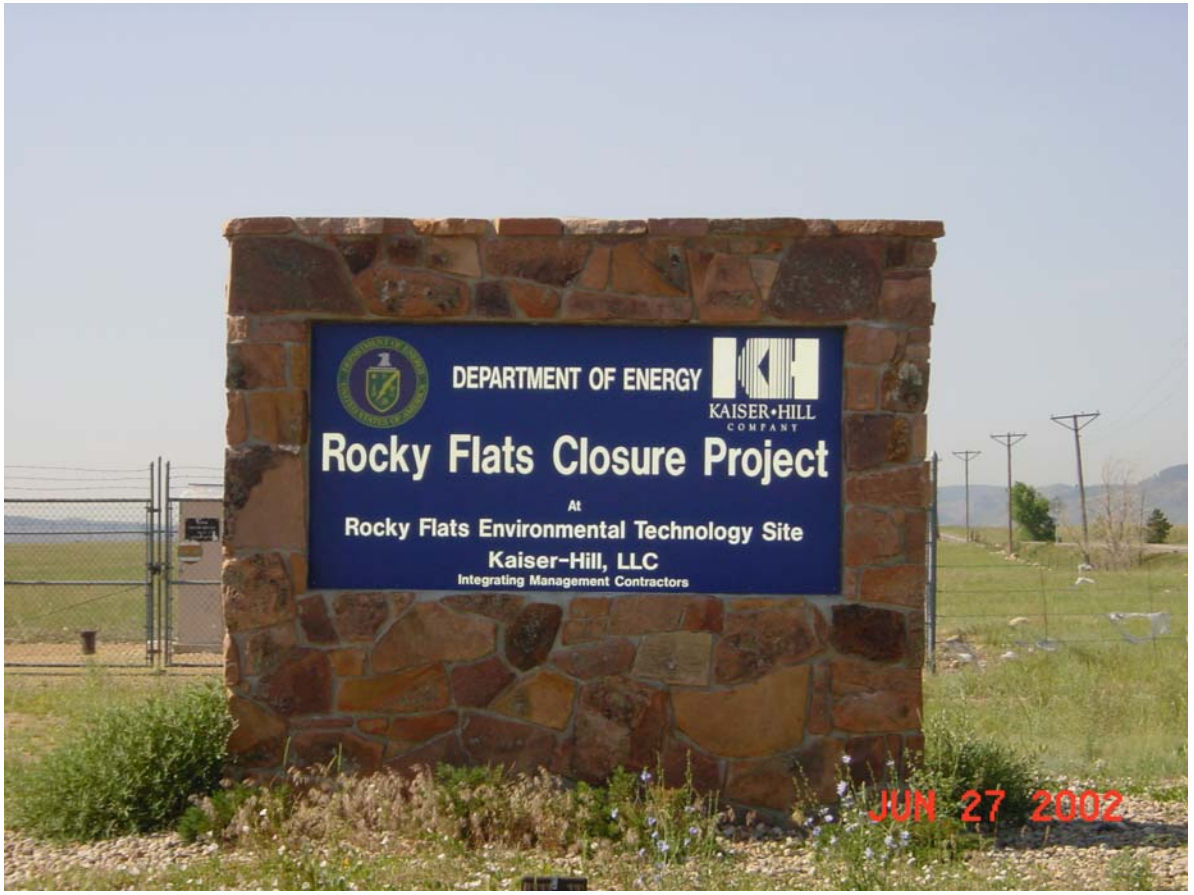
Former US DOE Weapons Facility

Rocky Flats (Golden, CO)

Solidification of Tank Liquids & Sludge for Transport to Utah



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Solidification of Tank Liquids & Sludge for Transport to Utah

Problems:

1. How to solidify for transport without doubling/tripling waste volume?

2. How to bind Cadmium, Chromium and other soluble metals to pass TCLP?

Summary:

This western legacy waste site produced nuclear components – including Plutonium – for many years.

Several lagoons were contaminated with LLRW water and soluble metals.

These lagoons were pumped dry and the water placed in 120 plastic tanks on concrete pads. The waste contents of each tank were analyzed and the aqueous waste classified either as A-B tank waste (low salt concentration below 1%) and C-Tank waste which had as much as 5% salts.

There were 247,000 gallons of A-B Tank Waste. It was determined to use *Waste Lock*® at 1% concentration. This would equate to about 22,000 lbs.

There were 500,000 gallons of salty C-Tank waste; some which had low pH of 1-2. Absorbent estimates ranged from 150,000 to 225,000 lbs.

The C-Tank waste also had 1 PPM Cadmium and 3 PPM Chromium.

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Summary (continued):

Treatment of the A-B Tank waste was straightforward and went smoothly using only the *Waste Lock*® polymer.

