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Analysis of Supplemental Treatment Approaches for Low-Activity Waste at the Hanford Nuclear Reservation

Overview and Conclusions

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PRE-DECISIONAL

Overview

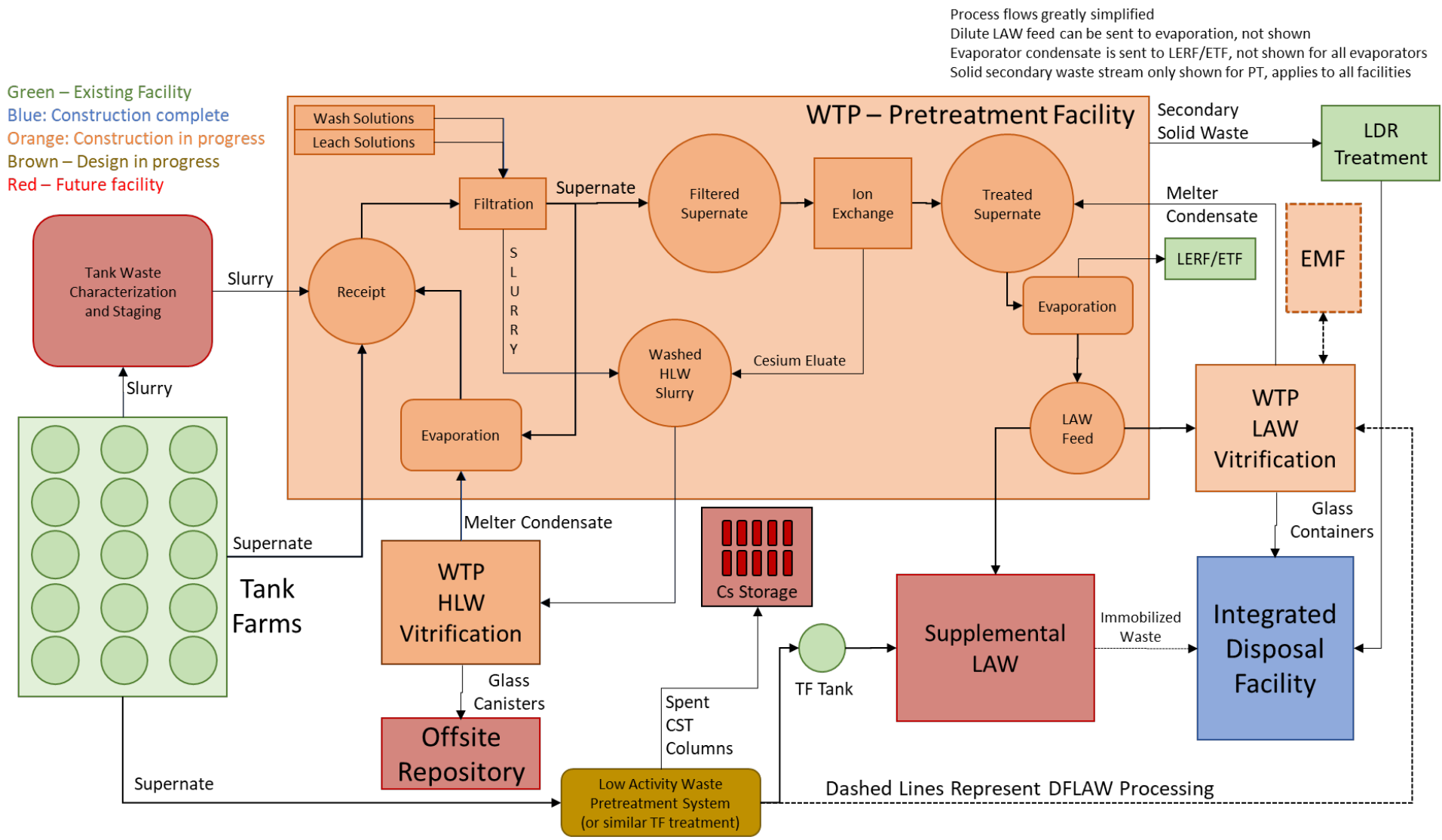
- NDAA Scope
- Feed Vector Basis and Relationship to System Plan 8
- WTP Process Overview
- Study Results – Tabulated
- Conclusions
- Areas for Further Study

NDAA Scope

"Not later than 60 days after the date of the enactment of this Act, the Secretary of Energy shall enter into an arrangement with a federally funded research and development center to conduct an **analysis of approaches for treating the portion of low-activity waste** at the Hanford Nuclear Reservation, Richland, Washington, **that, as of such date of enactment, is intended for supplemental treatment."**

2017 NDAA, Sec 3134

WTP Baseline Process



Executive Summary and High Level Table

NDAA CRITERIA	VITRIFICATION CASE: DISPOSAL ONSITE AT HANFORD	GROUTING CASE 1: DISPOSAL ONSITE AT HANFORD	GROUTING CASE 2: OFFSITE DISPOSAL	STEAM REFORMING CASE 1: SOLID MONOLITH PRODUCT DISPOSAL ONSITE AT HANFORD	STEAM REFORMING CASE 2: GRANULAR PRODUCT OFFSITE DISPOSAL
RISKS/ OBSTACLES	• Difficult to build and operate because highly complex process	• Requires pretreatment of organics • Requires wasteform validation	• Requires pretreatment of organics	• Requires most technology maturation • Requires wasteform validation	• Requires most technology maturation
BENEFITS	• Similar to technology being built for first LAW	• Low integrated complexity • No liquid secondary waste	• Low integrated complexity • No liquid secondary waste	• No liquid secondary waste	• No liquid secondary waste
COST	~$20B to ~36B	~$2B to ~$3B	~$5B to ~$8B	~$6B to ~$12B	~$9B to ~$17B
YEARS NEEDED BEFORE STARTUP	10-15 years	8-13 years	8-13 years	10-15 years	10-15 years
REGULATORY COMPLIANCE	• Primary waste is compliant • Secondary waste may require Iodine mitigation	• Likely meets requirements after organics pretreatment • May require iodine mitigation	• Compliant following organics pretreatment	• Likely meets technical requirements	• Compliant

Final Conclusions

- A viable SLAW treatment and disposal option can be developed for each of the three technologies evaluated (vitrification, grouting, and steam reforming).
- For grouting, both onsite and out-of-state disposal will likely require treatment of select organics if found in the waste, and additional flowsheet studies will be needed to define that treatment.
- Removal of technetium and iodine is not needed for out-of-state disposal of grouted or steam reformed wasteforms.
- Technetium removal is not needed for onsite disposal of grouted or steam reformed wasteforms, assuming high performing grouted and steam reformed wasteforms.
- Iodine removal is not needed for onsite disposal of grouted or steam reformed wasteforms, assuming best performing grouted and high performing steam reformed wasteforms.
- Grouting and steam reforming offer significant cost benefits over vitrification. Grout is the least expensive option, with FBSR and vitrification options ranging 2.5 to 5X and 4 to 10X higher, respectively, which is comparable to recent Government Accountability Office reporting.
- A near-term decision on SLAW treatment technology is needed to meet DOE mission completion goals.
- Secondary waste generated from vitrification will require additional wasteform development and treatment capabilities.

Key Areas for Further Study

- Treatment of organics restricted from land disposal (onsite and offsite grout cases)
- Treatment of technetium and iodine (onsite grout case)
- Treatment of secondary wastes (vitrification case)
- Performance of grouted waste forms (onsite grout case)
- Performance of steam reformed waste forms (onsite SR case)