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Tank Farm



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Problem: How to solidify wet sludge from flat bottom tanks?



A US Department of Energy used four 500,000-gallon AWW Water tanks to store sludge through the 1940's and 1950's. The tanks were not originally designed to store sludge since they had a flat, rather than a conical, bottom.

The tank dimensions were roughly 42' X 42' High.



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Problem: How to solidify wet sludge from flat bottom tanks?



Three of the tanks had aqueous sludge waste with roughly 40-50% solids with radiation levels of 3000-4000 picocuries/gram. There was no external dose hazard from the tank.

The fourth tank contained mixed waste and was the last to be remediated. Rad dose was similar.



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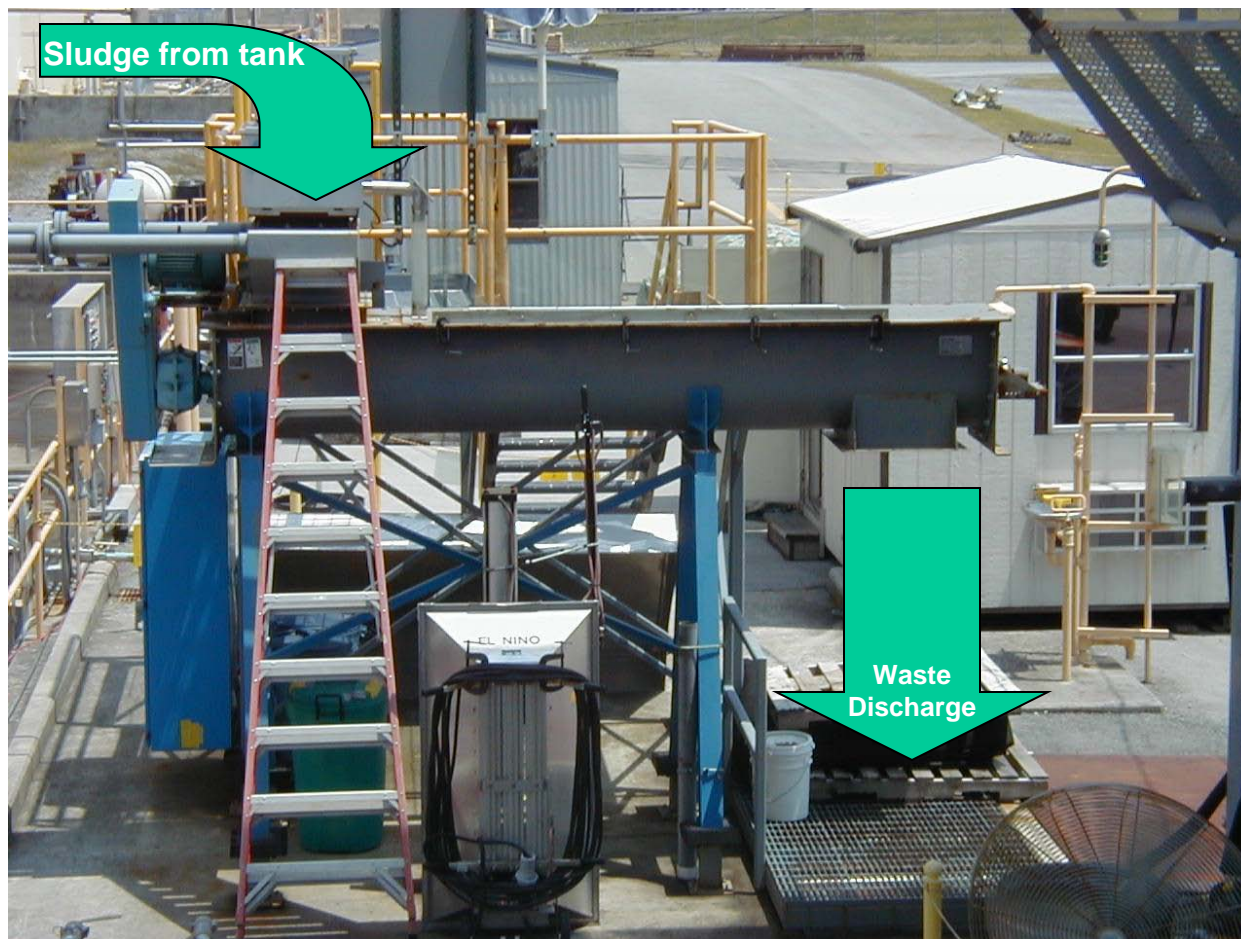
The tanks had 8” flanges with blanks located around the bottom circumference of the tank about 12” from the bottom. Taps of 4” diameter were run into the tank at multiple locations and liquid was removed. Positive displacement diaphragm pumps (air pressure) were used to pump the sludge.

Air was sparged continuously into the tank to keep the sludge from settling. Occasionally, a small amount of water (a couple of gallons) had to be added to the tank to get the sludge moving again.



Sludge Processing & Sorbent Polymer Addition

Sludge is pumped into auger with polymer metered in from above



The sludge was pumped from the tank into one end of a horizontal screw conveyer/auger.