Treatment of the C-Tank waste was more difficult. This waste had significantly higher salt content, soluble metals and a low pH. There was a need for the solidified waste to pass TCLP while there was an economic need to solidify the waste without greatly expanding the volume and raising the disposal costs.

Raising the pH to precipitate out metals was not a viable option as a lot of carbonate or hydroxide ion would be required and this would very significantly increase the waste volume. There was also a self-buffering effect in the C=Tank waste that tended to keep pH low no matter how much alkalinity was added.

Several variations of polymer, mineral absorbents and reactants were tried to pass TCLP with the least volume expansion.

Eventually, a process using Soda Ash, *Waste Lock*® polymer and Lime was developed and successfully implemented.

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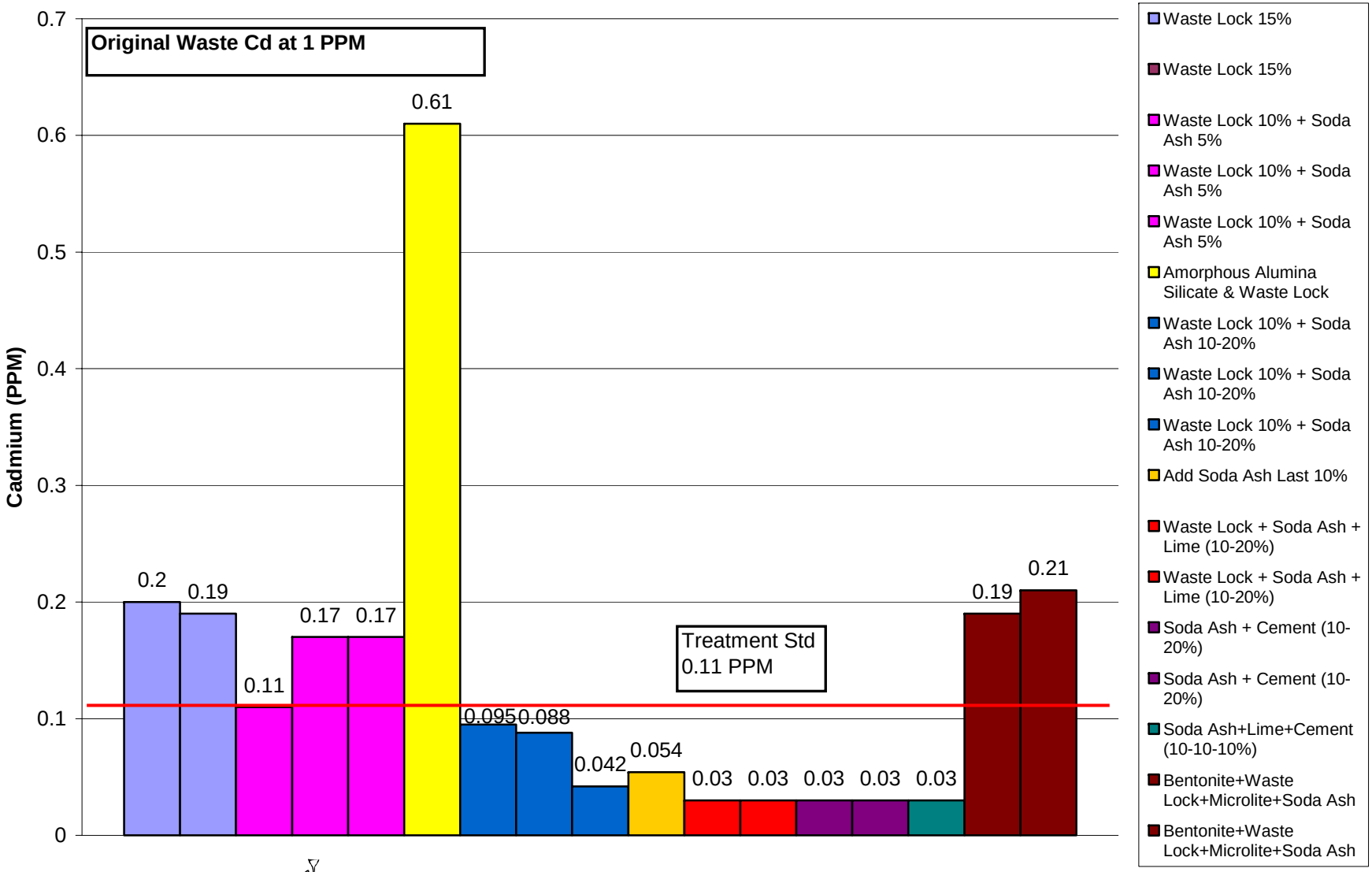
Treatability for Cadmium
(TCLP)



