SAND2014-18552PE

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Interim Storage Mock-Up

SNL&BAM S&T R&D Collaborative Workshop

October 8th, 2014

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

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Background

- Considerable work has been done on 304SS to demonstrate that it is susceptible to chloride induced stress corrosion cracking
- Work of particular relevance to interim storage relies on bend bars to provide the stress state
  - Is this representative?
  - What can these tell us and what are their limitations?
- Recall – SCC requires three things
  - Environment (EPRI work, etc.)
  - Susceptible material – Mockup (sensitization)
  - Stress – Mockup (weld residual stress)

Goals for a Mock Container

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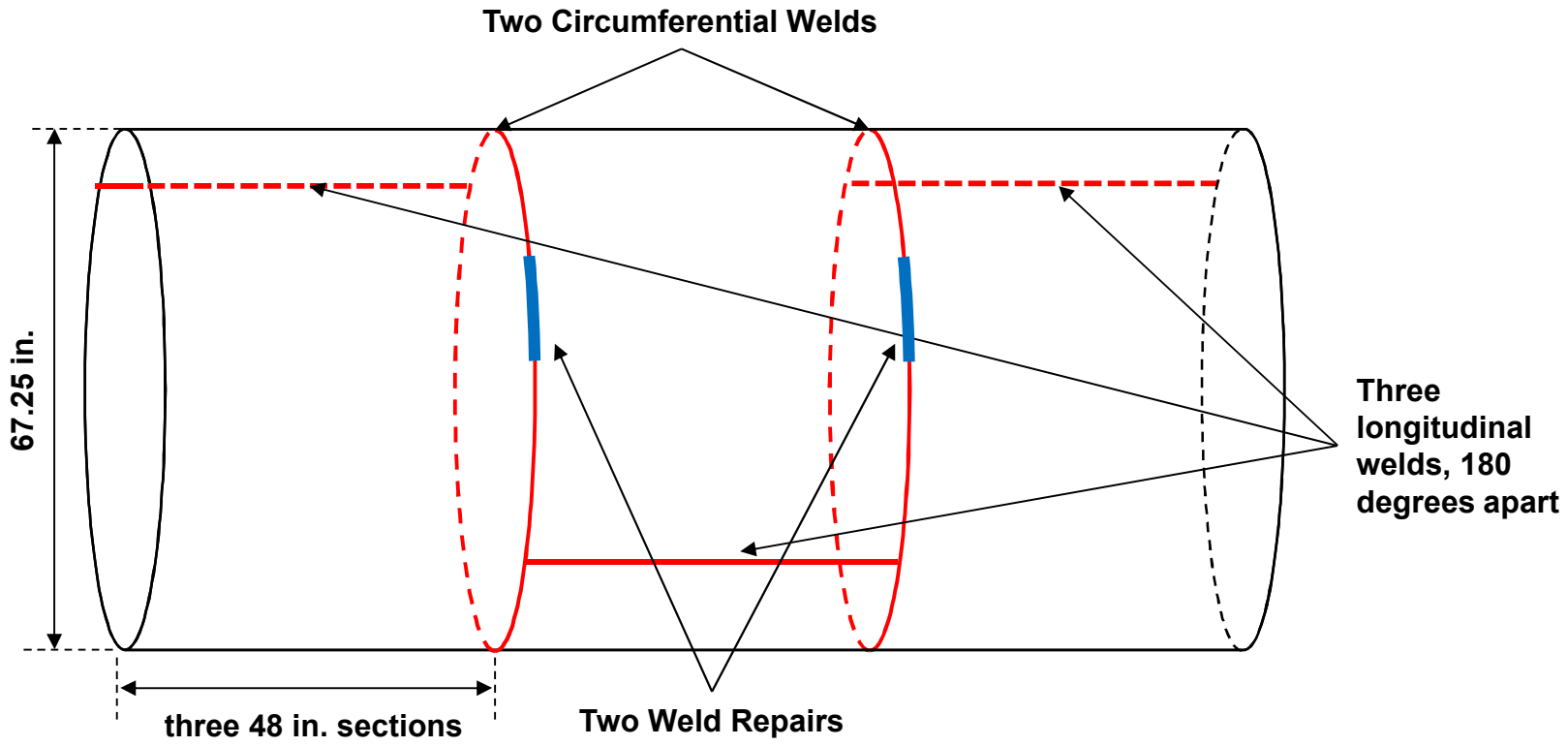
- Want to replicate fielded structures in order to assess the susceptibility stress corrosion cracking initiation and propagation
- Welding parameters, joint designs, etc. are all held proprietary by the vendors
- NEUP program (R. Ballinger, MIT) approached three vendors last year and received quotes from each of them for a basic mock-container design.
- We pursued the same three vendors, and made the decision to construct a mock-up based on the NUHOMS 24P design

Final Mock-Up Design

- Wall material: 304 SS
- Wall thickness, overall diameter, weld joint geometry: standard geometry for NUHOMS 24P
- Welds:
  - Specific design not specified by manufacturer.
  - Welds to be full penetration and inspected per ASME B&PVC Section III, Division 1, Subsection NB (full radiographic inspection)
  - Double-V joint design
  - Weld procedure: Submerged Arc

Final Mock-Up Design



- Weld repair regions were made intentionally and were subjected to the same volumetric inspection
  - Both the circumferential welds and the repairs were clear

Current Plans for the Mock-Up

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- What are we going to measure?
  - Weld residual stress state (deep hole drilling or neutron diffraction)
  - Extent of sensitization (electrochemical)
  - Baseline electrochemical testing
  - Stress corrosion cracking susceptibility

- What samples do we need to make?
  - Subdividing the mock-up will impact the stress state – need to determine how much
  - Sample geometry that we need?