

## ORP Glass Science Communication Tool

ORP Glass Science Activity		Program Objective	Impact or Desired Result on the Mission
1.	Improved waste loading in LAW	Reduce LAW glass mass over RPP mission	<ul style="list-style-type: none"> <li>• Eliminate need or reduce scale of SLAW facility</li> <li>• Reduce mission schedule</li> <li>• Reduce Live Cycle Cost</li> </ul>
1a.	Improve SO <sub>3</sub> & halide loading in LAW glass		
1b.	Improve Na <sub>2</sub> O & K <sub>2</sub> O loading in LAW glass		
1c.	Replace VHT constraint		
2.	Improve Tc retention in melt	Reduce need to recycle off-gas scrub solution	<ul style="list-style-type: none"> <li>• Simply RPP flowsheet</li> <li>• Reduce mission schedule/LCC</li> <li>• Eliminate need for SLAW facility</li> <li>• Disposition Tc with HLW</li> <li>• Reduce challenge and uncertainty in IDF PA</li> </ul>
2a.	Improve single-pass retention by controlling feed chemistry		
2b.	Incorporate Tc in mineral phases to improve single-pass retention		
3.	Improve waste loading in HLW	Reduce HLW glass mass over RPP mission	<ul style="list-style-type: none"> <li>• Eliminate need or reduce process requirements in PT</li> <li>• Reduce mission schedule</li> <li>• Reduce LCC</li> </ul>
3a.	Develop and demonstrate high waste loaded glasses for wastes high in Al, Fe, Bi, Cr, S, Ni, and Th		
3b.	Develop nepheline model for high Al <sub>2</sub> O <sub>3</sub> glass		
3c.	Develop spinel accumulation model		
3d.	Develop sulfate salt accumulation model		

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4.	Improve HLW melter feed reaction chemistry	Improve process efficiency	<ul style="list-style-type: none"> <li>• Eliminate process upsets and melter down-time</li> <li>• Improve melting efficiency</li> <li>• Reduce mission schedule/LCC</li> </ul>
4a.	Understand complex cold-cap reactions		
4b.	Develop and VV melter model		
4c.	Incorporate cold-cap reactions in melter model		
4d.	Optimize melter feed formulation		
5.	Expand glass property models and algorithms for plant operation	Implement glass improvements in plant operations	<ul style="list-style-type: none"> <li>• Improve waste loading</li> <li>• Reduce mission schedule/LCC</li> <li>• Reduce PT design criteria</li> <li>• Reduce need for SLAW facility</li> </ul>
5a.	Develop and VV LAW glass property models		
5b.	Update and VV ILAW formulation algorithm		
5c.	Develop and VV HLW glass property models		
5d.	Update and VV IHLW formulation algorithm		
6.	Develop mission planning glass models	Enable realistic predictions of vitrification capabilities over RPP mission	<ul style="list-style-type: none"> <li>• All DOE to make rational informed decisions on process and plant requirements</li> <li>• Predict RPP system performance/LCC</li> </ul>
6a.	Develop/update LAW loading models		
6b.	Develop/update HLW loading models		
6c.	Evaluate impacts of improved models on mission assumptions		

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7.	Develop design data for WTP	Improve contractor design assumptions where over conservatism is likely	<ul style="list-style-type: none"> <li>• Reduce conservatism in plant design</li> <li>• Reduce construction cost</li> <li>• Increase plant throughput</li> <li>• Reduce RPP system performance/LCC</li> </ul>
7a.	Thermal properties		
7b.	Melter split factors		
7c.	Second generation melter design		
7d.	Off-gas system performance		
7e.	Melter system performance		
7f.	Feed system performance		