

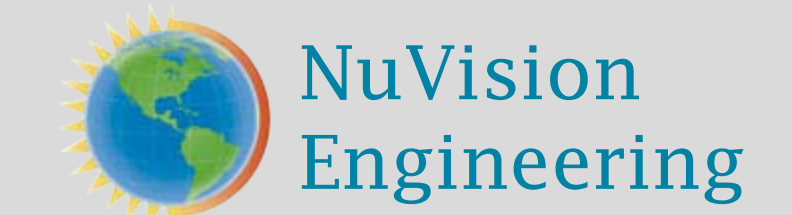


# Power Fluidics™: Improving the Efficiency of Enhanced Chemical Cleaning at the Savannah River Site



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## Introduction

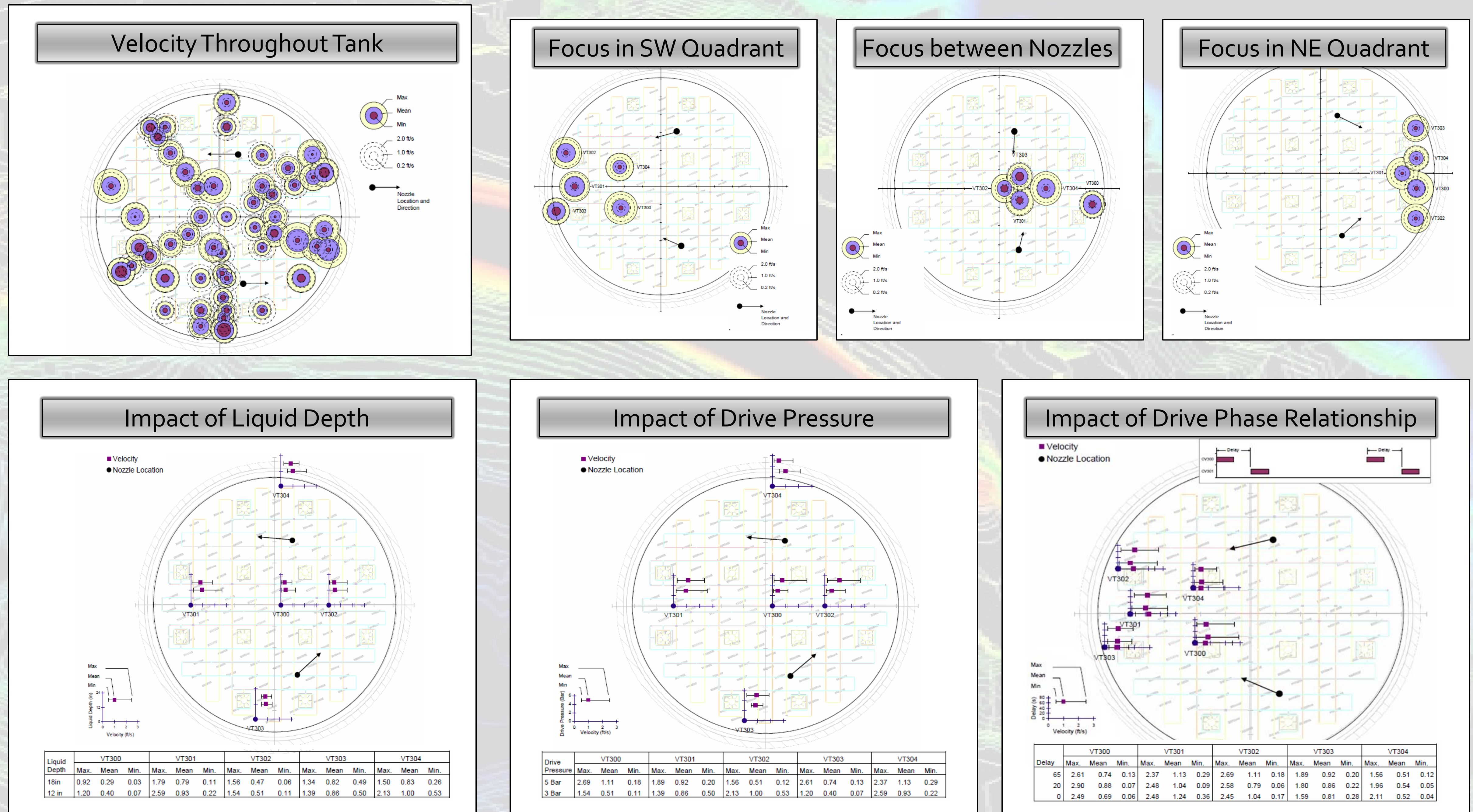
- The Savannah River Site currently performs chemical dissolution using a 5-wt% aqueous solution of oxalic acid to dissolve sludge and heel on the floor of the high level waste tanks.
- The aim of Enhanced Chemical Cleaning (ECC) is to achieve the same result using a 1-wt% solution of oxalic acid and less than 2 feet of liquid depth to reduce the oxalate burden on downstream waste processing systems, which results in costly and inefficient waste processing. [1]
- In order to fulfill ECC's aim of low liquid levels, standard slurry mixer pumps cannot be used as they cease operation when the liquid level drops in the tank below  $\approx 30"$ .

