

HIGH LEVEL WASTE/WASTE PROCESSING

PROJECT: Evaluation of Coatings and Development of a Deployment Coating Platform for the H-Canyon Exhaust Tunnel.

CLIENT: U.S. Department of Energy (U.S. DOE)
PRINCIPAL INVESTIGATOR: Dr. Leonel Lagos
LOCATION: Savannah River Site, SC

Description:

FIU's Applied Research Center (ARC) is supporting the U.S. Department of Energy's Savannah River Site with the evaluation of coatings and the development of a mobile platform for coatings application at the tunnel.

Inspections of the tunnel confirmed significant degradation of the HCAEX concrete walls that could potentially compromise the structure's stability. Hence, it is necessary for a coating to protect the degraded tunnel walls and extend its service life.

Objectives

- Develop and evaluate aged concrete surfaces similar to the degraded concrete walls of the HCAEX tunnel.
- Evaluate coatings, applied on aged and non-aged concrete surfaces, to select the suitable candidate.
- Develop and prototype an omnidirectional platform capable of traversing the HCAEX tunnel walls without damaging them further.
- Develop a deployment system that can be attached to the platform with the goal of applying a coating.

This task provides a means to develop and evaluate concrete and potential coatings through accelerated aging tests. Bench-scale testing allowed the development and evaluation of concrete surfaces similar to the tunnel, with exposed rebar, protruded aggregates and chemical damage. The "enhanced aging mode", combining the continuous exposure to nitric acid solution and erosion effect led to the highest deterioration. Further testing is necessary to select the best coating candidate to protect the tunnel walls.

This task also provides the site with the necessary technology to reach degraded areas in the tunnel and

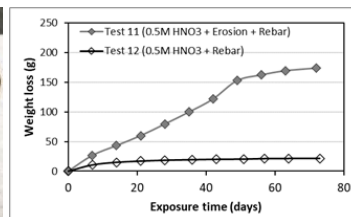
apply the selected coating with the goal of mitigating further damage to the HCAEX concrete walls.

Benefits:

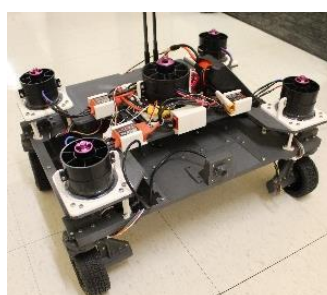
- Provide engineers with the necessary knowledge and lessons learned to develop and evaluate aged concrete surfaces and potential coatings under accelerated aging conditions.
- Provide the site with a viable technological solution capable of providing support to the ongoing activity of extending the work life of the HCAEX tunnel and maintain the current structural integrity of the infrastructure.

Accomplishments:

- Development and evaluation of aged and non-aged concrete surfaces and coatings via accelerated aging tests.
- Development and construction of a wheeled-based omnidirectional wall crawling platform capable of interacting with HCAEX walls in a nondestructive manner, while being remotely operated and equipped with environmental monitoring sensors.



Aged concrete with exposed rebar and aggregate protrusion-weight loss graph with and without erosion effect



Fully assembled wheel-based wall crawling platform with full scale testing being performed on degraded wall

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-EM0005213) can be classified as fundamental/basic, proof of principle, prototyping and laboratory experimentation.

Project Contact:

Dr. Dwayne McDaniel
Ph.: (305) 348-6554
Email: mcdaniel@fiu.edu
10555 W. Flagler Street, EC 2100
Miami, FL 33174
arc.fiu.edu