

PROJECT FACT SHEET

Design and Development of Innovative High-Level Waste Pipeline Unplugging Technologies (Peristaltic Crawler)

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

The U.S. DOE Hanford site has the largest number of High-Level Waste (HLW) storage tanks and the largest volume of HLW in the United States. The safe storage, retrieval, treatment, and disposal of approximately 53 million gallons of highly toxic, high-level radioactive waste stored in Hanford's 177 underground tanks are a national priority. Pipeline plugging has been cited as one of the major issues at can result in unplanned outages at the Hanford Waste Treatment & Immobilization Plant (WTP). The availability of a pipeline unplugging tool/ technology is crucial to ensuring efficient, continued operation of waste transfers at Hanford and helping them meet scheduled retrieval milestones. FIU has been tasked with developing new pipeline unplugging technologies that have the potential to efficiently remediate cross-line and transfer lines plugging incidents. One of these novel technologies is a peristaltic crawler.



(a) Peristaltic crawler unit, (b) inner bellow assembly (left) and outer bellow assembly (right)



Peristaltic crawler: (a) tether assembly (left) and reel system (right), (b) Peristaltic crawler performing an unplugging operation

Project Objectives

The objective of this task is to develop alternative pipeline unplugging technologies that meet DOE site requirements. To this end, FIU has implemented design improvements and experimentally tested a third generation crawler. The design improvements aim to overcome the limitations observed in the experimental testing of the first and second generation crawlers.

Project Benefits

Benefits of developing an in-situ peristaltic crawler for pipeline unplugging operations include:

- 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.

Project Accomplishments

- Reduction of the crawler's outer diameter and the use of an edge-welded bellow in the body assembly. This design improvement enables the unit to navigate through a 90° Victaulic® elbow.
- Design and testing of a 500 ft multi-line tether assembly. The tether holds the pneumatic, hydraulic and electrical lines that are used to provide power to the unit.
- Design and procurement of a tether-reel system.
- Evaluation of on-board control valve system. By placing the pneumatic valves close to the crawler unit, its navigational speed to the crawler significantly increases.