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PDI Piping Program Update

PDI / NRC Meeting
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Objectives

- General Piping Program Status
- Personnel Qualification Status
- Procedure Qualification Status
- Phased Array Qualification Activity
- Dissimilar Metal Weld Program Activity
- Summary

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PDI Piping Program: General Status

- Piping Program - 2008
  - Manual personnel qualifications
    - 162 complete (24 more planned for 2008)
  - Automated personnel qualifications
    - 82 complete (30 more planned for 2008)

  - Manual *procedure* qualifications
    - 3 EPRI PA quals complete (Piping, DM and WOL)
  - Automated *procedure* qualifications
    - 4 complete
    - 4 in-process or starting by December 15th

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PDI Piping Program: General Status (continued)

- PDI Participation from outside the U.S. continues to be high
  - 2008 Participants:
    - Spain
    - Korea
    - Belgium
    - Taiwan
    - Japan
    - Switzerland
    - Germany
    - Brazil
    - Sweden
    - South Africa

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PDI Piping Program: General Status (continued)

- New sample fabrication completed in 2008
  - New Large-bore DM Weld samples - 37” diameter PWR main loop piping
  - New Weld Overlay samples
    - Optimized WOL sample
      - 37” diameter PWR main loop
      - Expand the qualified thickness range to 1.65”
      - Contains a cast stainless steel safe-end
    - WOL Characterization samples
      - Laminar flaw sizing
      - Planar flaw sizing

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Personnel Qualification Status

- 2008 *INITIAL* personnel qualification attempts (conventional & PA):
  - Manual:
    - Supplement 12 w/IGSCC – 17
    - Supplement 12 wo/IGSCC – 14
    - Supplement 2 Depth Sizing only – 3
    - Supplement 10 (DM) – 30
    - Supplement 11 (WOL) – 12
    - Supplement 8 (Bolting) - 7
  - Automated:
    - Supplement 12 w/IGSCC – 6
    - Supplement 12 wo/IGSCC – 4
    - Supplement 2 Depth Sizing only – 8
    - Supplement 10 (DM) - 26

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Personnel Qualification Status

- 2008 Re-qualification attempts (IGSCC or WOL)
  - Manual:
    - IGSCC detection & length – 15
    - IGSCC depth sizing – 5
    - WOL – 3
  - Automated:
    - IGSCC – 6
    - WOL - 1

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Current Manual UT Qualified Workforce

- ✓ Ferritic – Detection only – 507
- ✓ Ferritic – Detection and Length – 461
- ✓ Ferritic – Detection, Length and Sizing – 272

- ✓ Austenitic and Ferritic – Detection only – 232 (without IGSCC)
- ✓ Austenitic and Ferritic – Detection & Length – 206 (without IGSCC)
- ✓ Austenitic and Ferritic – Detection, Length & Sizing – 75 (without IGSCC)

- ✓ IGSCC, Austenitic And Ferritic, Detection – 121
- ✓ IGSCC, Austenitic And Ferritic, Detection and Length – 109
- ✓ IGSCC, Austenitic And Ferritic, Detection, Length and Sizing – 48

- ✓ Dissimilar Metal Weld Detection only - 130
- ✓ Dissimilar Metal Weld Detection and Length – 100
- ✓ Dissimilar Metal Weld Detection, Length, Sizing – 10

- ✓ Weld Overlay – 128
- ✓ IGSCC, Aust. And Ferritic, Detection, Length, Sizing and Weld Overlay – 31
- ✓ IGSCC, Aust. And Ferritic, Det., Length, Sizing, Weld Overlay and DM Det, Length and Sizing - 0

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Current Auto UT Qualified Workforce

- ✓ Ferritic – Detection only – 102
- ✓ Ferritic – Detection and Length – 97
- ✓ Ferritic – Sizing – 51

- ✓ Austenitic and Ferritic – Detection only – 7 (without IGSCC)
- ✓ Austenitic and Ferritic – Detection & Length – 7 (without IGSCC)
- ✓ Austenitic and Ferritic – Detection, Length & Sizing – 0 (without IGSCC)

- ✓ IGSCC, Austenitic And Ferritic, Detection – 48
- ✓ IGSCC, Austenitic And Ferritic, Detection and Length – 47
- ✓ IGSCC, Austenitic And Ferritic, Detection, Length and Sizing – 27

- ✓ Dissimilar Metal Weld Detection Only - 137
- ✓ Dissimilar Metal Weld Detection and Length – 128
- ✓ Dissimilar Metal Weld Detection, Length and Depth – 44

- ✓ Weld Overlay – 39

- ✓ IGSCC, Aust. And Ferritic, Detection, Length, Sizing and Weld Overlay – 20
- ✓ IGSCC, Aust. And Ferritic, Det., Length, Sizing, Weld Overlay and DM Det., Length & Depth - 4

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Procedure Qualification Status

New Procedure Qualifications completed in 2008:

1 - Manual PA for Piping (EPRI)
1 - Manual PA for DM Welds (EPRI)
1 - Manual PA for Weld Overlay (EPRI)
1 - Auto PA for Piping
1 - Auto PA for Piping – Depth Sizing Only
1 - Auto PA for DM Welds
1 - Auto ID DM Weld Procedure - Essential Variable Change

New Procedure Qual Work In-Progress or Still Scheduled for 2008:

1 - Auto PA for Weld Overlay
1 - Auto PA for DM Welds
1 - Auto PA for Piping
1 - Equivalency to Zetec-OmniScanPA-03 (DM Welds) - substituting Ultravision software for Data Acquisition

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Phased Array Qualification Activity

- Several Phased Array Procedures Qualified in 2008
- Several More in Process or Planned
  - All major piping supplements now have PA techniques qualified
    - Multiple organizations
    - Multiple techniques
      - Automated & Manual
      - 1D arrays & 2D arrays
      - Linear scanning (e-raster)
      - Sectorial scanning

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Dissimilar Metal Weld Program Activity

- Qualified techniques are available for a large population of DM welds
- The PDI sample set spans the majority of configurations present in plants
  - New 37” Diameter Main Loop Samples further expand the library

- Remaining limitations are primarily due to access and geometry
  - Safe-end Tapers
  - Short Safe-ends
  - Adjacent austenitic welds
  - Weld crowns
  - Adjacent nozzle geometry
  - ID geometry
  - Cast SS

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Dissimilar Metal Weld Program Activity

- Qualification status overview for the DM program
  - From the OD
    - Manual qualified techniques
      - Detection and length sizing with conventional UT
      - Detection, Length and Depth sizing with Phased Array
    - Automated qualified techniques
      - Qualified for detection, length & depth sizing
      - Conventional and Phased Array
  - From the ID
    - Current techniques
      - Qualified for detection & length sizing
      - Depth sizing reliably demonstrated, but currently has not been able to meet the Code required RMS value

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Summary

- Heavy personnel qualification activities in 2008
  - Across the board, the pool of technicians has increased slightly in 2008 (still not that large)
- Several new PA procedures qualified in 2008
- Several more planned for the next few months
- Phased array techniques - now qualified for most nuclear piping applications

  This is where most of the innovation is taking place today
- Dissimilar Metal Welds – techniques are now qualified for most configurations in the fleet

  Remaining limitations are due to access and geometry

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