

Mobile evaporator

Purpose

To concentrate caustic supernate solutions from Hanford tank waste by driving off excess water and minimizing double shell tank (DST) storage requirements and/or need for additional DSTs.



Orano's mobile evaporator

Orano's mobile evaporator has a nominal capacity of 10,000 gallons a day. Orano designed, built and operated a mobile nuclear evaporator to support its steam generator replacement services and operations at U.S. nuclear utility sites regulated by the Nuclear Regulatory Commission (NRC). The unit was designed,

built and used to process activated liquid waste from onsite operations.

The mobile system was designed to take spent water-ethylenediaminetetraacetic acid (EDTA) based chemical cleaning solvent and reduce the volume of waste required to go through downstream processes.

Background

Orano will take the lessons learned from the nuclear industry and combine them with previous studies DOE has conducted related to the potential use of a mobile evaporator at the Hanford site to address the suitability of the mobile evaporator to treat supernate waste from tank recovery.

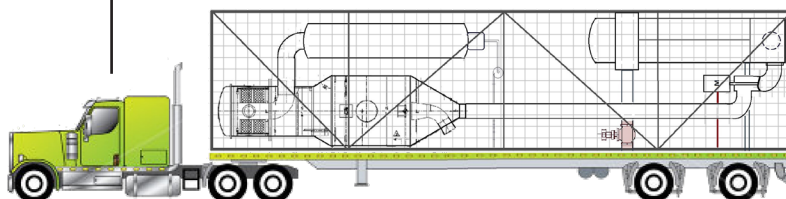
Problem

Current techniques for the retrieval of waste from the Hanford single shell tanks (SSTs) rely on the addition of liquid in the form of supernate recycled from the DSTs or by the addition of additional caustic solution. The resulting slurry is returned to the DSTs and allowed to settle.

Periodic evaporation campaigns are required to regenerate space in the DSTs by driving off water from the supernate. Free space is created using the site's only operational evaporator, 242-A. The tank farm Operator has identified 242-A as a potential single point failure on a number of occasions and a high project risk.

Current operation of the 242-A evaporator is limited to 182 days per year by permitting and this imposes a bottleneck on SST retrievals due to an inability to evaporate at the required rate. Adding a second evaporator will enable more SST retrievals as required by contract. It also adds flexibility and a backup in the event of prolonged downtime of the 242-A.

Due to the geography of the site and the spacing of the tank farms, liquid or slurry transfers to the evaporator can require multiple valve/tank



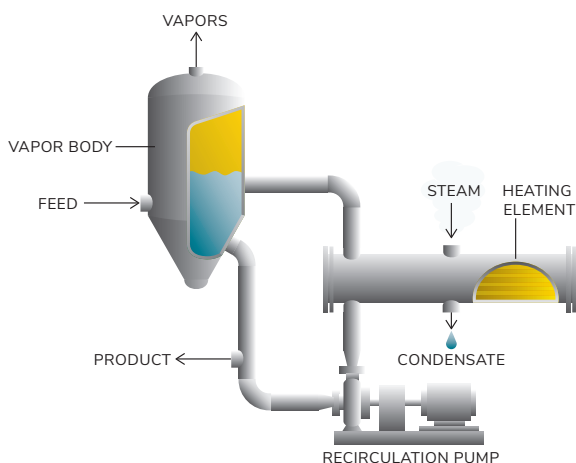
The design and fabrication of a mobile evaporator would significantly reduce risk by creating the capability to reduce liquid volume at the source

operations and in the case of the west farm DSTs would require the cross site transfer lines to be used. The cross site liquid only line (approximately seven miles long) has been commissioned but not used again for around ten years. There are concerns regarding the integrity of the slurry line that never passed commissioning testing and has never been used for active slurry.

The design and fabrication of a mobile evaporator would significantly reduce the overall risk to SST retrievals and the impact of any future tank failures by adding the capability to reduce liquid volumes at the source and potentially eliminating cross site transfers particularly if the failure was in west farm.



Mobile evaporator at Palo Verde Generating Station, Tonopah, Arizona



Forced circulation crystallizer (horizontal heat exchanger)

Solution

The design and fabrication of a mobile evaporator would significantly reduce the overall risk to SST retrievals and the impact of any future tank failures by adding the capability to reduce liquid volumes at the source and potentially eliminating cross site transfers, particularly if the failure was in west farm. Adding a second evaporator will enable more SST retrievals. It also adds flexibility and a backup in the event of prolonged downtime of the 242-A.

A mobile evaporator supports:

- Tank side treatment
- Reduced secondary waste production
- Improved flowsheet optimization
- Improved efficiency of tank retrievals

The mobile evaporator will potentially reduce the need for the total number of new tanks that are being discussed for the Hanford site, provide back-up capability should the 242-A onsite evaporator encounter a major maintenance issue, and reduce the complexity and functionality of future permanent onsite treatment facilities.

