

An Innovative Approach to Sludge Retrieval from Containers at K Basin

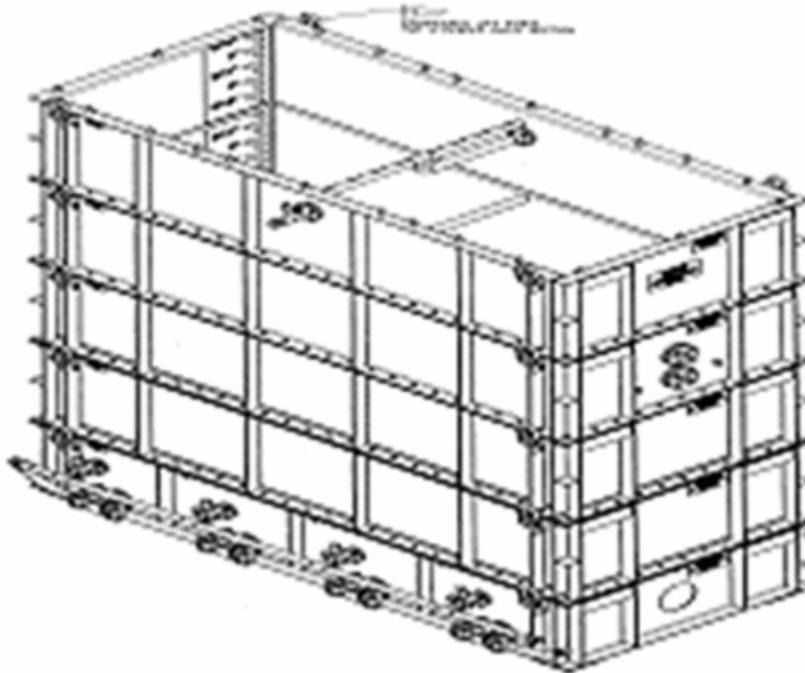
Technical Exchange Nov 15 - 18, 2010, Atlanta, GA

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Overview and Summary

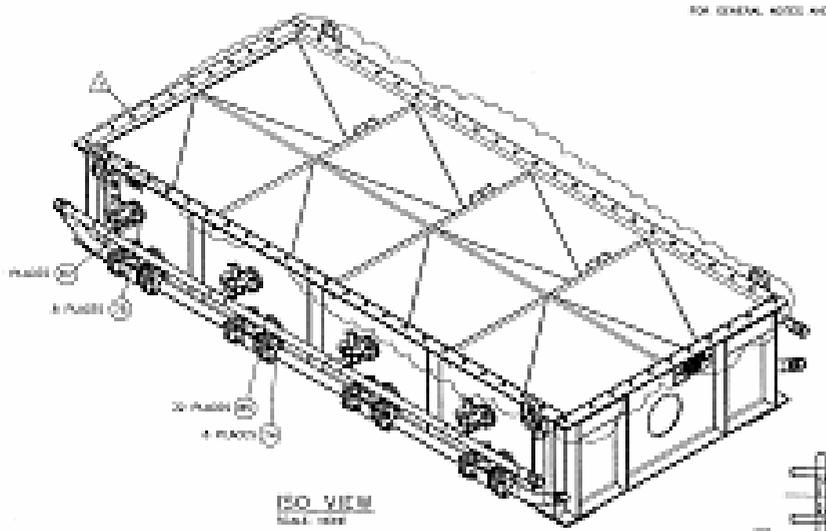
- ❑ NuVision Engineering has successfully demonstrated through proof-of-principle trials and prototypic testing, an alternative approach to sludge retrieval from the top of K basin containers
- ❑ The approach is based on proprietary technology from the UK
- ❑ Full scale mock-up technology testing scheduled for late 2010 / early 2011
- ❑ Excellent example of
 - ❑ fast paced teamwork between NuVision Engineering, EM and the site contractor, CH2M Hill Plateau Remediation Co
 - ❑ the advantages of applied R&D

The Challenge



- 6 Containers – 8 compartments
- ☉ overall 12 ft x 6 ft x 13 ft deep
- Baseline method of sludge retrieval relied upon manifolded arrangement connected to a centrifugal pump – Sludge removed from base of container
- Objective of this work is to provide and demonstrate an alternate method of emptying the K- Basin Sludge from the top of the containers

