

PNNL Impact on Hanford Cleanup:

S&T Underpinnings of Hanford Tank Waste Treatment

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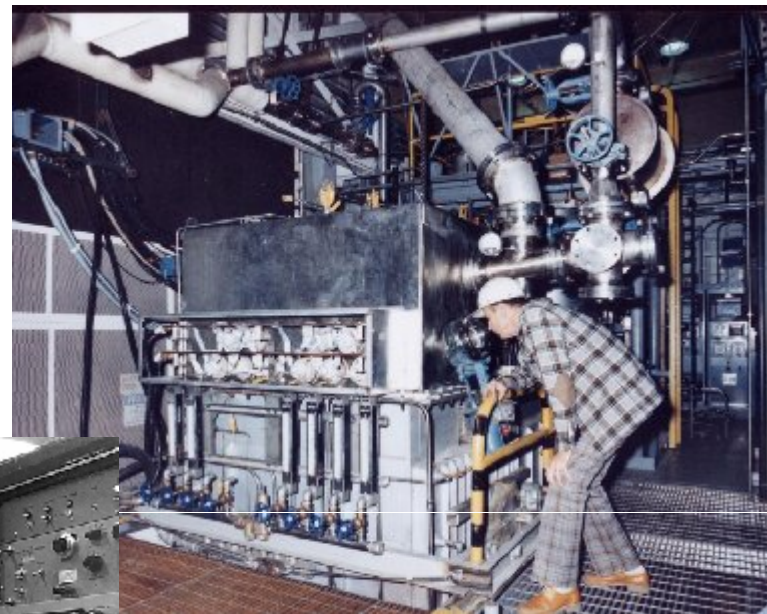
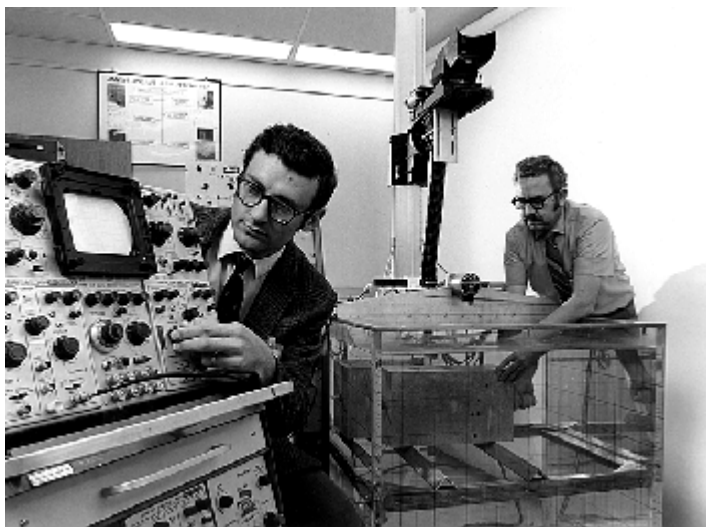


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Pacific Northwest National Laboratory Chemical and Nuclear Processing

- ▶ PNNL foundation in nuclear chemistry & processing
 - Nuclear fuels and materials
 - Chemistry of nuclear processing
 - Process development and scaling




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Chemical and Nuclear Processing

Scaled-testing and integrated modeling underpin process development

- ▶ Science base in chemistry and materials
- ▶ Radioactive waste testing (lab-scale)
- ▶ Scaled testing – bench and pilot
- ▶ Process simulation

Example:

Waste Treatment Plant Leaching & Filtration

Unproven performance of WTP leaching and filtration at scale

- ▶ Extensive laboratory characterization of range of tank wastes
- ▶ Laboratory-scale testing of WTP process flowsheet with actual wastes
- ▶ Simulant development and process testing at lab and bench-scales
- ▶ Engineering-scale simulant testing with PEP



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Example:

WTP Slurry Transport, Piping, and Mixing

Developed technical basis, foundation for WTP design and operations

- ▶ Technical basis for tank waste property variability (e.g., rheology, particle size distribution)
- ▶ Newtonian and non-Newtonian slurry behavior
 - Transport – piping design and operating basis
 - Non-steady state mixing in process vessels

