

# Alternative Treatment Technologies for Contaminated Sediments

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Environmental Stewardship  
Concepts

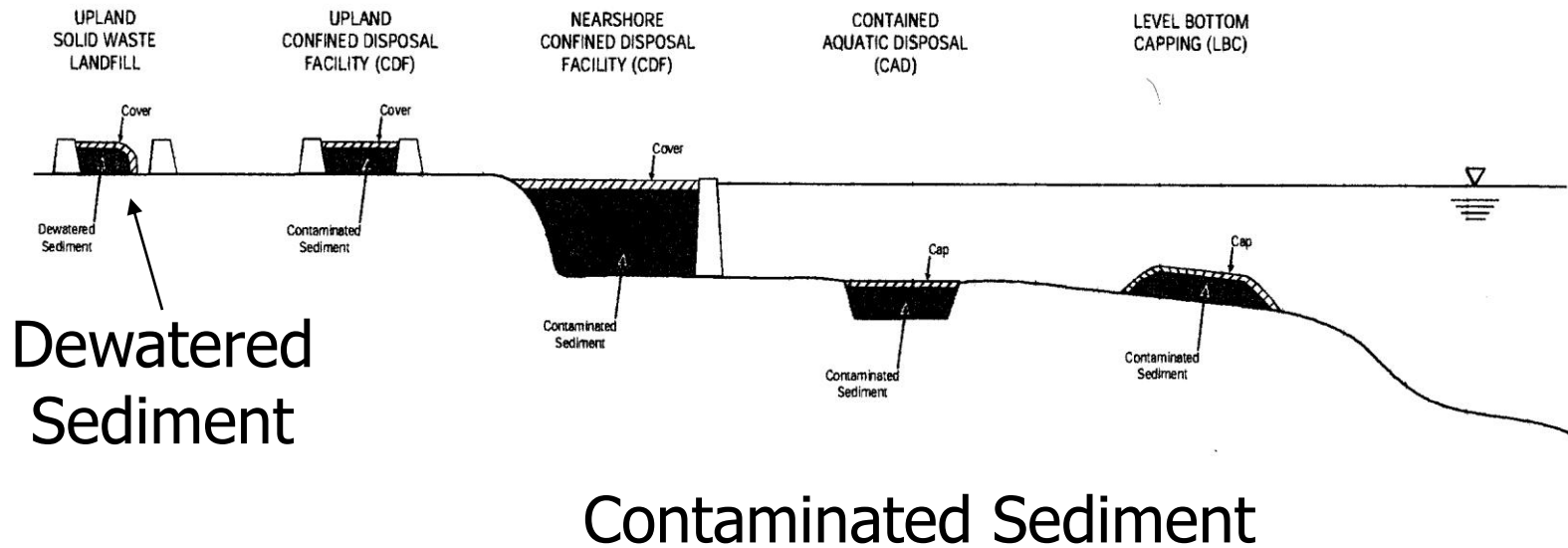
Richmond VA September 2003

# Options for Contaminated Sediments

- Do nothing
- Leave in place and cover with clean materials – cap in place
- Dredge
  - Dispose in the water elsewhere
  - Confined disposal
  - Upland disposal
  - Treatment– *The focus of this talk*

# Disposal Options from MUDS Report

S-5



SOURCE: Based on Palermo et al. 1998a

**Figure S-1** Conceptual Illustration of Confined Disposal Alternatives

MUDS Final PEIS

Oct 99

MPEIS Figure S-1.xar

# Upland/onland Treatment

- Moves the contaminated sediment away from the water
- Isolates and treats sediment
- Requires transportation of sediment
- “Dewatering” nearly always required
- Space and time requirements
- Pilot programs

# Impacts- treatment

- Dredging and any transport will be the same as in other options
- loss of habitat
- fugitive releases
- emissions, discharges and/or waste streams from the facility
- untreated or residual contamination

# Treatment Alternatives

- Gas-phase high temperature
- Soil washing and separation
- Iron injection
- Sound and irradiation under controlled conditions

# Gas Phase Chemical Reduction

- In use for over a decade
- High temperature gases – 800-950 °C
- Used to treat contaminated soil and sediments
- 99.999998 % efficient
- Bay City, Michigan (SITE Program)
- Warren Co., NC 99.999999% destruction

# Iron Injection

- Research papers from ES& T
- Inject powdered iron at 250 °C
- Reduces higher Cl PCB's and removes Cl from the less Cl PCB's
- 8 Hours
- Under development

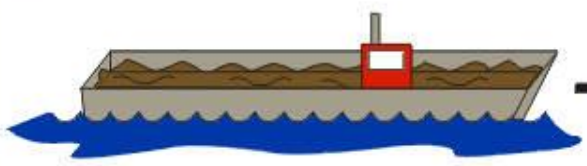
# Sonochemical Irradiation

- Sound is used at high frequency
- In combination with irradiation
- At normal temperatures
- 100 % reduction in Cl for higher CL PCB's

