FIU | Applied Research Center
FLORIDA INTERNATIONAL UNIVERSITY

U.S. DEPARTMENT OF ENERGY

ENVIRONMENT & ENERGY / MECHANICS & MATERIALS

PROJECT: Pipeline Unplugging and Plug Prevention: *Development of Alternative Unplugging Technologies (Asynchronous Pulsing)*

CLIENT: U.S. Department of Energy
PRINCIPAL INVESTIGATOR: Dr. Leonel Lagos
LOCATION: Hanford Site, WA

Description:

FIU's Applied Research Center is assisting the Department of Energy objectives by developing novel pipeline unplugging technologies.

Availability of pipeline unplugging technologies is critical to the effort of cross-site HLW transfers through pipelines. In the past, some of the pipelines have plugged resulting in schedule delays and increased costs. Furthermore, pipeline plugging has been cited as one of the major issues that can result in unplanned outages at the Hanford WTP, causing inconsistent operation. Currently, there are no unplugging technologies qualified to be deployed at the sites should the plugging of a transfer line occur. In the past, a number of plug locating, and pipe unplugging technologies were demonstrated at FIU, which allowed down-selection of the most promising technologies that have potential for deployment. FIU has evaluated the lessons learned from the previous technology testing and has directed current efforts to developing new pipeline unplugging devices and methods that can assist site engineers when a plugging event occurs.

The overall objective of this task is to develop an alternative pipeline unplugging technique that meets DoE site requirements. The system being developed utilizes an asynchronous pulsing method to unplug pipelines. The Asynchronous Pulsing System (APS) will be optimally designed and evaluated to determine its effectiveness for operability and deployability at the sites.

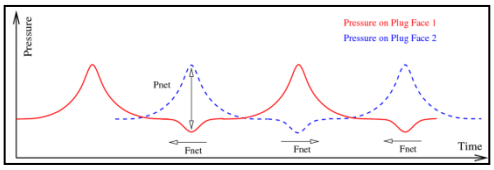
Benefits:

- Developing novel technologies and improving the "toolbox" for pipeline unplugging at the Hanford and Savannah River sites.
- Ensuring smooth operation of waste transfers and assisting tank farm engineers with meeting milestones.

Accomplishments:

- Designed and commissioned an asynchronous pulsing system (APS).
- Validated APS effectiveness over a range of frequencies and pressures using simulated plug material on both a bench-scale as well as an engineering scale loops.
- Developed a computational fluid dynamics (CFD) model derived from the method of characteristics that is capable of predicting pressure variations in a pipeline.
- Conducted experiments to determine the affect air in the pipeline has on the system's performance. Also developed entrapped air calibration curves.

(a)



(b)

Asynchronous Pulsing Method: (a) Principles of Operation (b) Engineering-Scale Test Bed for Asynchronous Pulsing

ABOUT

Since 1995, the Applied Research Center (ARC) at Florida International University (FIU) has provided critical support to the Department of Energy's Office of Environmental Management (DOE-EM) mission of accelerated risk reduction and cleanup of the environmental legacy of the nation's nuclear weapons program. ARC's applied research is performed under the DOE-FIU Cooperative Agreement (under Contract # DE-EM0000598) and provides technical support to DOE EM in the area of environmental remediation and STEM workforce development and training.

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