The Challenge



GA of Tank Base



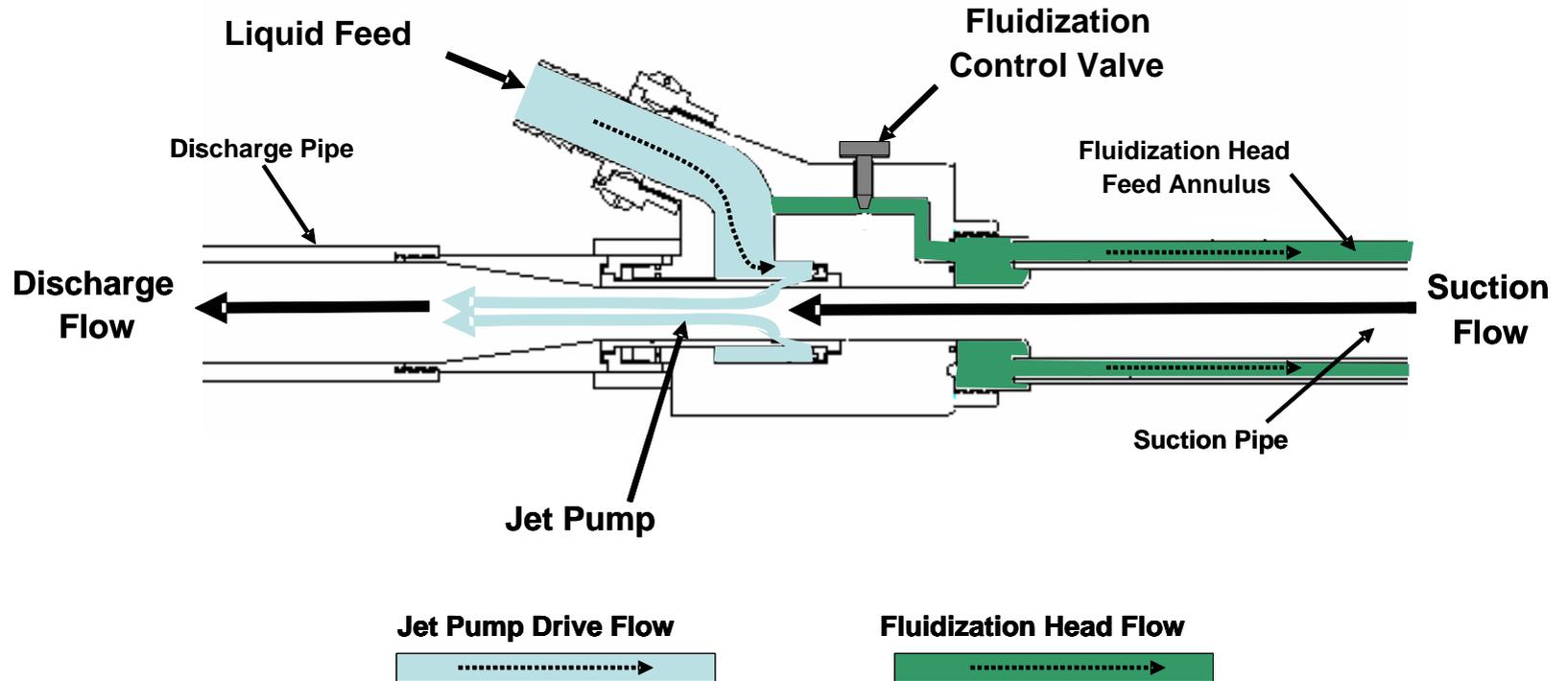
Plan view of one of eight compartments

Test and Demonstration Program

- ❑ Proof of Principle Trials
 - ❑ Use available “Shop Test Unit” and single supply feed

- ❑ Prototypical Trials
 - ❑ Redesigned retrieval system
 - ❑ Prototypical Simulants
 - ❑ MASF testing to support TRL level 3 determination
 - ❑ Additional testing to TRL level 6 with refined objectives