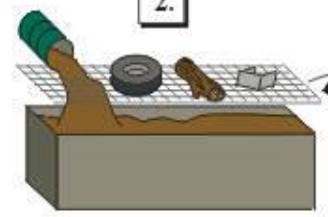
# Soil Washing and Treatment

- Used on a variety of contaminants-including mixtures
- Best on soil/sediment with large size and/or mixtures
- Washes and separates the fine grains
- Uses chemicals to extract the PCB's
- Can be tailored to the type of material and chemicals

1. Delivery of Dredged Material by Barge

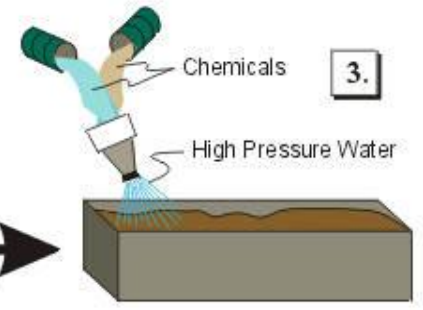


2.



Vibrating Screen for Separation of Oversized Materials

3.



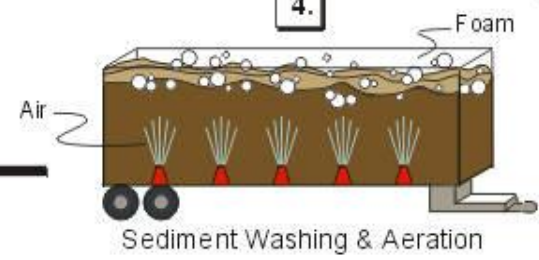
Chemicals

High Pressure Water



Side Stream Oversized Material Disposal

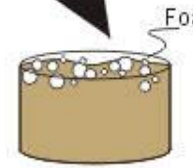
4.



Air

Foam

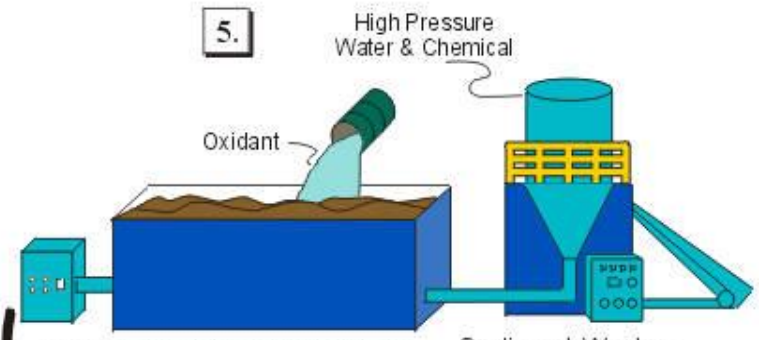
Sediment Washing & Aeration



Foam

Side Stream Skimming Tank for Floatable Organic Contaminants

5.



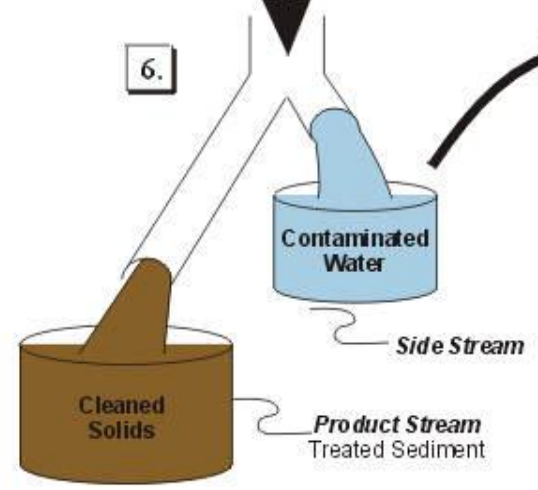
High Pressure Water & Chemical

Oxidant

Cavitation Unit for Destruction of Organic Contaminants

Sediment Washer

6.



Contaminated Water

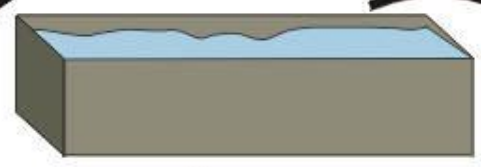
Side Stream

Cleaned Solids

Product Stream Treated Sediment

7.

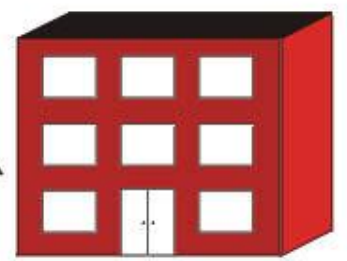
Pretreatment for Metals (Precipitation)



Side Stream Sludges to Landfill

8.

Recycle Water Back Through the System or to a Publicly Owned Water Treatment Facility



# Costs- from MUDS report

<b><u>Alternative</u></b>	<b><u>Cost \$/yd<sup>3</sup></u></b>
Dredge/Cap	\$15-\$21
Cap in place	<\$15-\$21?
Aquatic confined	\$28-\$46
Upland confined	\$49- \$67
Treatment	\$60-230 wash

# Conclusions

- Various treatment options exist now
  - Wash and separate
  - Gas, iron, sound
- MUDS report supported a regional treatment facility
- Some techniques in development may be applicable
- Costs are not certain