

HIGH LEVEL WASTE/WASTE PROCESSING

PROJECT: Chemical Process Alternatives for Radioactive Waste. *Evaluation of Nonmetallic Components in the Hanford Waste Transfer System (WTS)*

CLIENT: U.S. Department of Energy (U.S. DOE)
PRINCIPAL INVESTIGATOR: Dr. Leonel Lagos
LOCATION: Miami, FL

Description:

Nonmetallic materials are used in U.S. DOE's Hanford Site Tank Farm WTS and include the inner primary hoses in the hose-in-hose transfer lines (HIHTLs), Garlock® gaskets, ethylene propylene diene monomer (EPDM) O-rings, and other nonmetallic materials. These nonmetallic materials are exposed to β and γ irradiation, caustic solutions as well as high temperatures and pressure stressors. How the nonmetallic components react to each of these stressors individually has been well established. However, simultaneous exposure of these stressors has not been evaluated and is of great concern to Hanford Site engineers. FIU-ARC engineers worked closely with key Hanford HLW personnel to develop an experimental test plan that determines how these nonmetallic components react to various simultaneous stressor exposures.

Objectives

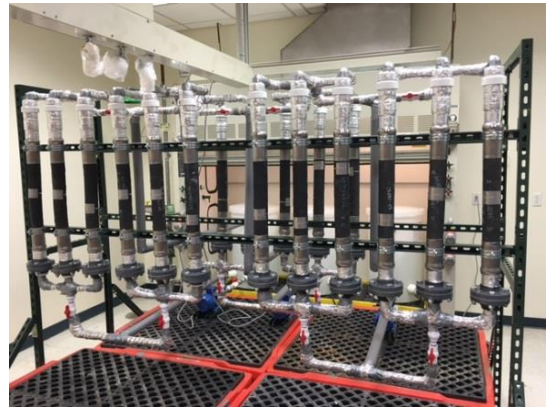
- Provide Hanford Site with data from testing hose-in-hose transfer lines, Garlock® gaskets and EPDM O-rings used in their tank farm WTS under various combinations of simultaneous stressor exposures of caustic solutions, high temperatures and high pressure.
- Evaluate baseline materials and compare with materials conditioned with the various stressors.

Benefits:

- Helps engineers understand how nonmetallic components of the tank farm WTS react to

simultaneous stressor exposures of caustic solutions, high temperatures and high pressure.

- Helps determine service life of WTS parts that contain nonmetallic components.
- Assists engineers with designing new transfer systems by establishing more detailed/accurate guidelines governing the life expectancy of the transfer system parts by ensuring that HLW tanks cannot be overfilled.

**Nonmetallic Aging Test Loop****Material Properties Test Coupons: EPDM (left) and Garlock® (right)****Accomplishments:**

- Completed design & fabrication of aging test loop.
- Completed design & fabrication of HIHTL blowout test apparatus.
- Manufactured material testing coupons.

ABOUT

Since 1995, the Applied Research Center at Florida International University has provided critical support to the Department of Energy's Office of Environmental Management mission of accelerated risk reduction and cleanup of the environmental legacy of the nation's nuclear weapons program. ARC's research performed under the DOE-FIU Cooperative Agreement (Contract # DE-EM0000598) can be classified as fundamental/basic, proof of principle, prototyping and laboratory experimentation.

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