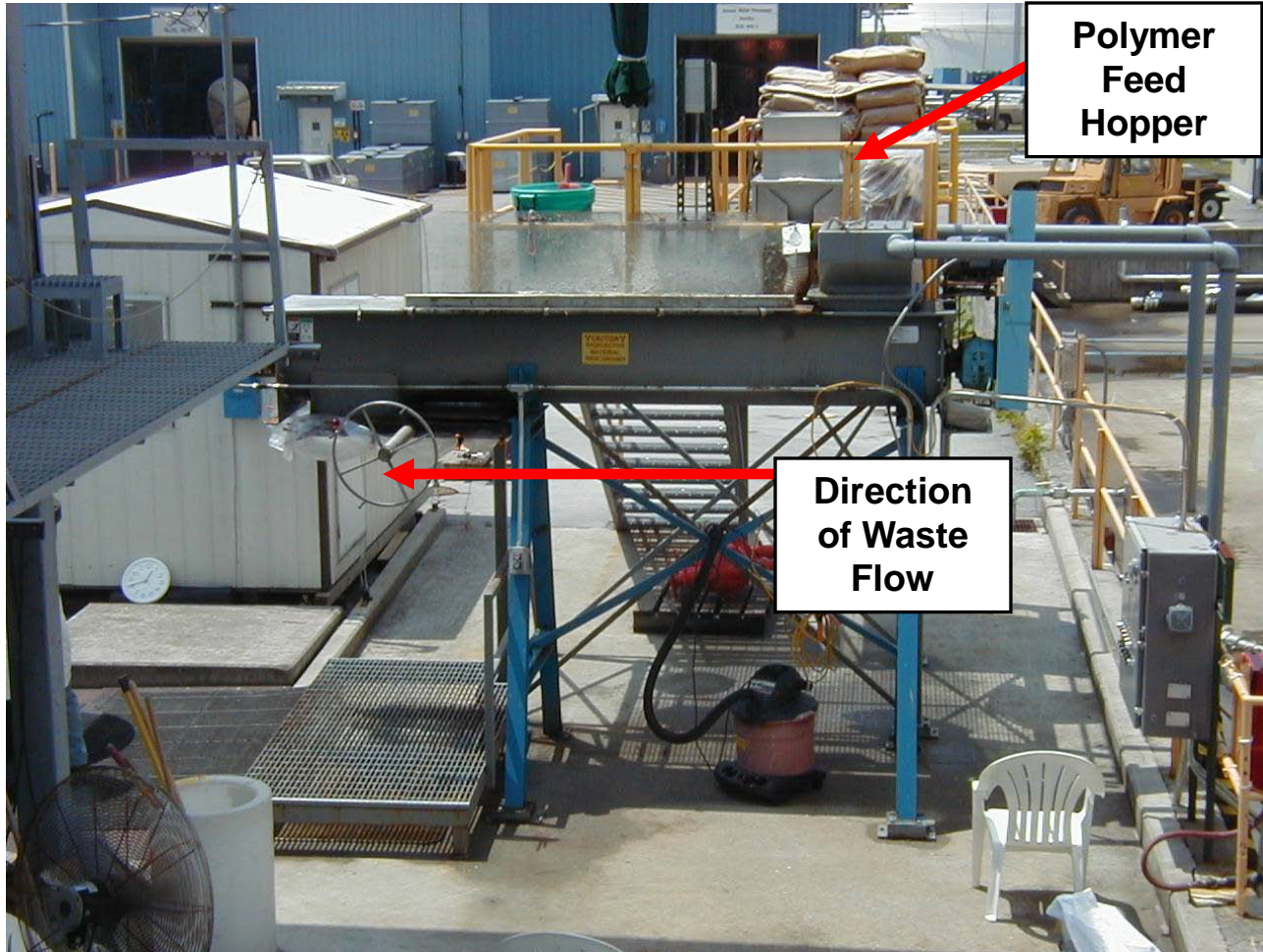
The screw was 12 feet in length and had a diameter of 16 inches.

The had sealed bearings at each end. Regular maintenance on the end bearings was required to prevent metal fatigue and leaking.



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Above this large screw auger was a platform with a small hopper equipped with a small metering screw to add polymer sorbent to the large horizontal auger at a controlled rate.



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Bags of polymer were added by hand to the hopper.

The metering screw was adjusted and timed to slowly add the polymer sorbent at the proper rate to the sludge.

Absorbent dose rate was determined visually and the entire operation was very sensitive to operator control. The amount of polymer used varied according to the wetness of the sludge. Typically 66-110 lbs of polymer sorbent were used per 21st Century container (360 gallons). Generally, an excess of polymer was used so that there appeared to be excess polymer and no free liquid in the finished product.



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The polymer mixed very efficiently with the sludge as it moved down the long auger.

At the end, the stabilized waste tumbled out the bottom into waiting containers.



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The lined, 21st Century containers were then sealed and shipped to Utah for land disposal. The operation processed 600,00 to 800,000 kgs/year of sludge.



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