

Principles of Solidification/Stabilization and Examples of Use at Brownfields

Remediation Technologies
Symposium 2003

Banff, Alberta

Solidification/Stabilization

- Mixing Portland Cement into Contaminated Media or Industrial Waste.

S/S Benefits to Brownfields

- An established technology that protects human health and the environment.
- Treated soil can be reused at the site.
- Cost effective.

Terms

- Solidification
- Stabilization

Technology Uses

- Industrial Wastes
- Remediation

Industrial Wastes

- Used to treat industrial waste prior to land disposal
- Can reduce the level of hazard and cost.
- BDAT for over 50 RCRA –listed wastes

Remediation

- Clean-up of Contaminated Media:
 - Soil, Sludge, Sediment
- Remediation Programs
 - Superfund, RCRA Corrective Action, Brownfields

Superfund Remedial Actions: Source Control Treatment Technologies

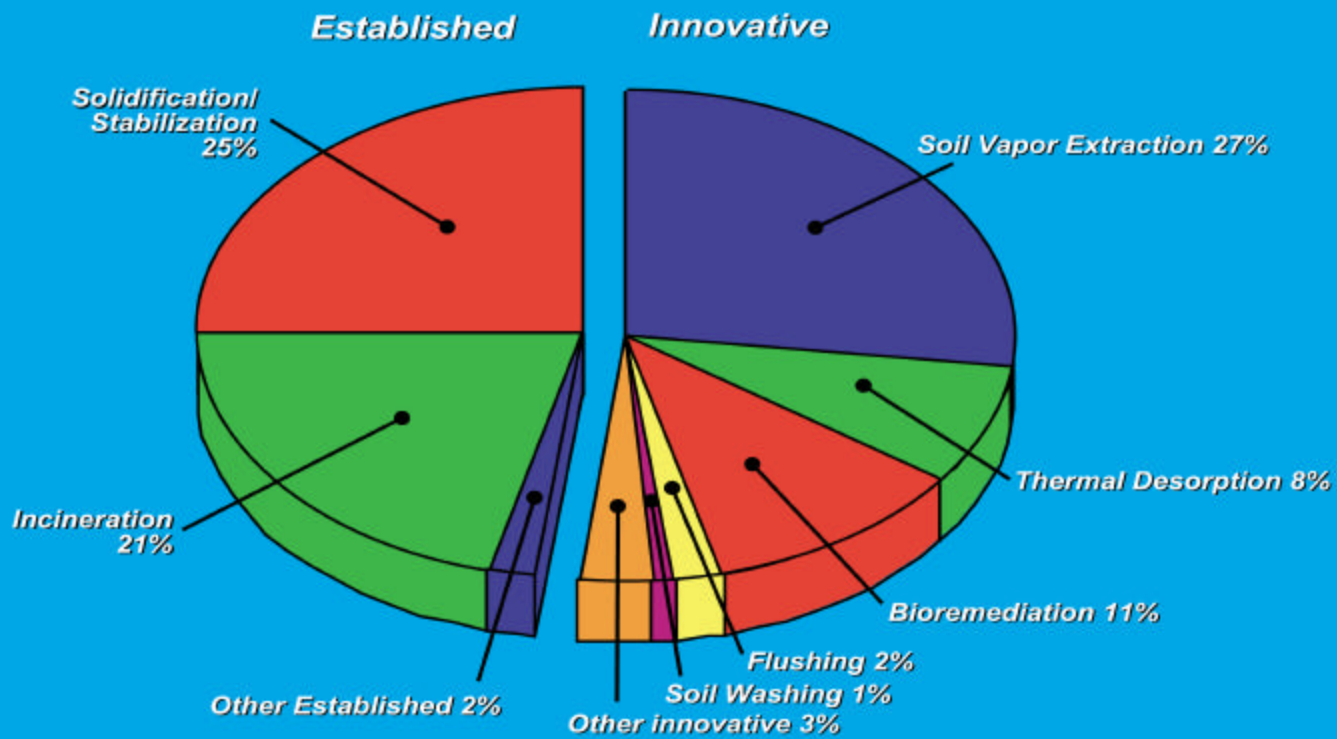


Table I. Effectiveness of S/S on General Contaminant Groups for Soil and Sludges.^[4]

	Contaminant Groups	Effectiveness
Organic	Halogenated volatiles	□
	Non-halogenated volatiles	□
	Halogenated semivolatiles	■
	Non-halogenated semivolatiles and non-volatiles	■
	PCBs	◆
	Pesticides	◆
	Dioxin/Furans	◆
	Organic cyanides	◆
	Organic corrosives	◆
Inorganic	Volatile metals	■
	Non-volatile metals	■
	Asbestos	■
	Radioactive materials	■
	Inorganic corrosives	■
	Inorganic cyanides	■
Reactive	Oxidizers	■
	Reducers	■

Key: ■ Demonstrated Effectiveness: Successful treatability test at some scale completed.

