**Department Of Energy (DOE) Pipeline Unplugging Requirements**

**Pipelines used to transport radioactive waste**

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### AVAILABLE PIPELINE UNPLUGGING METHODS

**NuVision Engineering**

NuVision’s technology acts as an ocean wave on the beach erosion. It can operate on a long pipeline that has multiple blockages, including a slurry of heavy metals, to transport clean and radioactive liquids and solids. This sonic resonance travels through the water stream and transfers vibration to both the pipe and the blockage.

**AEMM Technology’s Hydrokinetic™**

The Hydrokinetic™ process uses a sonic resonance with cleaning water that moves through the water stream and transfers vibration to both the pipe and the blockage.

**AquaMiser**

The Aqua Miser line of water blasting equipment combines 15,000 to 40,000 psi water injection at a high rate in their pipes for this purpose. Due to high levels of radiation the pipes are difficult to access for maintenance or unplugging. Plugging of the pipes creates a difficult and hazardous problem to correct.

### METHODS USED AT DOE SITES

**INL:** Hydro pneumatic rooter (hydrojet) high pressure flushing, chemical dissolution

**Hanford:** Plugged pipelines are abandoned

**SRS:** Hydrojet (high pressure hose placed in pipe)

### WHY DO THESE PIPELINES PLUG

Numerous causes include:

- **Settling of solids because the flow rate was too low or the solids volume fraction was too high**
- **Operational upsets – Interruption of the waste tank, inadvertent entrainment of solids in the feed,** and changes in the environmental temperature.
- **Chemical instability – precipitation, gel formation, or other transformations due to temperature changes**
- **Safety – Hazards to workers (pressure, temperature, moving equipment), ent, and changes in the environmental temperature**
- **Compatibility with current systems – Corrosion, utilities, isolation of systems, new flanges needed**
- **Operability – How complex, flexible (adapt to various systems), easy to operate**
- **Maintainability – Easiness to maintain, parts availability**

### CRITERIA OR REQUIREMENTS THAT NEW METHODS MUST MEET TO BE USED AT DOE SITES

- **Pressure requirements:** The maximum pressure allowed at Hanford site is about 350 psi. The pressure allowed at INL is 200 psi (full line pressure).
- **Training of personnel:** Training should be easy; simple is better, site specific training should be identified.
- **Environmental:** Determine the volume of waste and waste characteristics.
- **Safety:** Hazards to workers (pressure, temperature, moving equipment), radiation/contamination concerns.
- **Compatibility with current systems:** Corrosion, utilities, isolation of systems, new flanges needed.
- **Operability:** How complex, flexible (adapt to various systems), easy to operate.
- **Reliability:** Works consistently.
- **Maintainability:** Easiness to maintain, parts availability.

### Evaluation criteria/requirements for tank farm pipeline unplugging:

<table>
<thead>
<tr>
<th>Evaluation criteria/requirements for tank farm pipeline unplugging</th>
<th>Rank</th>
<th>Weight (out of 5)</th>
<th>Total (Rank x Weight)</th>
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<tbody>
<tr>
<td>Safety</td>
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<td>Operability</td>
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</tbody>
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The criteria on the table above were ranked and weighted as high-to-low in importance to the Savannah River Site Liquid Waste Operations with input from the LW Structural Integrity engineering group.