## Objective

- Design, build and test 80% scaled HLW tank including obstructions. 
- Achieve a scalar fluid velocity  $\geq 0.2$  ft/s, particularly in regions in close proximity to obstacles and the tank floor.
- Prove Power Fluidics™ system can be a viable option for enhancing mass transfer needed.
- Provide data necessary to develop technical and functional requirements.
- Represent a deployable system that is constrained by the location, number and size of the available risers in the candidate tanks.



## Test Campaigns



## Conclusion

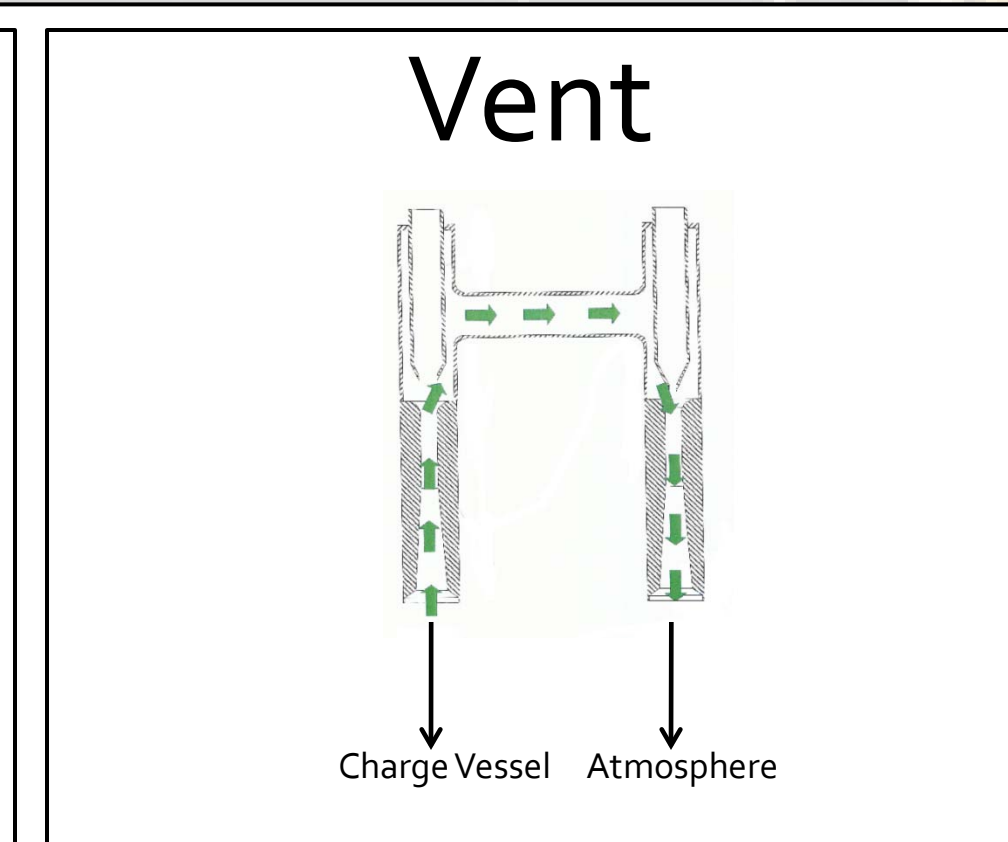