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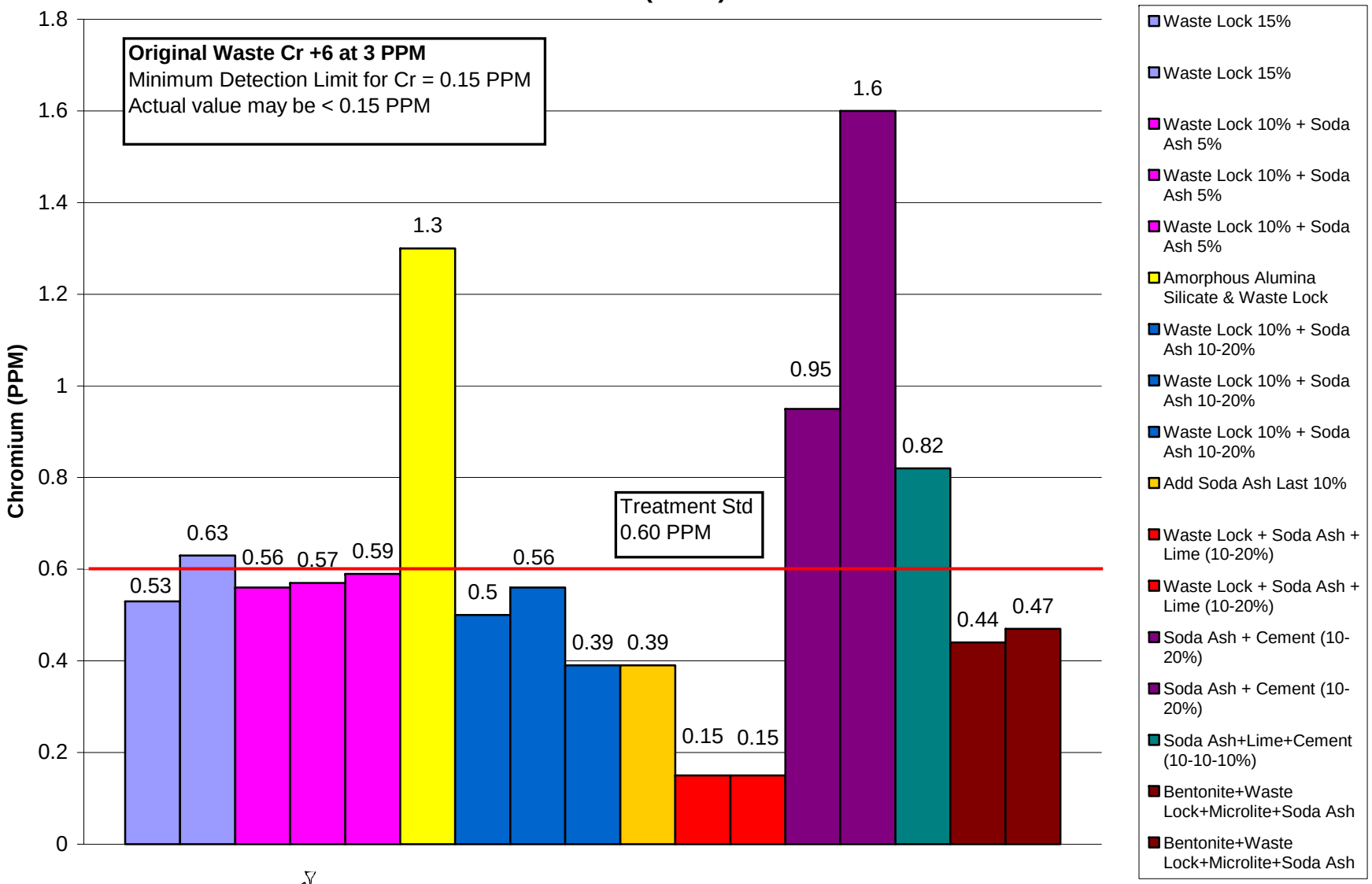
Treatability Results for Chromium (+6)
(TCLP)