Top retrieval unit - HydroLance

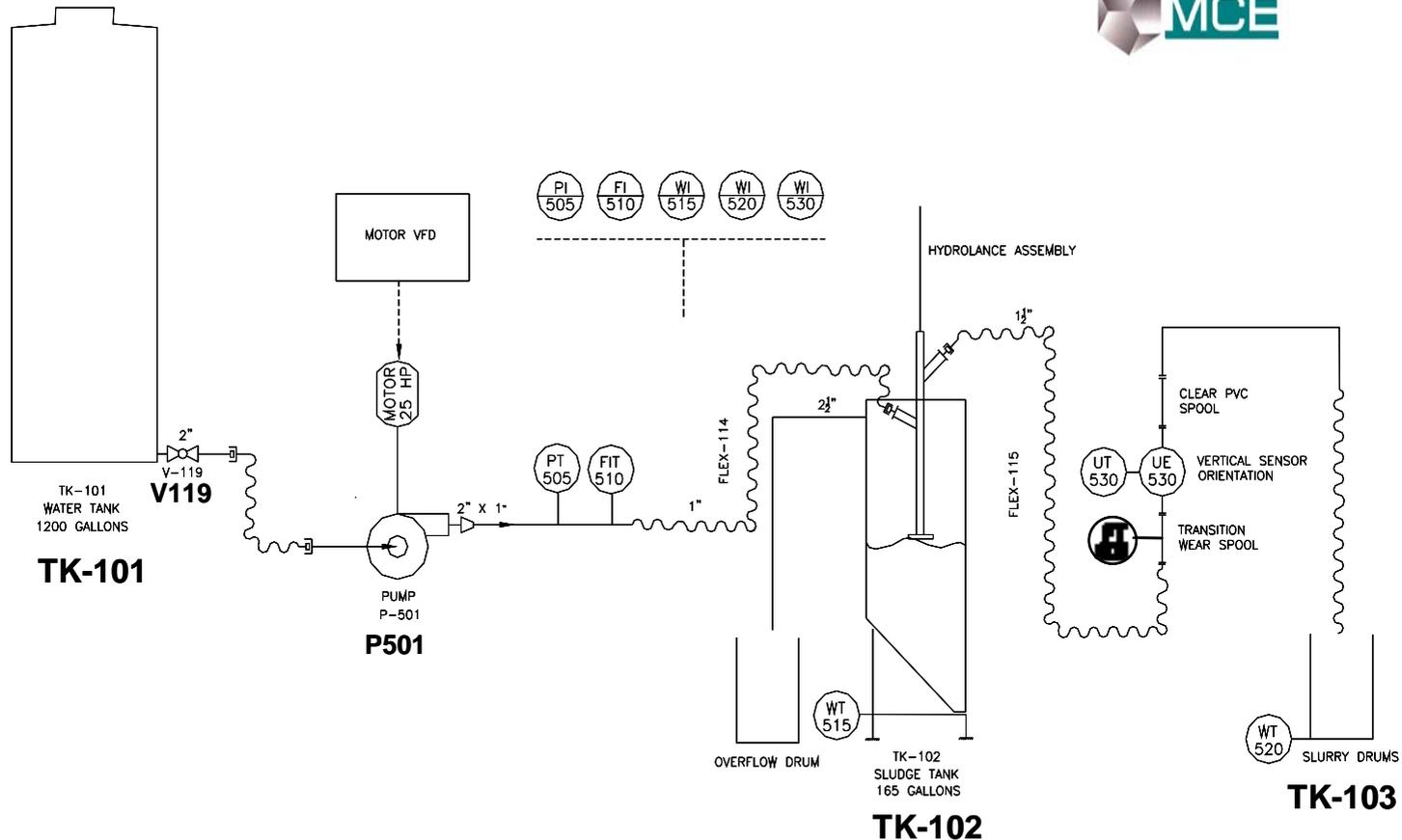


Benefits of HydroLance

- Focused “zone of influence”
 - Mobilization and retrieval using minimum water
 - Independently adjustable mobilization and eductor suction flows*
- Demonstrated ability to handle high solids concentration without blocking or loss of performance
- Simple construction allows fabrication from materials with higher erosion resistance