◆ Potential Effectiveness: Expert opinion that technology will work.

□ No Expected Effectiveness: Expert opinion that technology will/does not work.

S/S of Inorganic Constituents

- Portland cement chemically reacts with water.
- Hazardous constituents are made less soluble or less toxic.
- Hazardous constituents are encapsulated in cement matrix.
- Reduction of hydraulic conductivity and surface area.

S/S of Organic Constituents

- Physical Binding of Contaminants: Solidification.
- Decrease Hydraulic Conductivity.

Physical Tests

- Paint Filter Test (PFT)
- Liquid Release Test (LRT)
- Moisture Content
- Density
- Hydraulic Conductivity
- Unconfined Compressive Strength
- Freeze-Thaw & Wet-Dry Durability

Chemical Tests

- Toxicity Characteristic Leaching Procedure (TCLP)
- Synthetic Precipitation Leaching Procedure (SPLP)
- Acid Neutralization Capacity
- Multiple Extraction Procedure
- Equilibrium Leach
- Dynamic Leach

S/S Treatment Methods

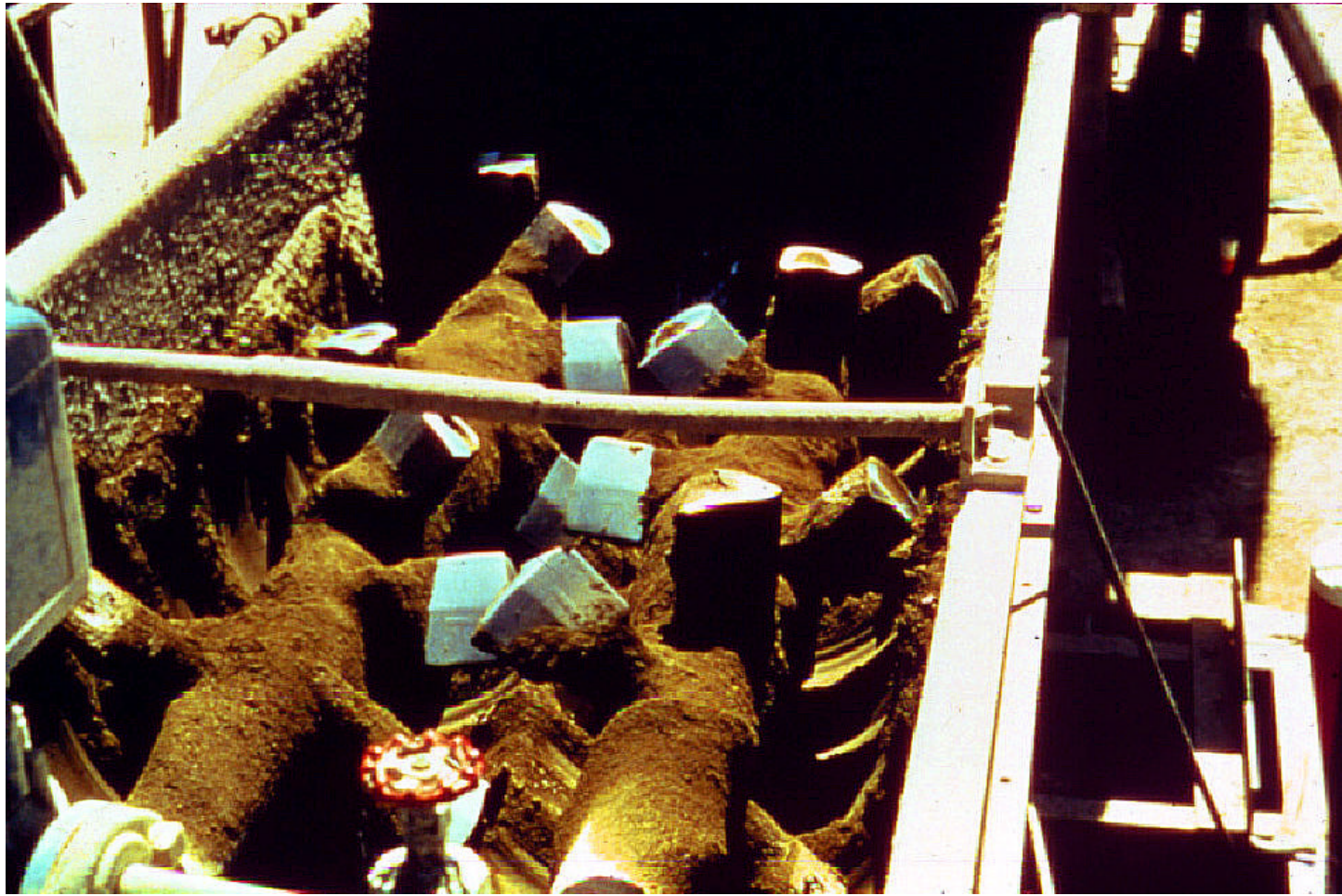
- In-situ
- Ex-situ

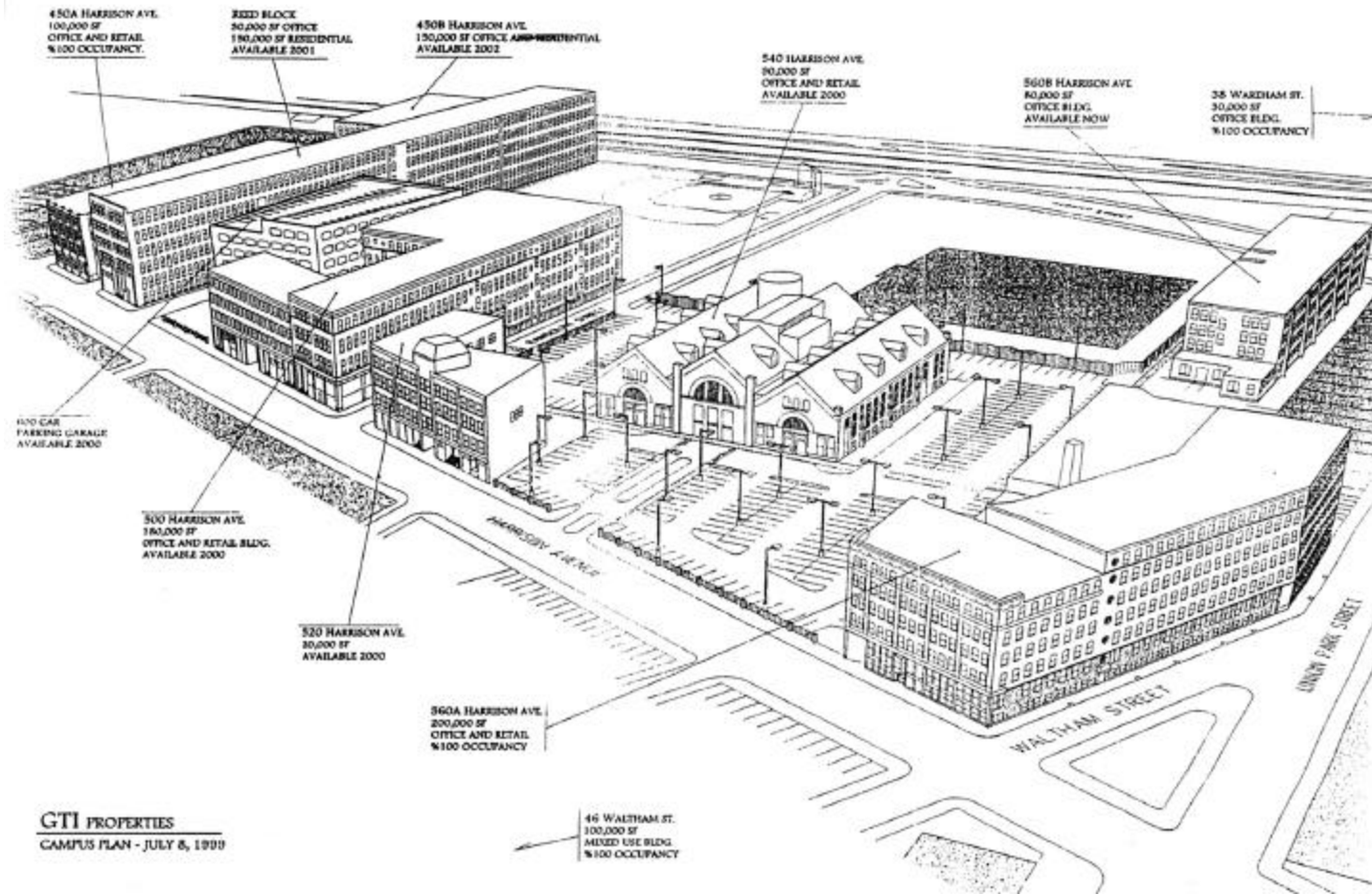
Projects











GTI PROPERTIES
CAMPUS PLAN - JULY 6, 1999







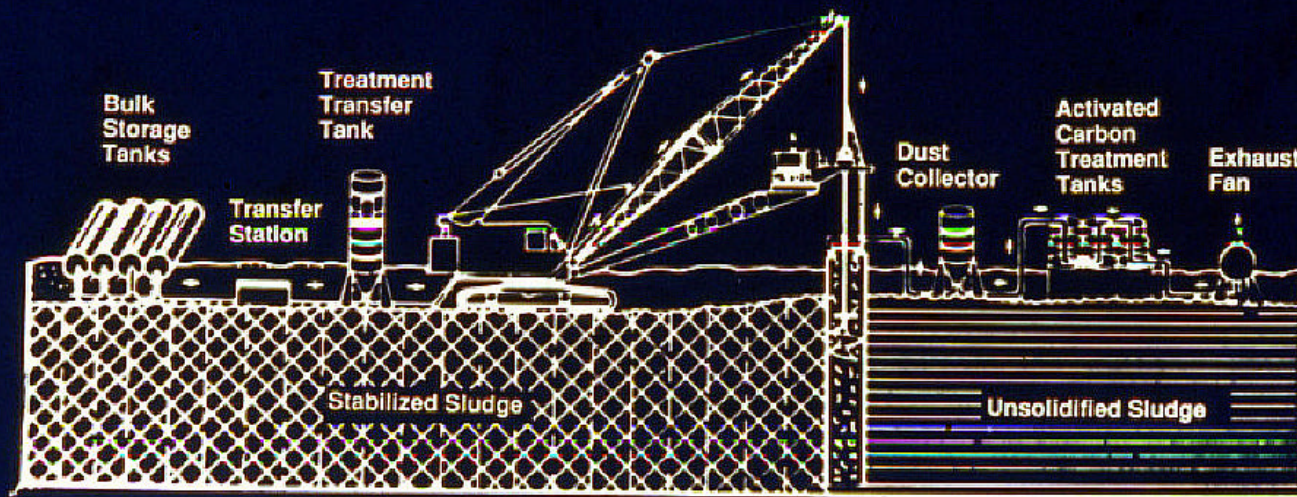




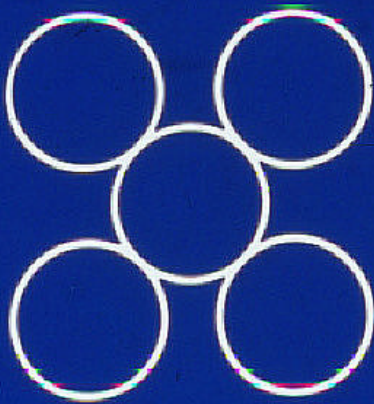




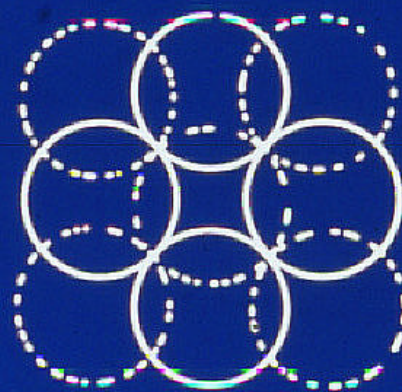
Shallow Soil Mixing System



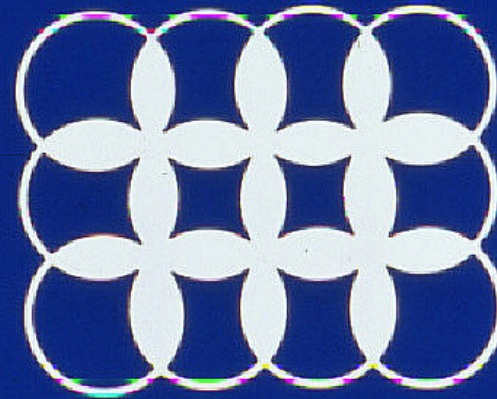
Shallow Soil Mixing System Drilling Pattern