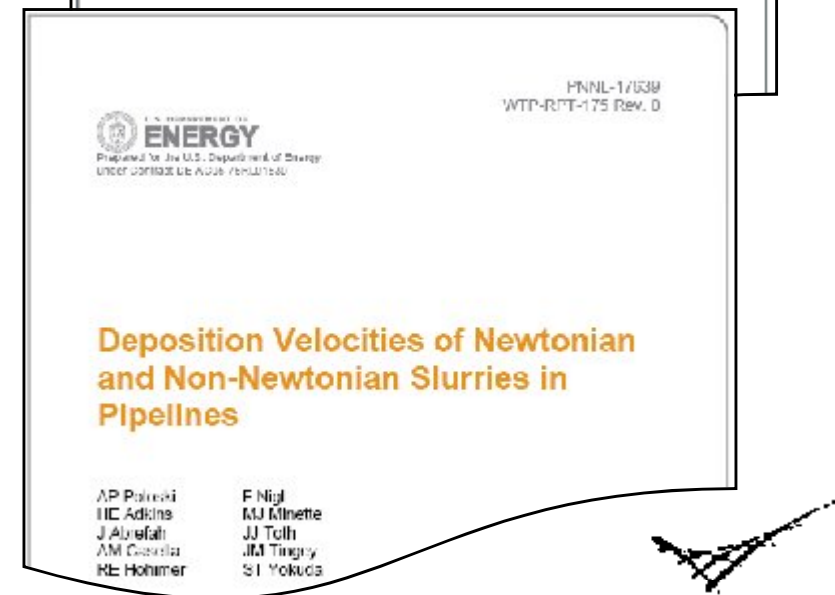
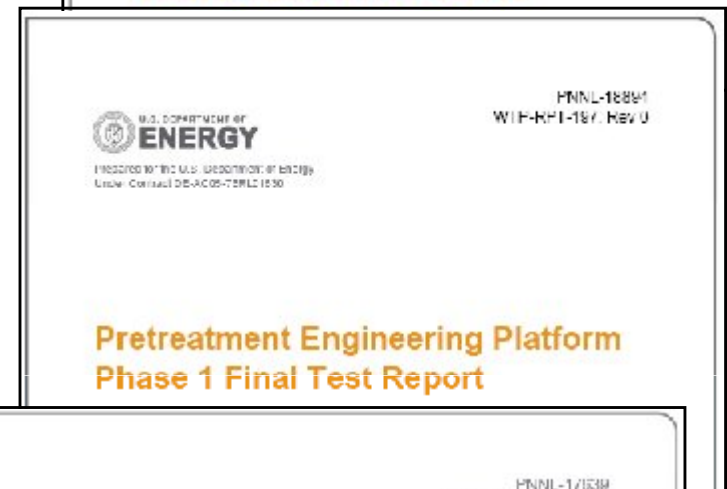
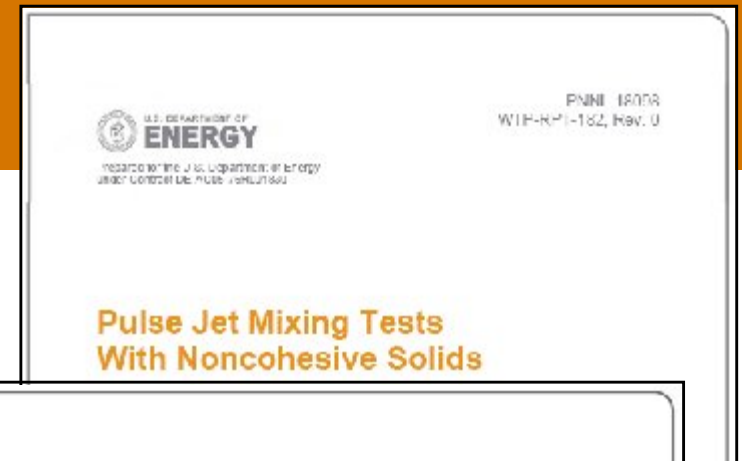


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Summary

- ▶ PNNL science and engineering expertise in chemistry, materials, and process scaling
 - Rooted in laboratories historic role at Hanford
 - Renewed through DOE Office of Science, Nuclear Energy, and Environmental Management R&D
 - Underpins key decisions on tank waste treatment process design and future WTP operations
 - Reducing uncertainty in waste treatment process design and risk to future operations
 - Partnered with DOE and contractors to address EM's most complex waste processing challenges



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