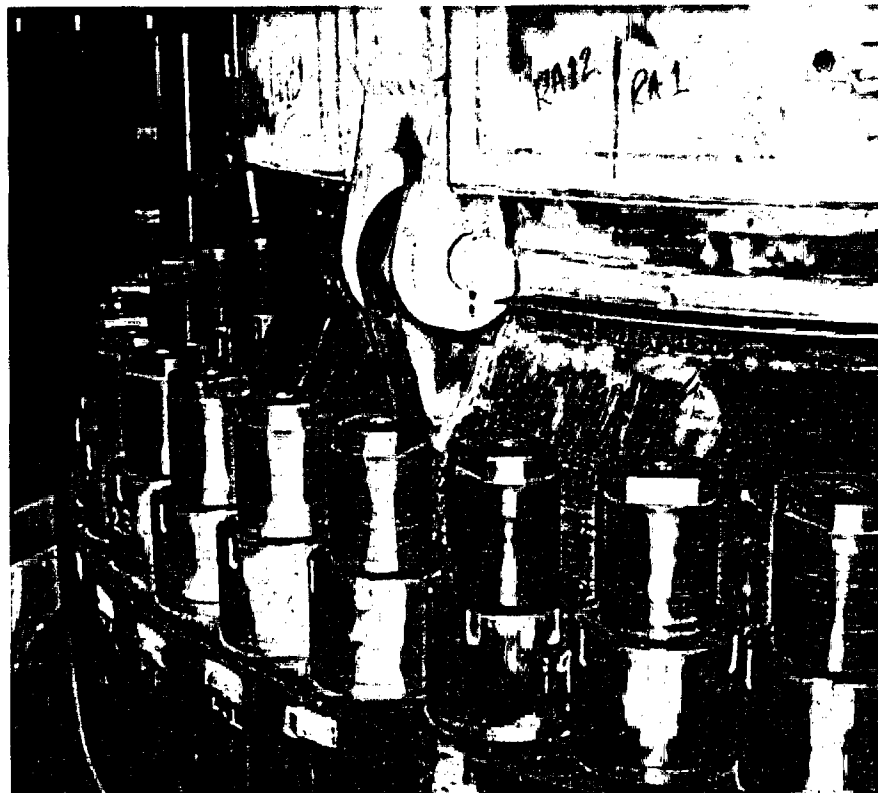
CEDM/ICI Volumetric Summary

- ▶ Axial and Circ TOFD
- ▶ 0 degree UT
- ▶ Triple Point
- ▶ 0 degree "Riverbed" examination for leakage assessment



