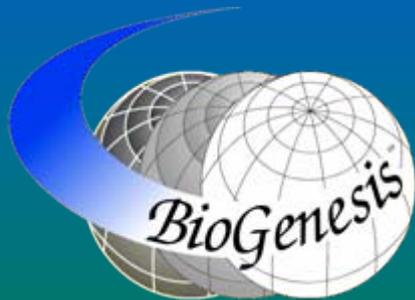


BioGenesisSM Washing

A High Value, Low Cost Solution for Contaminated Soil and Sediment



BioGenesis Enterprises, Inc.

Outline

- **Who we are**
- **Value we bring to sediment management**
- **What we do**
- **How we have been tested**
- **What about cost?**
- **Our advantages and disadvantages**



Who We Are

- **Soil and sediment washing technology developer; founded in 1989**
- **Technologies tested with US EPA and US ACOE, starting in 1991; patented from 1994**
- **Works with leading engineering firms to implement technology nationally and internationally**

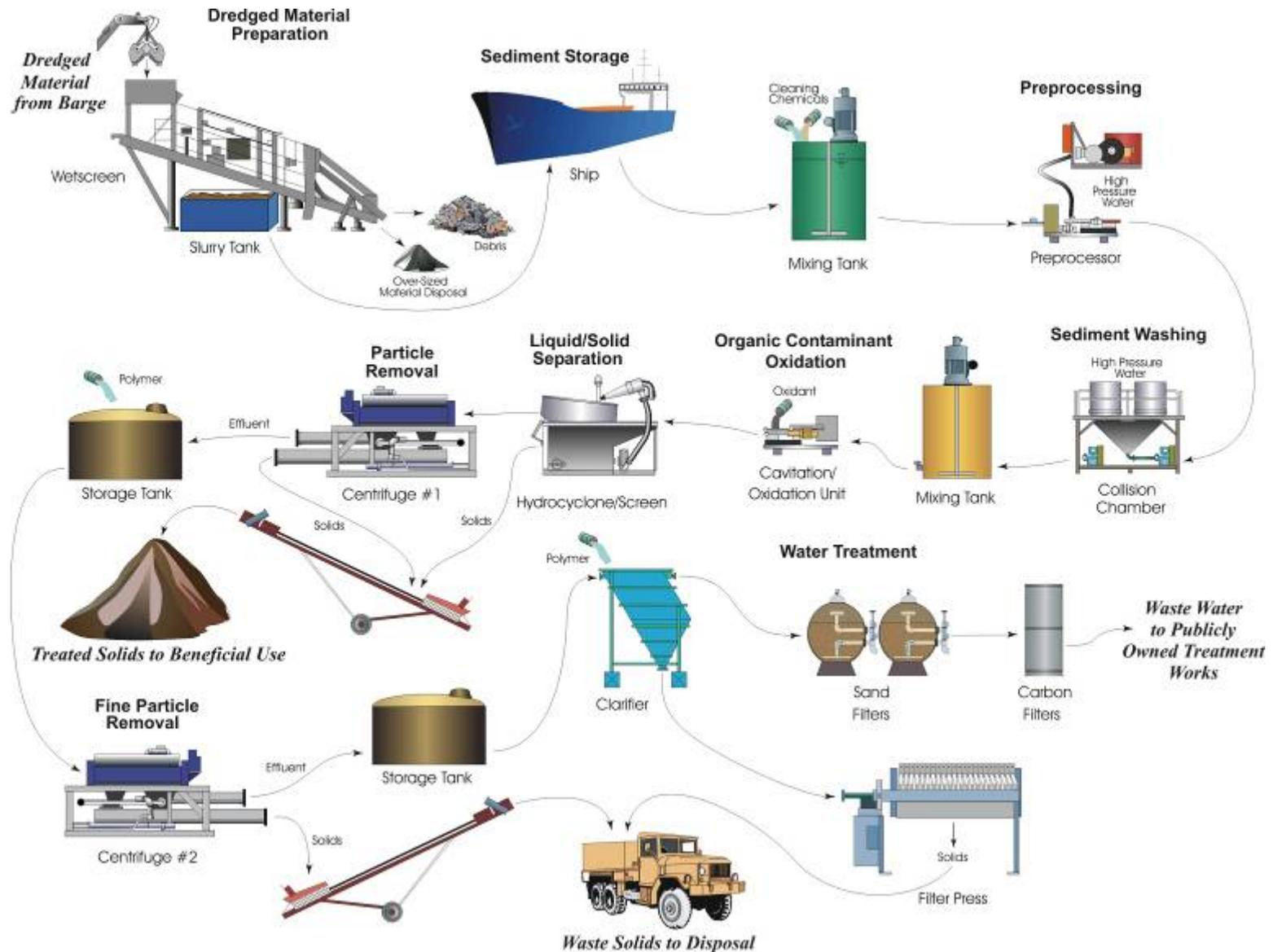


Value We Bring to Sediment Management

- U.S. EPA validated results; 12 years of development