Primary



Secondary



Completed Overlapping
and Complete Treatment





805 KING STREET



Atlanta Gas Light Company
GAS PLANT CLEANUP PROJECT OFFICE



Williams Environmental Services

Please pardon our construction efforts as we cleanup environmental impacts from a former manufactured gas plant that once lit the streets, heated homes, and brought industry to Augusta for over 100 years. When the project is complete, area properties will be returned to beneficial use in the community. Improvements to the Third Level Canal will return it to a functional part of the Augusta Canal system and will make it an amenity to be enjoyed by the Augusta community.

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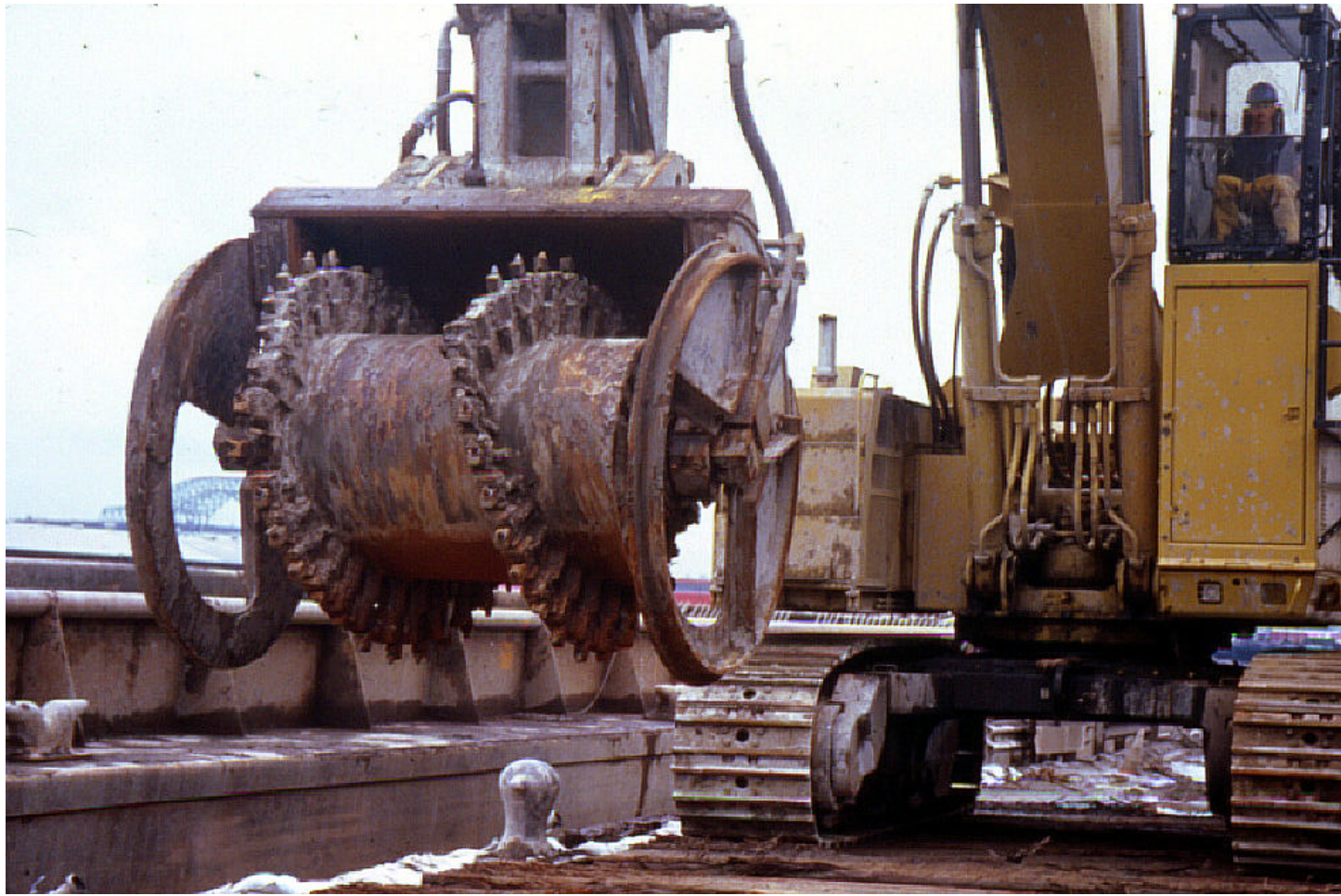




Solidification: Key Features

- Reduce Permeability by 2-4 Orders of Magnitude.
- Compressive Strength Greater than 50 PSI.
- Durability Tested by Wet/Dry and UCS.