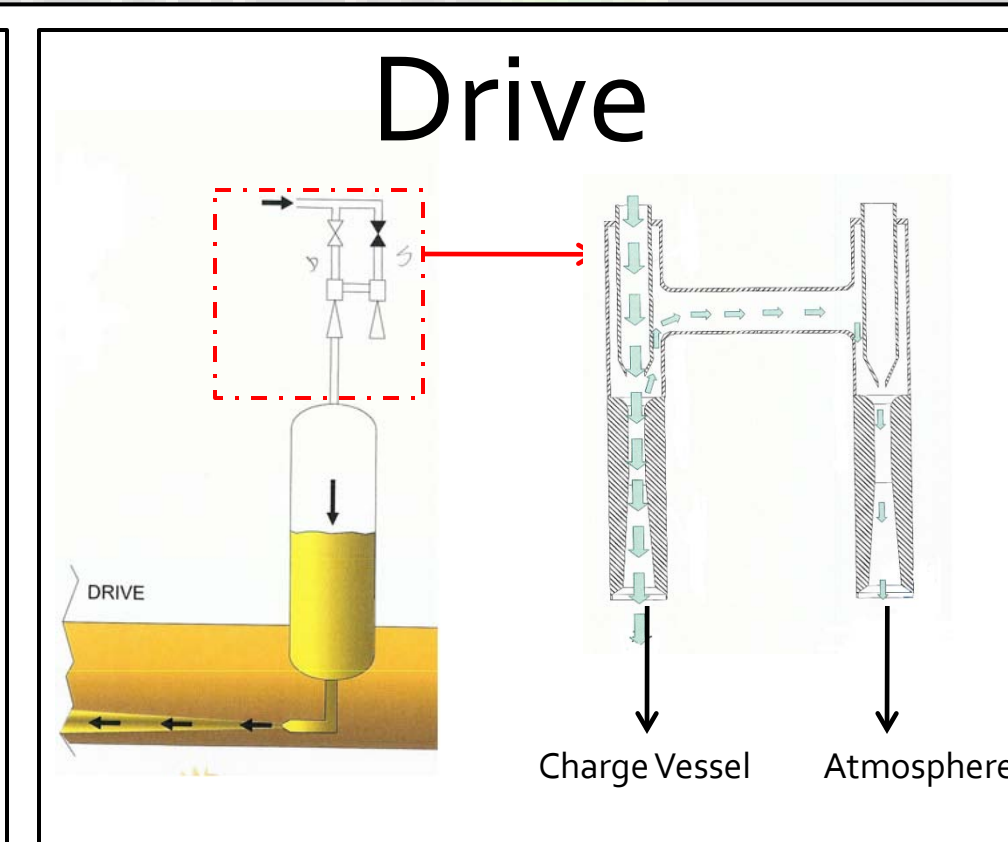
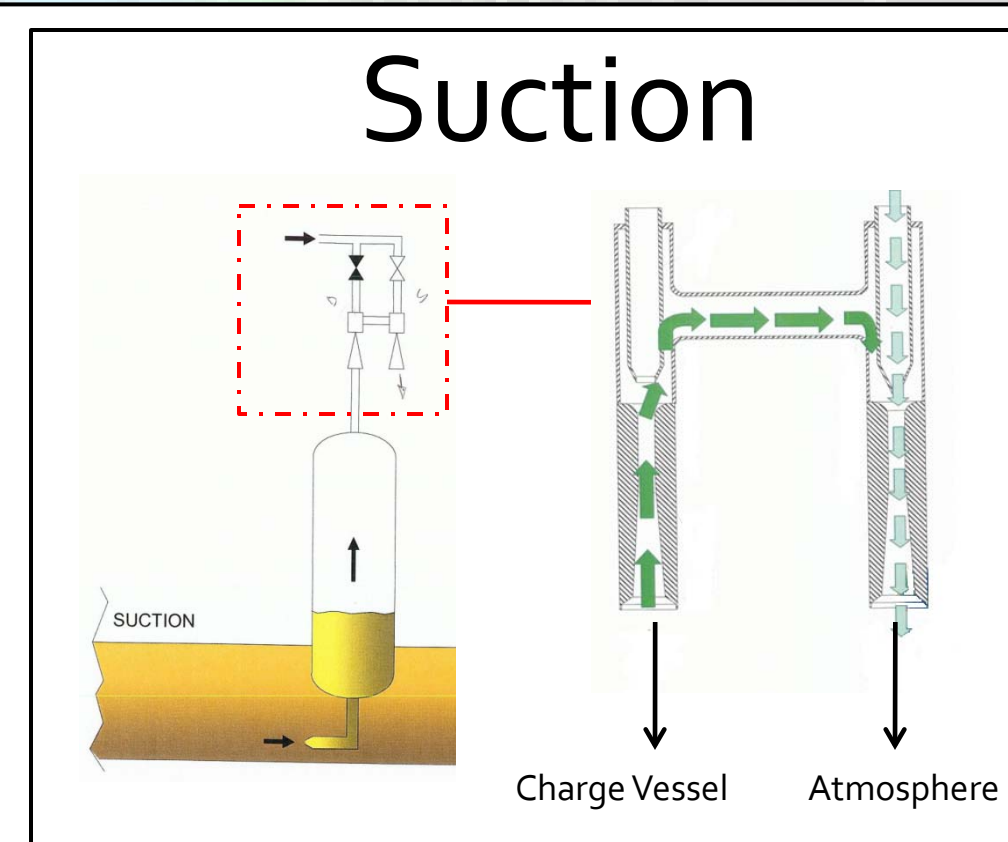
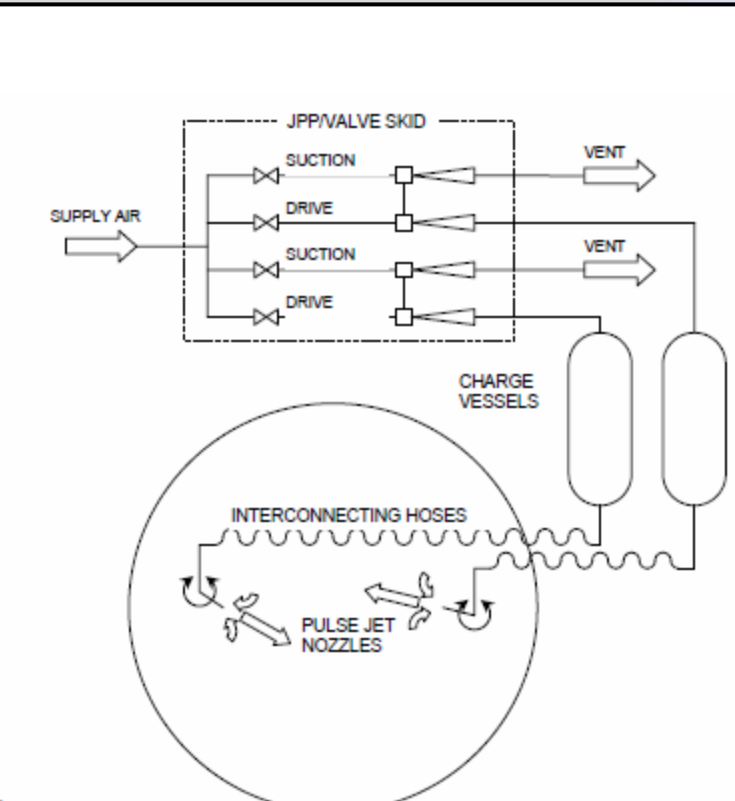
NVE has demonstrated a system that exceeds the key performance criteria set out by SRS/DOE while satisfying the design constraints of the number (two), size (24" diameter), and the location of available risers.

The system capabilities satisfy these statements:

- The system is capable of exceeding the primary criterion to achieve a 0.2 ft/s velocity at any location in the tank.
- The system is marginally capable of meeting the "stretch" criterion to achieve a 2 ft/s velocity at any location in the tank.



## Power Fluidics™ Jet Pump Pair



## References

- Test Report: "Demonstration of Power Fluidics™ Mixing Technology to Enhance Chemical Cleaning Operations in High Level Waste Tanks," NVE Document Number 2302-4-002.
- Memorandum: "Mixing Evaluation on a Type I Waste Tank", August 6, 2008, T. Caldwell, Liquid Waste Operations Division, Engineering Department, Technology Development Group, Washington Savannah River.

## Acknowledgments

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