*Purpose built unit used for Prototype trials

Proof of Principle Trials



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Proof of Principle Trials



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Proof of Principle Trials

- The proof-of-principle trials confirmed that the available “shop test unit” HydroLance was capable of acceptable levels of retrieval and transfer of sand slurry at an acceptable mass dilution ratio.
- Lessons learned carried into the prototypic system

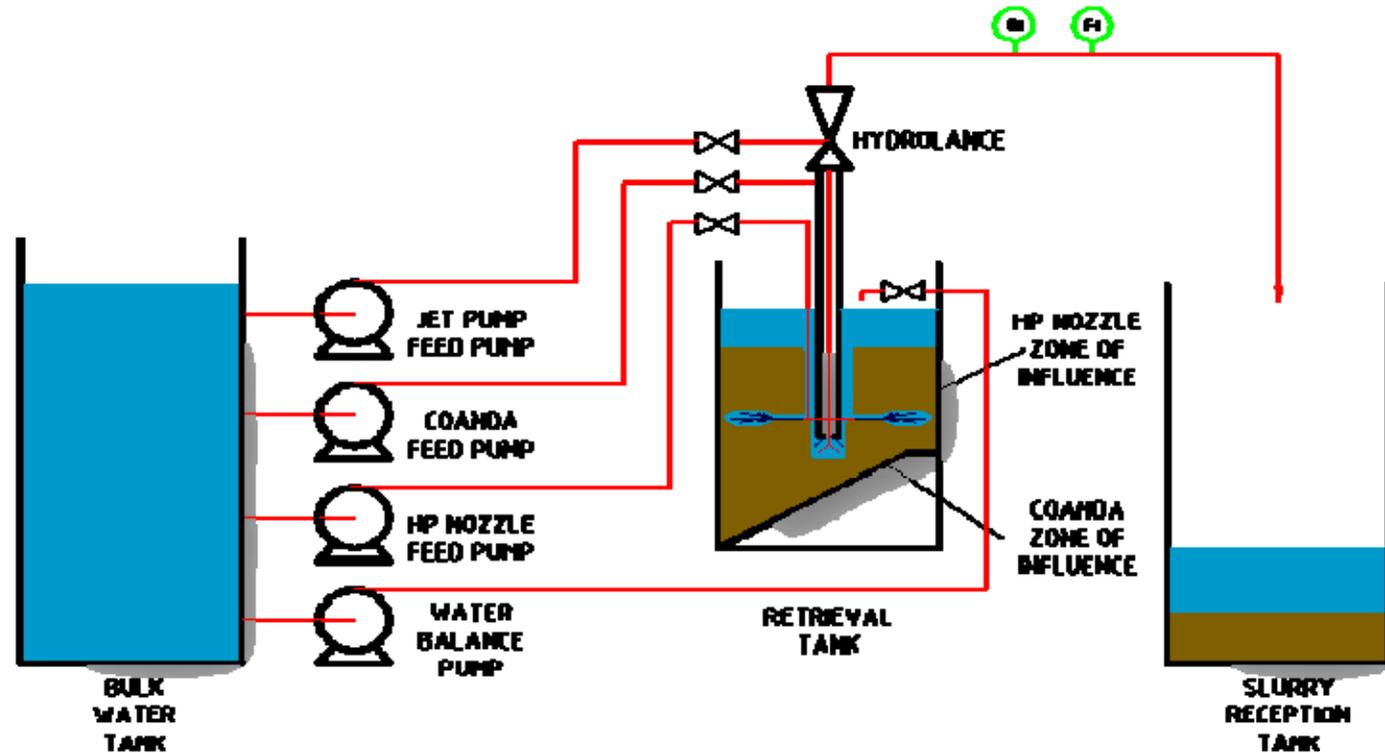
Proof of Principle Trials

- Although shown to provide successful transfer of sand slurry, the zone of influence of the proof-of-principle HydroLance units fluidization head needs to be increased to meet the container simulant requirements.
- Final proof-of-principle trials confirmed that modifications to the HydroLance fluidization head would provide significant performance improvements.
- The HydroLance, fitted with the Coanda fluidization head, was capable of picking up and delivering 100% of the largest and heaviest tungsten components used in the container simulant formula.

