U.S. DEPARTMENT OF ENERGY

Recap & Conclusions to Tc/I in Hanford Flowsheet Presentations

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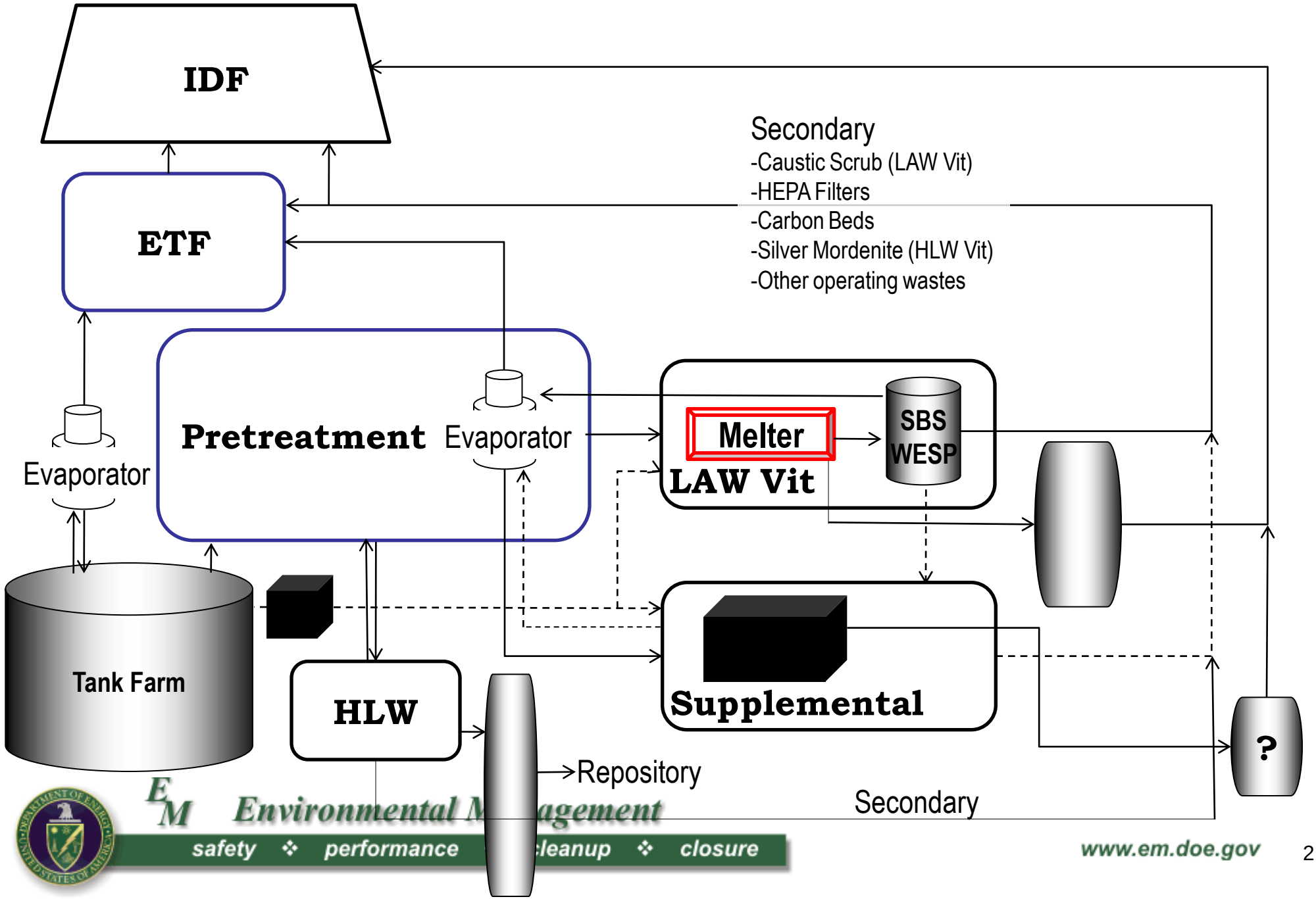
Rough Flowsheet Diagram



Fate of Tc-99 at WTP

- WTP flowsheet Tc partitions:
  - approximately 77.1% to supplemental LAW treatment
  - approximately 20.2% to LAW glass
  - approximately 2.3% to HLW glass
  - approximately 0.4% to secondary wastes

  [assumes no recycle from supplemental LAW treatment]
- Secondary Wastes:
  - Tc-99 concentration in secondary waste is predicted to be < 0.4% of ETF limit

Technetium Retention During LAW Vitrification

- Single pass Tc retention in glass ranges approximately from 20 – 60% with an average of approximately 38%
- Significant variation of retention across waste compositions
- Tailoring feed composition may allow for an increase in single pass retention to approximately 50%
- Re behavior was generally similar to Tc but with slightly higher average retention; however, there are significant exceptions
- Good agreement across melter scales (overall 60× scale-up)

Impact of Recycle on LAW Glass

- Advanced silicate formulations reduce glass by approximately 40% and phosphate glass reduce glass by a further 15%
- Breaking the recycle loop reduces glass by 7 to 10%

Hanford Secondary Waste Streams & Waste Forms

- Testing and modeling of secondary waste forms are in progress:
  - results needed to determine fraction of Tc-99 and I-129 that can be immobilized effectively to meet IDF performance requirements
- Goethite precipitation process effective in capturing and sequestering technetium from simulated vitrification off-gas scrubber solutions
  - rhenium is not a good surrogate for technetium in the goethite precipitation process itself
  - proposed process to divert Tc to HLW glass
  - Goethite vitrification test planned

Hanford LAW FBSR NAS Waste Form Qualification

- FBSR sodium-aluminosilicate (NAS) waste form has been identified as a promising supplemental treatment technology for Hanford LAW
  - Research in progress to determine Tc & I location in waste form and waste form chemical durability
  - Testing using actual Hanford LAW at bench-scale coupled with simulants at laboratory-, bench-, and pilot-scales