



***Hanford River Protection Project  
Low Activity Waste Treatment  
Business Case Study and  
Technology Readiness Assessment***

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*Tank Waste Committee Meeting  
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U.S. Department of Energy



**Office of River Protection**

# Purpose of Business Case Study

- Requested by EM-1
- Provides response to GAO report
- Compare various combinations of LAW treatment technologies
- Evaluate cost, technology readiness, and advantages/disadvantages

# Why conduct Technology Readiness Assessment (TRA)?

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- Provide information for DOE EM management to assess adequacy of technology in design/construction projects
- TRA process is structured
- TRA process developed by NASA
- Congressionally mandatory for DOD
- GAO recommending TRA process to DOE

*“GAO recommends that DOE develop a consistent approach for measuring the readiness of critical project technologies. DOE supports GAO’s recommendations but suggested revisions to allow it to first conduct a pilot application on selected projects to better understand the process and evaluate its potential use.” GAO-07-336*

# LAW Treatment Business Cases

Table 1. Summary Overview of the LAW Business Cases

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Business Case		Supplemental LAW Immobilization	LAW Immobilization Duration (Years)		Early LAW Immobilization	TF-Based Pretreatment
			HLW	LAW		
1	A	None	60	60	No	No
	B	None	27	60	No	No
2		2 <sup>nd</sup> LAW	27	27	No	No
3		BV	27	27	No	No
4		CS	27	27	No	No
5		SR	27	27	No	No
6		BV (200 E & 200 W)	27	32	Yes	Yes
7		BV with LAW First	27	32	Yes	Yes

# Technology Readiness Assessment

- Critical Technology Elements (CTEs) identified.
- Assess TRLs for each CTE
- Assess Advancement Degree of Difficulty (AD2) for TRLs below 6.

## Critical Technology Elements Evaluated in Study

### Supplemental Pretreatment

- Microfiltration
- Cross Flow Filtration
- Ion Exchange
- Fractional Crystallization
- Selective Dissolution
- NaOH Recovery and Recycle

Note: WTP TRLs were developed in a previous ORP study and used in this study's business case analyses.

### Supplemental Immobilization

- Bulk Vitrification
  - Feed receipt and preparation
  - Glass melting
  - Off-gas
  - Container closure/handling
- Steam Reforming
  - Feed receipt and preparation
  - Calcination
  - Off-gas
  - Container closure and handling
- Cast Stone/Grout
  - Feed receipt and preparation
  - Mixing/Curing
  - Container closure and handling

# Technology Readiness Level Scale

System Operations	TRL 9	Actual equipment/process successfully operated in the operational environment (Hot Operations)
System Commissioning	TRL 8	Actual equipment/process successfully operated in a limited operational environment (Hot Commissioning)
	TRL 7	Actual equipment system/process system successfully operated in the expected operational environment (Cold Commissioning)
Technology Demonstration	TRL 6	<i>Prototypical equipment/process system demonstrated in a relevant environment (Cold Engineering Scale Pilot Plant)</i>
	TRL 5	Bench scale equipment/process system demonstrated in a relevant environment
Technology Development	TRL 4	Laboratory testing of similar equipment systems completed in a simulated environment.
	TRL 3	Equipment and Process analysis and proof of concept demonstrated in a simulated environment
Research to Prove Feasibility	TRL 2	Equipment and process concept formulated
Basic Technology Research	TRL 1	Basic process technology principles observed and reported

**TRL 6 normally required for incorporation of technology into design**

# Report Status

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- Technology Readiness Assessments Complete
- Business Case Study EM-1 Review Complete
  - Independent Expert Review
  - Disposition Comments
- Present Comment Resolution to EM-1
- Release Business Case and TRA Reports in November 2007