

# Stabilization of Oil Well Brine Slops

**Problem: How to solidify high conductivity waste to pass Paint Filter Test and remain solid in strong sunlight?**



Throughout the Gulf of Mexico, in the Caribbean and across northern Latin America there are large deposits of natural gas. Many are located off-shore.

Many brine solutions – particularly Zinc Bromide – are pumped down the well hole to hold back the gas under pressure.

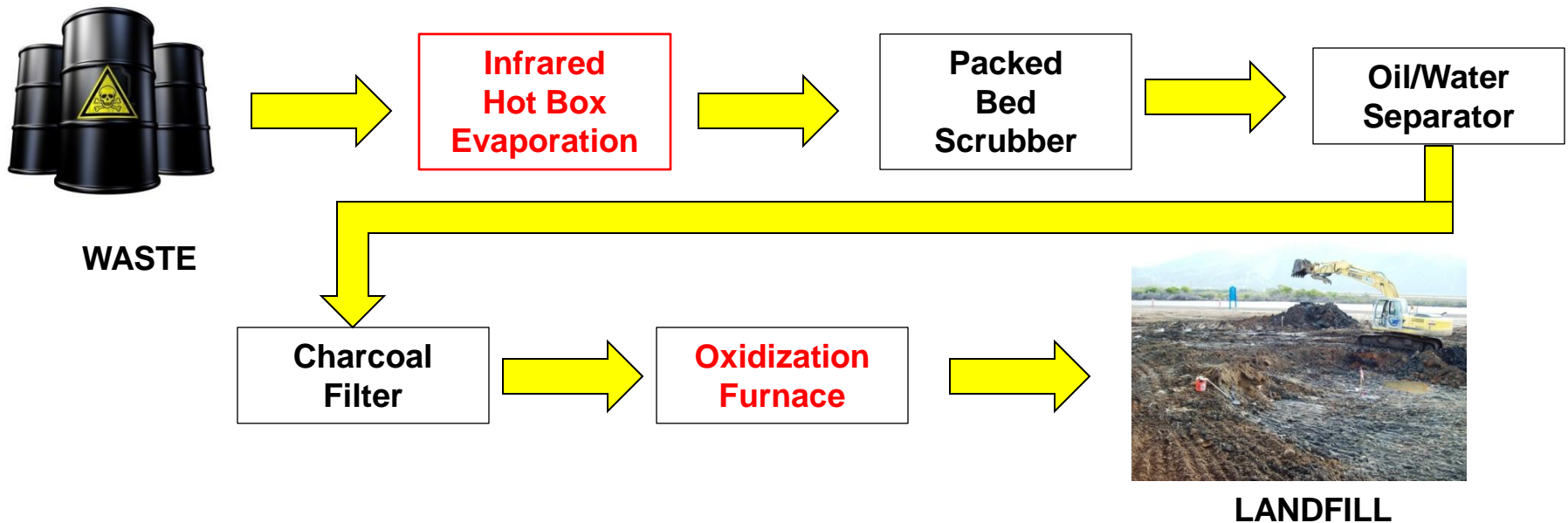
Disposal of these brines is problematic and costly.



# Stabilization of Oil Brine Slops

Multinational gas producers customarily turned to either Direct Fired Thermal Desorption (DTDU) or VIR Thermal Evaporation Systems to reduce bulk of waste and to remove free liquids so that solids can be sent to a permitted landfill.

Both systems are slow and very energy intensive leading to high costs.



VIR Thermal Desorption Process

**What to do to speed up waste processing AND reduce costs?**



# Stabilization of Oil Brine Slops

In 2002, M<sup>2</sup> Polymer was contacted by a US Department of Energy facility seeking to solidify a railcar filled with Zinc Bromide (ZnBr<sub>2</sub>) solution. Zinc Bromide is used as a neutron scavenger in shielded steel boxes with glass windows called “Hot Cells.”

After trying several types of polymers, it was found that only a super absorbent made of a co-polymer of acrylic-acrylamide was capable of stabilizing such waste. A paper was published on the topic and it was through this that people in The Caribbean located our company.

Samples of *Waste Lock*<sup>®</sup> *PAM / Type S* (200-800 μm) were sent for laboratory scale testing. Initial results were favorable.

Next a 2200 lbs pallet was ordered for a pilot scale run.

It was determined that 40 lbs of the *Waste Lock*<sup>®</sup> *PAM / Type S* were capable of stabilizing one barrel of Brine Slop waste. Volume increase was <2%.

**An important note about sunlight.** Another benefit of using the *Waste Lock*<sup>®</sup> *PAM / Type S* in a very sunny region like the Caribbean is that this type of polymer remains stable under strong UV radiation like sunlight. Conventional acrylic homo-polymer superabsorbents break down in hours or days under strong sunlight. The UV rays break the cross-linking bonds rendering the polymer into a viscous liquid (a water soluble Sodium Polyacrylate). This does not occur with *Waste Lock*<sup>®</sup> *PAM* polymers.



## Stabilization of Oil Brine Slops

In October 2015, the multinational gas client had 28,000 BBL of Zinc Bromide slops being stored in a myriad of rented storage tanks and bins at a high cost of rental. The goal was to have all this waste processed by end of CY 2016.

Sealand containers of **Waste Lock® PAM / Type S** were ordered in 55 lbs (25 kgs bags). To maintain DOT road weigh limits, each container held 790 bags or 43,450 lbs.



## Stabilization of Oil Brine Slops

Processing began in October of 2015. By February 2016, there had been 8000 BBL processed with a balance of 20,000 BBL remaining. One full Sealand of *Waste Lock*<sup>®</sup> PAM / *Type S* (43,450 lbs) could solidify roughly 1000 BBL of Zinc Bromide slops.



Brine Storage Boxes





## Stabilization of Oil Brine Slops

Waste was pumped from the storage boxes to a mixing tank with a horizontal paddles and an auger in the V-bottom. The **Waste Lock® PAM** polymer sorbent was added by hand one 55-pound bag at a time while mixing occurred. Polymer addition – and sorbent use optimization – was easily achieved when the operator could see No Free Liquids.



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Once the waste was stabilized, it was discharged by removing the plate from the screw auger. The final product was placed into 2000 lbs supersacks for transport to a local, lined landfill.



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## EPILOUGE:

By September 2016, 24,000 BBL of Zinc Bromide brines had been processed with only 4000 BBL remaining. (Eleven months after processing started.)

By end of November 2016, the work was concluded with all 28,000 BBL having been stabilized and sent to the landfill.

Waste volume expanded by <2% with the use of the **Waste Lock® PAM** polymer sorbent.

The multinational client was extremely pleased as *the project came in under budget AND ahead of schedule.*

We are now exploring opportunities in similar waste streams in other regions and with other multinational petroleum companies.



EXXON  
Mobil





# Stabilization of Oil Brine Slops

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