Prototypical Trials

- ❑ Goal was TRL-3
- ❑ Equipment development trials using CHPRC provided simulant based upon the results of the POP trials
- ❑ Equipment fabrication – Independent feeds
- ❑ New pumps/variable speed drive skids
- ❑ Testing at the MASF facility conducted by CHPRC with technical support from NVE team
- ❑ Initial trials conducted on K-Basin simulant, trials extended to cover settler sludge as a second simulant

Prototypical Trials



Prototypical Trials



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Prototypical Trials



Coanda head – Mobilization Flow

Prototypical Trials



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Prototypical Trials



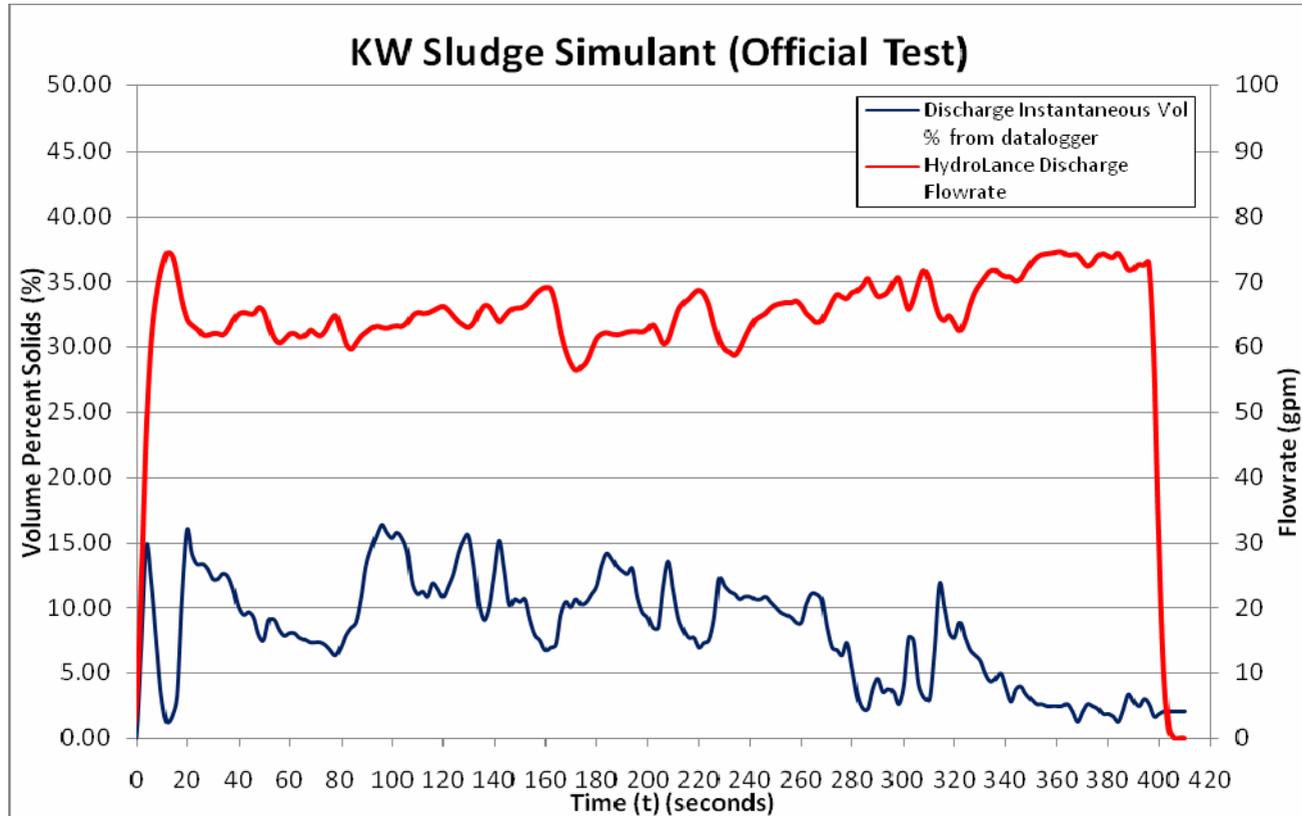
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Prototypical Trials



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Prototypical Trials



Prototypical Trials

- Results:
- In the case of the system performance with container sludge simulant, the minimum volume percent criterion of 5 was successfully achieved. The average concentration achieved was 10.3 volume percent.