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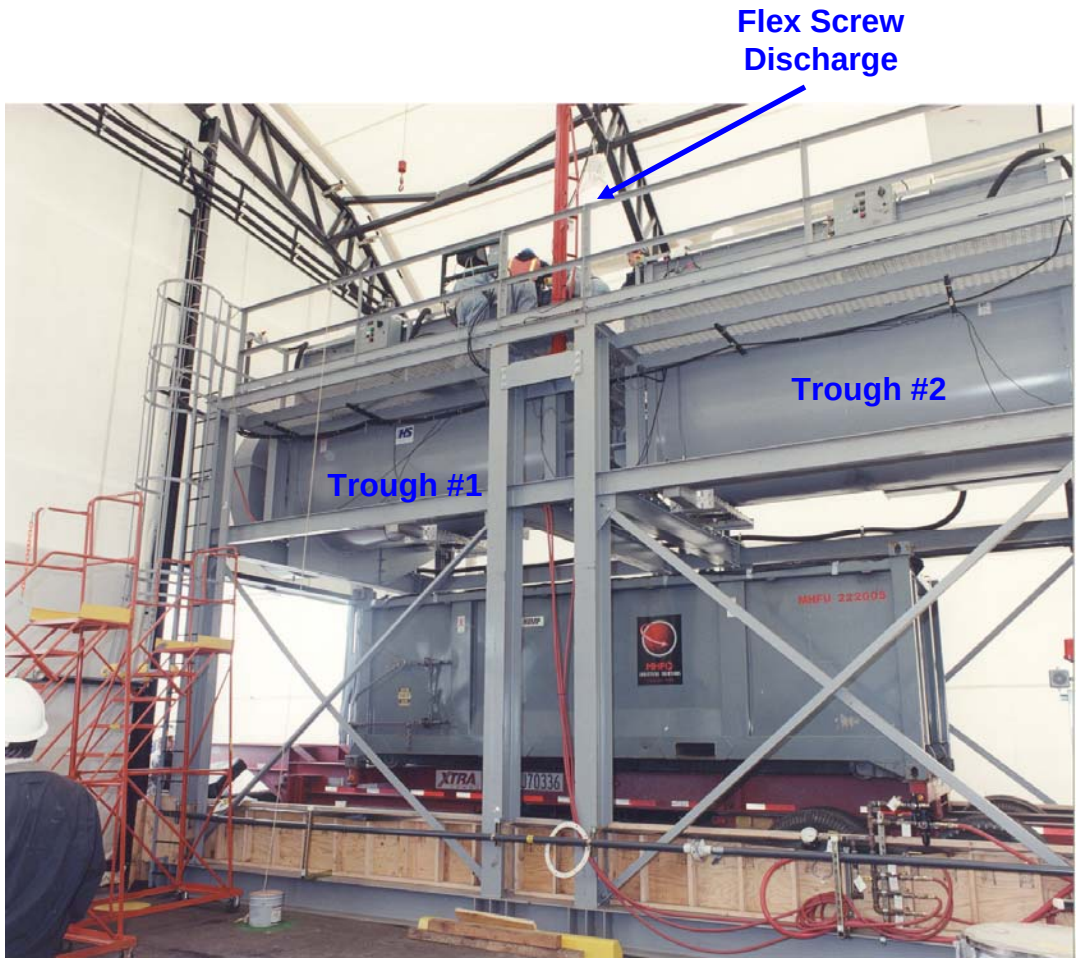

Summary (continued):

Treatment of the A-B Tank waste was straightforward and went smoothly using only the *Waste Lock*® polymer.

The A-B Tank waste was pumped 100 feet from the tank farm and up 30 feet in the air.

Twin 1,200 gallon mixing troughs were designed with mixing paddles and a bottom discharge into an Intermodal container.

Polymer and other powders were lifted to the mixing troughs via a flexible screw.

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Mixing Trough & Paddles

The trough was filled with 1,100 gallon of waste liquid, the mixing paddles started and reactants and polymer were added gradually during the mixing.

Treatment of the C-Tank waste was more difficult due to high salt and soluble metals concentrations.

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The C-Tank waste "Recipe" was developed to pass TCLP and to minimize waste volume expansion. The treatment was performed in batches as follows:

11,000 lbs. C Tank Waste (1,100 gallons)

+ 1,100 lbs Soda Ash (then, mix)

+ 1.000 lbs Waste Lock® 770 (then, mix)

+ 1,300 lbs Lime

= 14,400 lbs per batch (2 batches done simultaneously)

Load into Intermodal:

28,800 lbs (Two batches of processed waste)

+ 8,500 lbs (one partial batch)

= 37,300 lbs of waste

+ Intermodal Container & Trailer

= 56,200 lbs shipping weight

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Bottom unloading of processing troughs into Intermodal shipping container.

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Conclusion:

Over the course of 2 ½ years, over 100 loads of solidified waste were shipped using this process and the Waste Lock® 770 Superabsorbent Polymer.

Every load was accepted at the disposal facility for passing TCLP.

Every load passed Paint Filter Test.

In the end, it was determined that the use of Waste Lock® 770 saved the project an estimated $2 to $3 million over the projected use of less costly mineral-based absorbents. While these products cost less per pound, the doubling or tripling of the waste volume would have negated any savings from using a lower cost absorbent.