

Secondary Waste

Hanford Science and Technology Workshop

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
Office of River Protection under Contract DE-AC27-08RV14800



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Hanford Science and Technology Workshop

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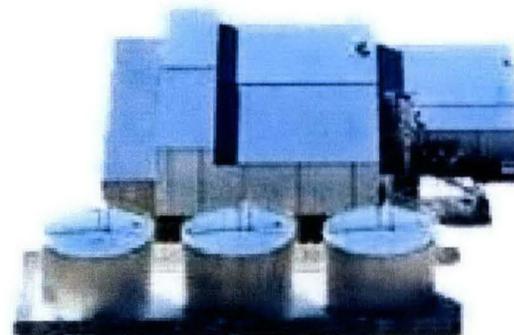
Tom Crawford

June 9, 2009

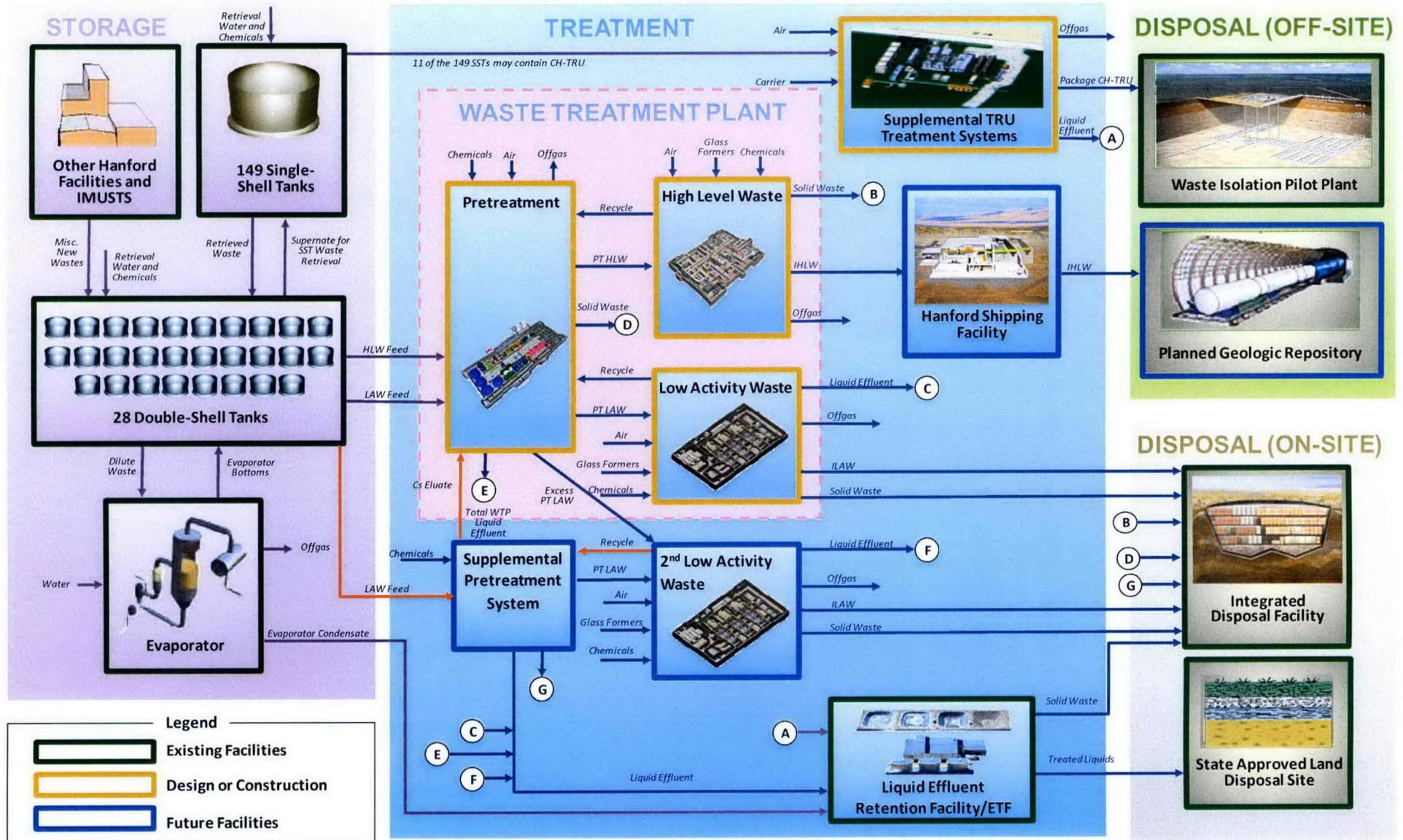


Issue Definition

- Secondary Waste Treatment is required for operations of the Waste Treatment Facility (WTP)
- In order to treat WTP secondary waste, the current operating Effluent Treatment Facility (ETF) will need an immobilization facility to be added to produce a compliant waste form that has yet to be defined and may need equipment upgrades for material compatibility
- These upgrades and additions are currently not in RL or ORP's baseline funding; although some of the ARRA funds have been slated for this work (i.e., waste form qualification testing and ^{99}Tc minimization in waste



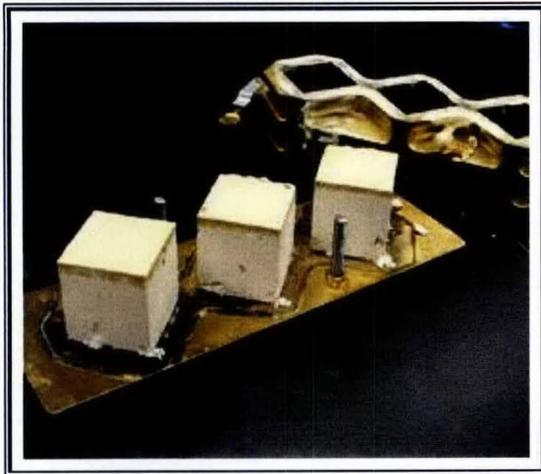
Waste Treatment Complex Configuration



- Processing of the tank wastes through WTP will generate secondary wastes, including routine solid wastes and liquid process effluents
- Solid wastes from the waste treatment facilities may include failed equipment, decontamination wastes, high-efficiency particulate air filters, carbon absorption beds, silver mordenite iodine sorbent beds, and spent ion exchange resin
- Liquid wastes may include process condensates and scrubber/off gas treatment liquids from the thermal waste treatment processes
- After packaging, the solid secondary wastes will be sent to the Integrated Disposal Facility (IDF) for disposal
- The liquid-effluent secondary wastes will be sent to the ETF for further treatment and disposal, either as treated liquid effluent under the ETF State Wastewater Discharge Permit or as solidified liquid effluents under the Dangerous Waste Permit for disposal at the IDF
- The primary focus is on the waste streams that contained the largest fractions of the I-129 and Tc-99 that the IDF risk assessment analyses showed to have the largest contribution to the estimated IDF disposal impacts to groundwater

- Limited work has been done on Secondary Waste Forms and their qualification. Work to date includes:
- Work on 4 different low temperature waste forms funded by EM-21 and ORP in 2004-2005 (~400K).
- Secondary Waste Roadmap Workshop in 2008
- Development of Cementitious Barriers Partnership CRADA (EM-21)
- New waste form development testing starting in FY09 funded by EM-21 (\$350 K)
- Other sources that have identified this need for waste form development are the IPS project and the Tank Closure and Waste Management EIS (draft). The IPS study identified some potential incompatibilities with materials in ETF
 - High halide concentration under certain flowsheets in 316L SS equipment

