



ELECTRIC POWER  
RESEARCH INSTITUTE

## ***Current Experience Using CC-780 Framework in Performing Equipment Equivalencies***

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Demonstration

**PDI/NRC Meeting**

December 2011

# Overview

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- Ongoing Activities
- EPRI Internal Research
- Recent Qualification Experience
- Summary

# EPRI Internal Research

- EPRI has completed extensive research project focused on equipment equivalency
  - *Nondestructive Evaluation: Ultrasonic Instrument Equivalency Demonstration Through Technical Justification. EPRI, Palo Alto, CA: 2009. 1019114*
- The objective of this project was to;
  - Institute the methodology for determining equivalency of ultrasonic instruments when using the same general techniques
  - Develop an efficient method of establishing instrument equivalency through technical justification
  - This project was used to justify CC-780

# EPRI Internal Research

- Scope of Project
  - Five different phased array systems utilizing nine different possible system configurations were evaluated on austenitic piping welds
  - Four different phased array systems were evaluated on dissimilar metal welds
  - Various phased array search units from two different manufacturers
- Results
  - In all cases if all factors were properly addressed the various equipment was capable of producing equivalent results

# Ongoing Activities

- Internal quality instructions developed
  - Draft version is under review by PDI
- Currently performing equipment substitution using merged requirements of both CC-780 and existing Appendix VIII requirements
  - Technical justification required
    - Details changes required
    - No change to technique or analysis processes allowed
  - Side by side comparison of newly collected data with original data collected during initial qualification
  - At least one personnel test utilized
  - Demonstrations performed blind

# Recent Qualification Experience

- 2010 through 2011
  - Three automated procedure equipment substitution qualifications have been performed
    - Two Supplement 2 procedures
      - Application
        - Detection, length and depth sizing, including IGSCC
    - One Supplement 10 procedure (Multiple Instruments)
      - Application
        - Detection, length and depth sizing

# Recent Qualification Experience (Conventional Supplement 2 Procedure)

- Changes required
  - Instrument
    - Microtomo to OminiScan
  - Cabling
    - Connectors different between two systems, but same cable type was used
  - Analysis Software
    - Later version of software used, but utilized same analysis views and processes
      - Could read old data for direct comparison

# Recent Qualification Experience (Conventional Supplement 2 Procedure)

- Extent of Qualification
  - Scanned at least one personnel test worth of data with new system (Detection, length and depth sizing)
    - ~15 flaws for detection and length
    - ~10 flaws for depths sizing
  - Side by side comparison of new data with original data was performed and results documented
- Results
  - Successfully qualified
  - Data had equal or better quality



# Recent Qualification Experience (Supplement 2 Phased Array Procedure)

- Changes required
  - Instrument
    - Tomo III to Z-Scan
      - Procedure was originally qualified using Tomoscan Focus system
  - Cabling
    - Connectors different between two systems, but same cable type was used
  - Analysis Software
    - Later version of software used, but utilized same analysis views and processes
      - Could read old data for direct comparison

# Recent Qualification Experience (Supplement 2 Phased Array Procedure)

- Extent of Qualification
  - Scanned at least one personnel test worth of data with new system (Detection, length and depth sizing)
    - ~15 flaws for detection and length
    - ~10 flaws for depths sizing
  - Side by side comparison of new data with original data was performed and results documented
- Results
  - Successfully qualified
  - Data had equal or better quality

# Recent Qualification Experience (Supplement 10 Phased Array Procedure)

- Changes required
  - Instruments
    - OmniScan to DYNARAY Lite or ZIRCON Systems
      - Multiple instruments
  - Cabling
    - Connectors different between various systems, but same cable type was used
    - Removed splitter cables allowing use of entire active aperture
  - Analysis Software
    - Later version of software used, but utilized same analysis views and processes
      - Could read old data for direct comparison
    - New Focal Law Calculator

# Recent Qualification Experience (Supplement 10 Phased Array Procedure)

- Extent of Qualification
  - Scanned at least one personnel test worth of data with new system (Detection, length and depth sizing)
    - ~15 to 20 flaws with both systems
  - Side by side comparison of new data with original data collected with each instrument was performed and results documented
- Results
  - Successfully qualified
  - Data had equal or better quality

# Summary

- Over the past several years, the PDI Program has been able to successfully demonstrate that various conventional and phased array ultrasonic systems can be configured to produce equivalent data
- PDI will continue to obtain additional ultrasonic data to use as validation that the equivalency of ultrasonic instruments and search units can be established through technical justification
- PDI wishes to implement Code Case N-780 and are developing internal instructions to control its use