The Golf Course at Constable Hook Bayonne, NJ



Pugmill: Processes up to 20,000 cy/day of Dredged Material





















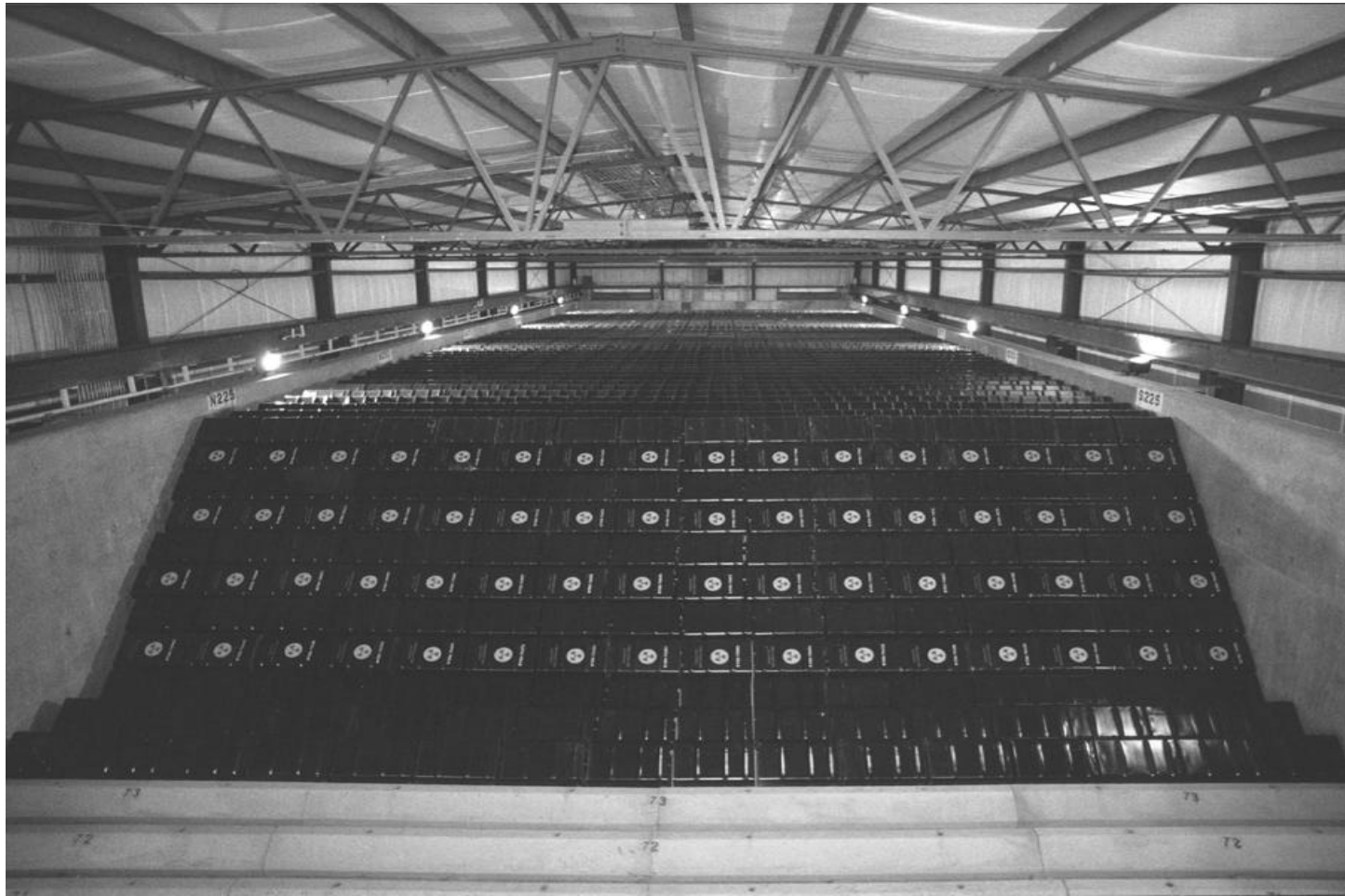






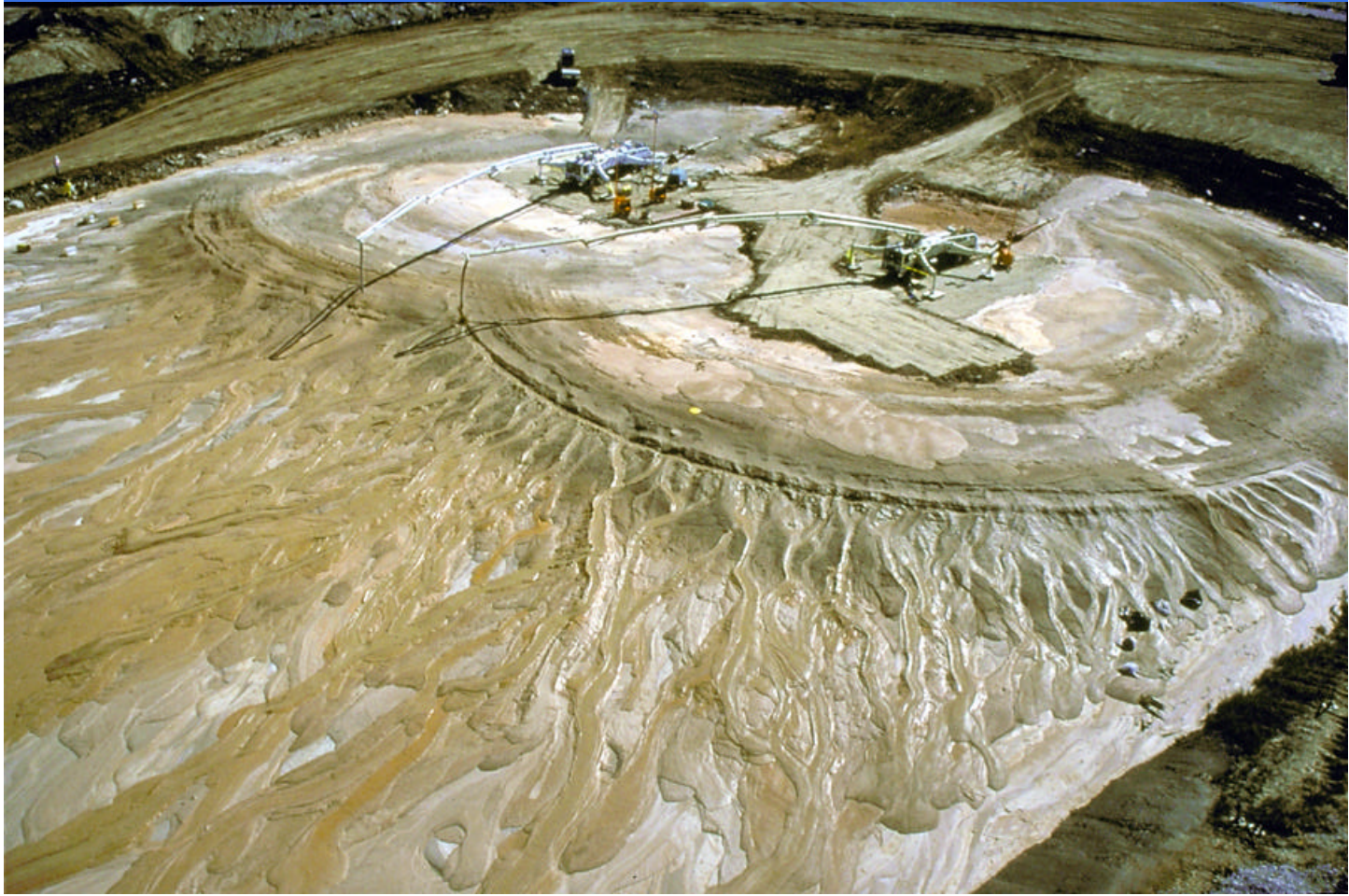