Previous Waste Form Development



DIAL Waste Form Testing



Cast Stone



"DURALITH"
GEOPOLYMER LOW TEMPERATURE WASTE FORM

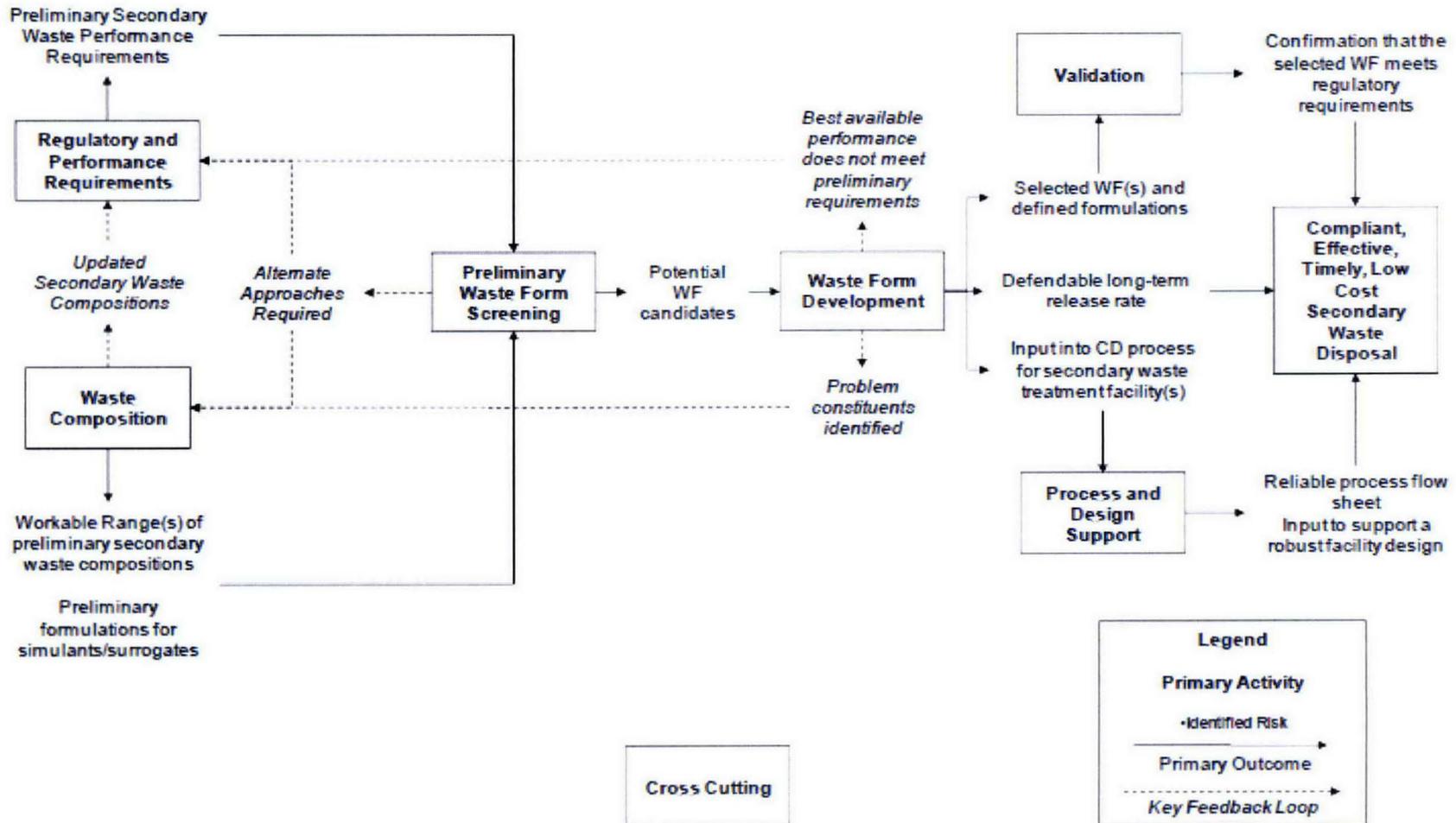
Duralithe



Ceramicrete

- In August 2008 a workshop was held with waste form experts from across the country, state regulators, NRC, and stakeholders
- The purpose was to develop a roadmap that would lead to the development and qualification of the final waste form for the WTP secondary wastes (a report was issued as a PNNL document that will be issued under an ORP number in the future)
- EM-10 staff were also given briefings and copies of the roadmap. The workshop was funded by EM-21.

Overarching Secondary Waste Roadmap



Current Work Challenges

- Schedule: Both the ARRA and Ecology's Permit requirements have near term deadlines. The current work planned this FY is \$350 K for waste form development and qualification. This work is multi-year as currently scoped/funded, but will need to be completed prior to the construction of an Immobilization Facility addition to ETF.
- Scope: The ARRA scope needs to be defined to determine if there are overlaps with EM-21 or significant gaps.
- Interface: There are currently three ICDs in place to work this issue (ICD-3, ICD-5, and ICD-6); however, because the ETF is currently managed by RL there are two DOE offices and three contractors to integrate with

- EM-21 is funding waste form development work this FY including Steam Reforming through the ART program
- EM-21 also has a Cementitious Barrier Partnership CRADA with CRESPI through Savannah River.
- Per WTP permit conditions (and BNI contract requirements):
 - A report will be produced in June of 2010 that estimates the levels of Tc-99 and I-129 from WTP and
 - Before December 2015, ORP must select the appropriate treatment that will mitigate environmental impacts.
- Facility specific upgrades to immobilize the liquid secondary waste will proceed when the appropriate treatment is selected and approved