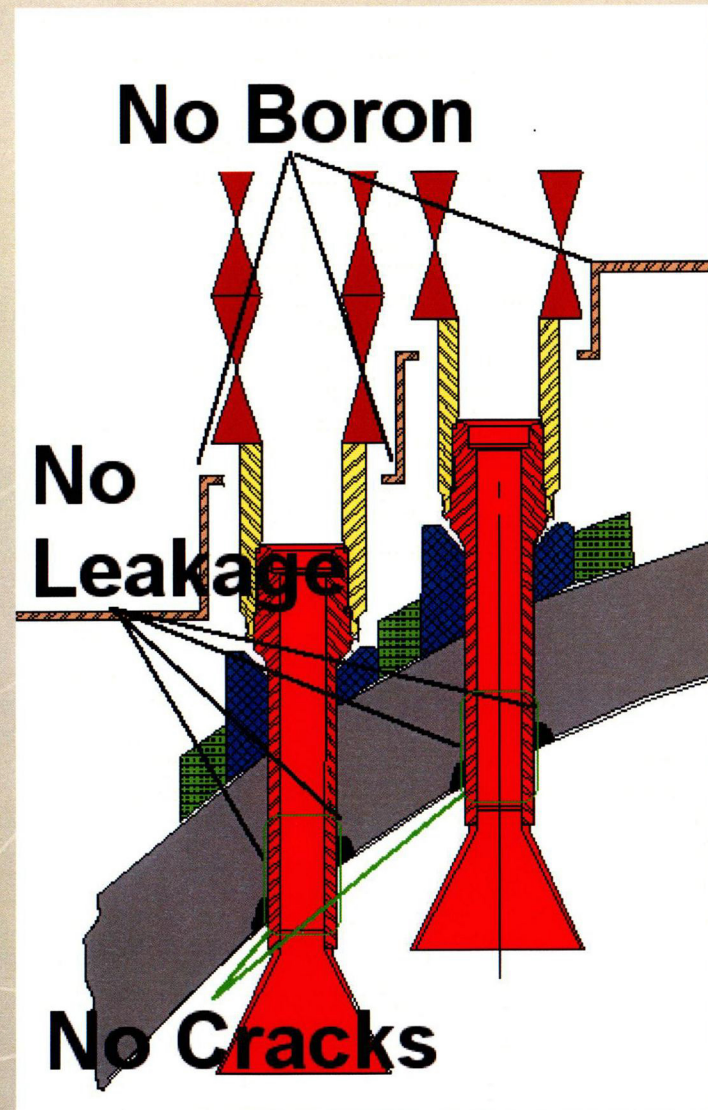
Supplemental Visual

- ▶ Above shroud
- ▶ Around flange
- ▶ Through doorways



2R16 Inspection Plan

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

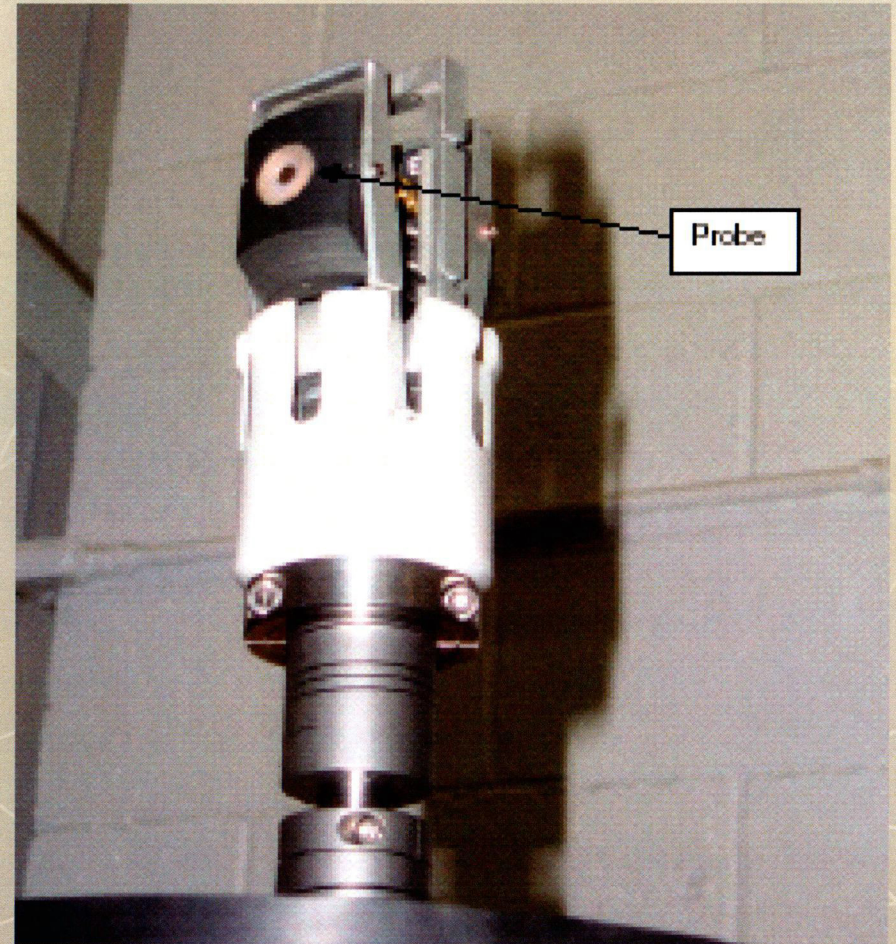


Low Frequency Eddy Current Exam for CEDM and Vent Locations

6/17/2003

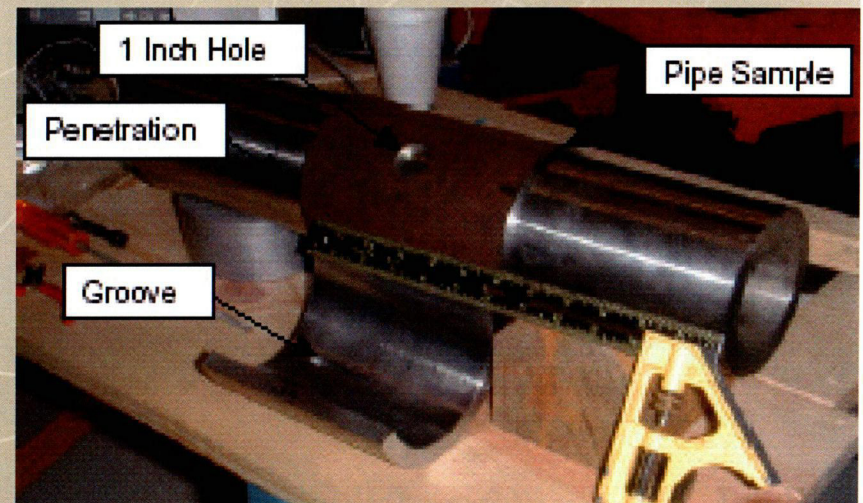
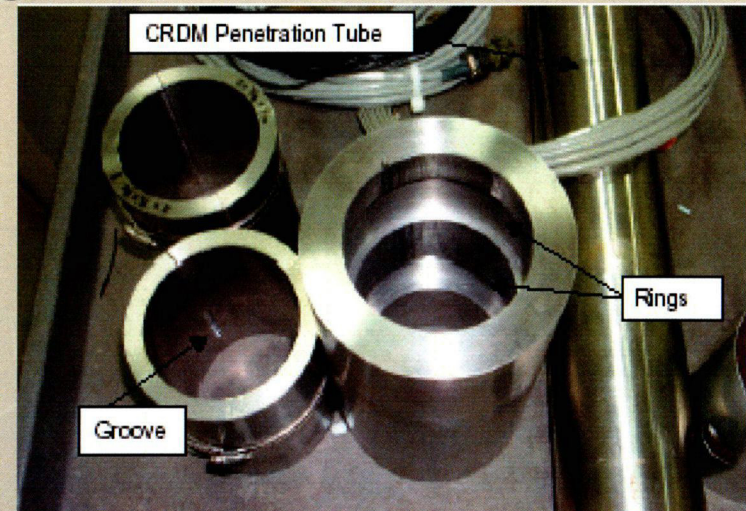
Development of Low Frequency EC Vessel Leakage/Integrity Inspection

- ▶ Developed in Spring of 2002, as diagnostic tool
- ▶ Designed to detect leakage/degradation of carbon steel in head penetration annulus region
- ▶ Utilizes $\frac{3}{4}$ " Driver/Pick-up probe, operating at 200 Hz



Development of Low Frequency Vessel Leakage/Integrity Inspection

- ▶ Evaluated using machined samples, representing various degradation morphologies (rings, grooves, drilled holes)
- ▶ Tests performed both on a test stand, and on an actual reactor vessel head at the Waltz Mill facility



Development of Low Frequency Vessel Leakage/Integrity Inspection

- ▶ Inspections were performed on six penetrations on the Jamesport reactor head
- ▶ Results showed this tool's ability to map the counter bore region near the OD of the head (0.015" change)