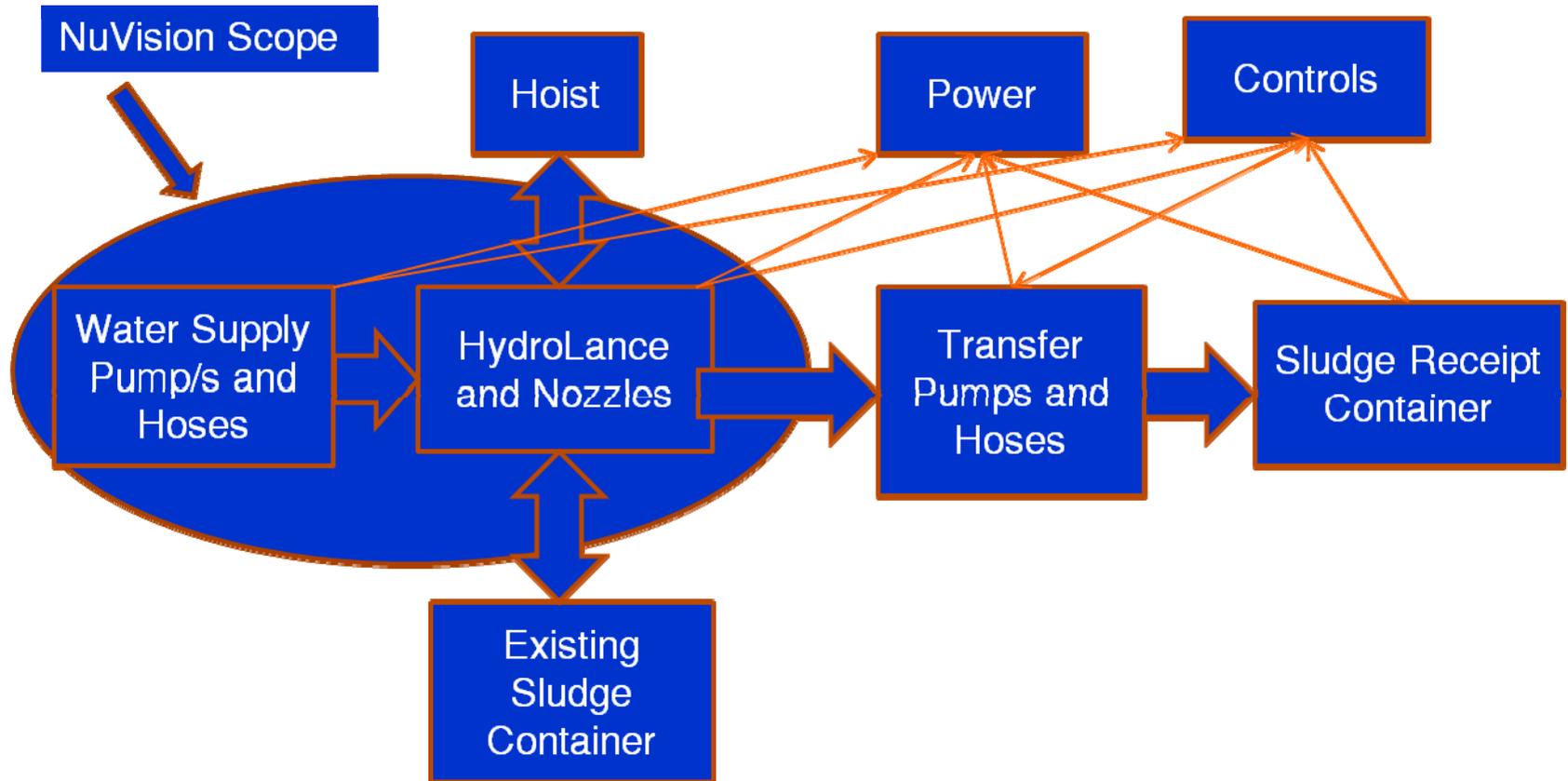
Prototypical Trials

- For the system performance with Settler Tank sludge simulant the target 5% average volume percent was 90% achieved.
- The narrow margin by which the target was missed and analysis of the concentration vs. time profile during the test indicates that the fluidization and retrieval concept utilized by the HydroLance is suitable for use with the Settler Sludge.
- The conclusion was that by optimizing the method of operation and integration of the HydroLance into an engineered retrieval system the target 5% can be met.