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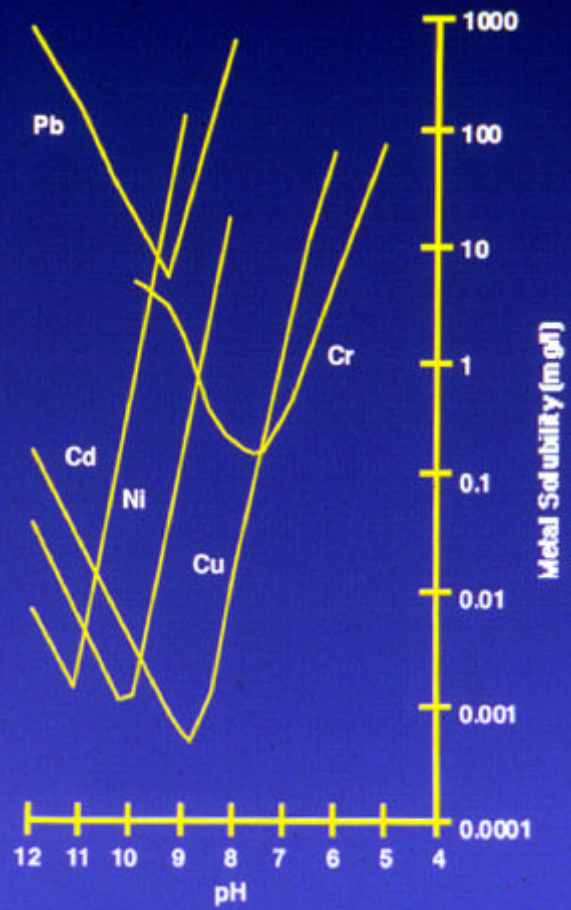


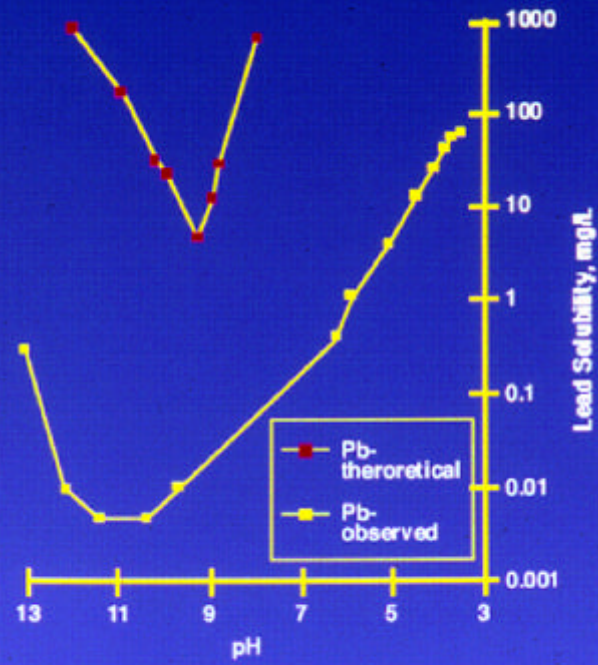
Portland Cement Association

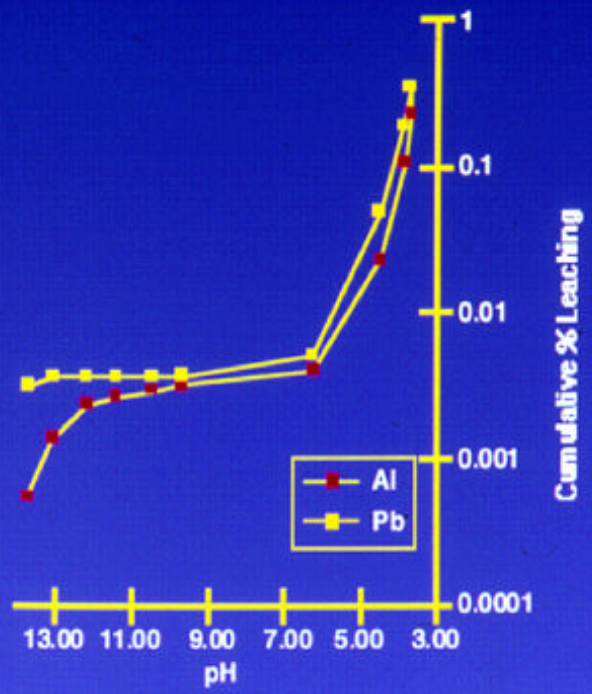
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**PORTLAND CEMENT
ASSOCIATION**







Cost Estimates

- Mobilization \$100,000 - 200,000
- Excavation \$10 - 50/cy
- Processing \$50 - 100/cy
- Disposal \$100 - 250/cy