Current Work Overview

- Design and Fabrication of more prototypical system, building on lessons learned and results from previous testing
- Transition from EM funding to Contractor funding
- Proceeding to TRL-6 testing
- Full Scale mock up at MASF

Current Work Overview

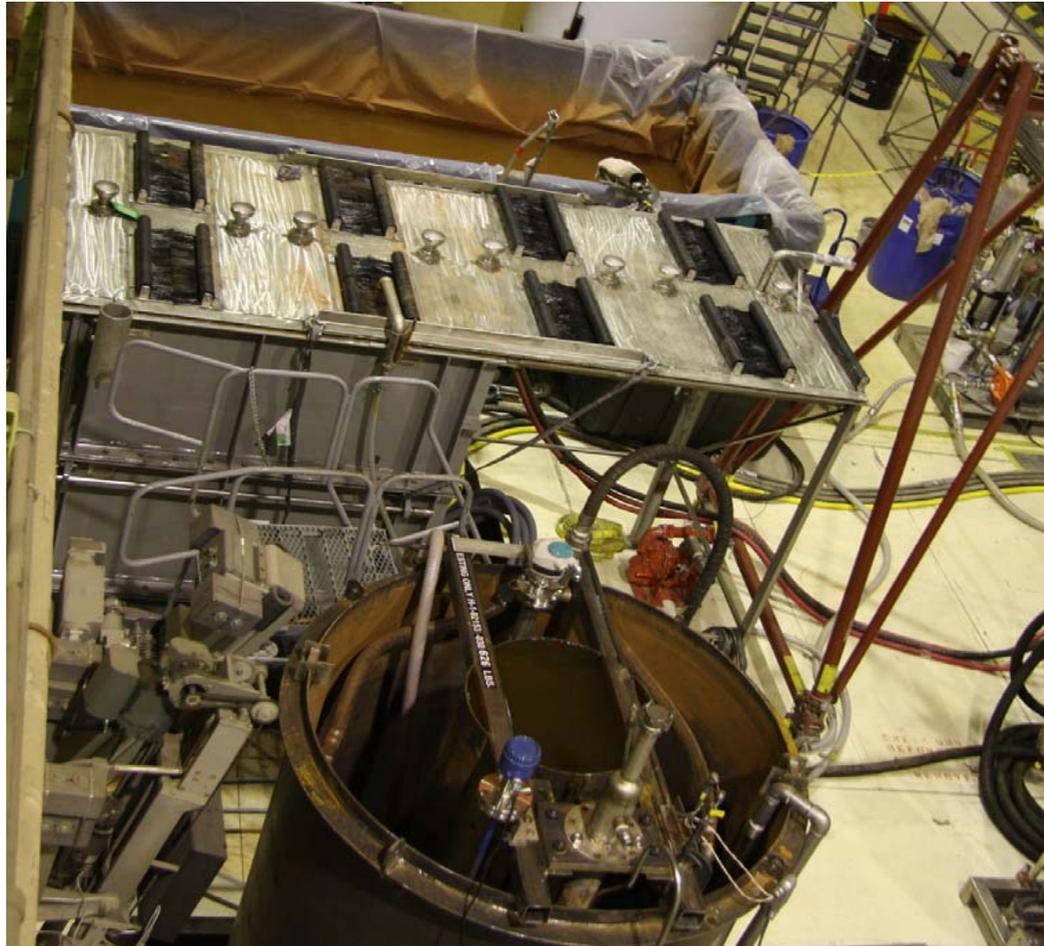


Current Work Overview



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Future work – Program plan

- Support to TRL-6 testing
- On call technical support
- Final design
- Fabrication and FAT testing
- Support to Operations

Potential Applications

- Sludge retrieval from basins or tanks
 - Minimization of water addition
 - STSC (Storage Containers)
- Sludge mobilization and washing
 - Utilize the eductor to retrieve solids while washing solids in the mixer tube
- End effector on MARS arm (WRPS, EM Funded)

Contact Details

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