- Regulatory acceptance simplifies permitting
- Community understanding of “green” technology
- Simplicity combined with the flexibility to meet project unknowns
- Competitive costs
- Availability of beneficial use options



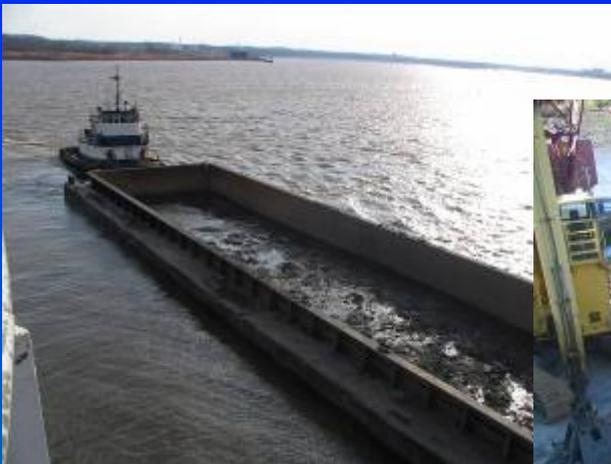
BioGenesisSM Process Flow, NJ Demo



Technology Implementation



BioGenesisSM Process Equipment



BioGenesisSM Process Equipment (cont.)



Environment Canada CoSTTeP Program (Contaminated Sediment Treatment Technology Program)

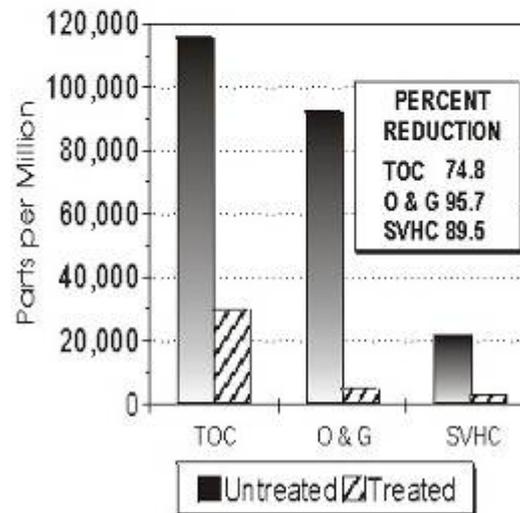


**Sediment grain size:
11% sand, 89%
silt and clay**

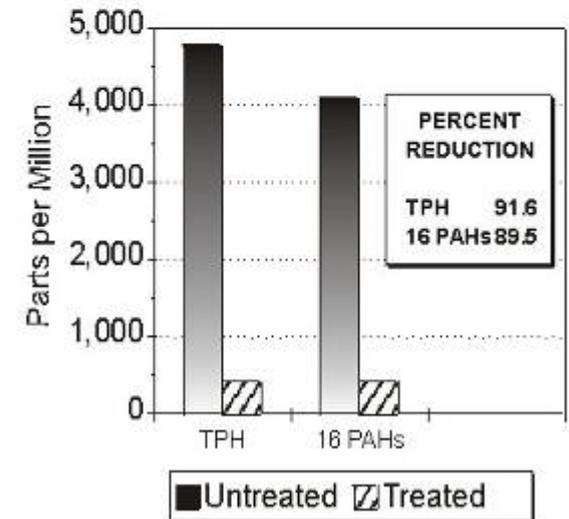
Overall BioGenesisSM Removal Rates

Thunder Bay, Ontario, Harbour Sediment

Total Organic Content, Oil & Grease,
Semi-volatile Hydrocarbons



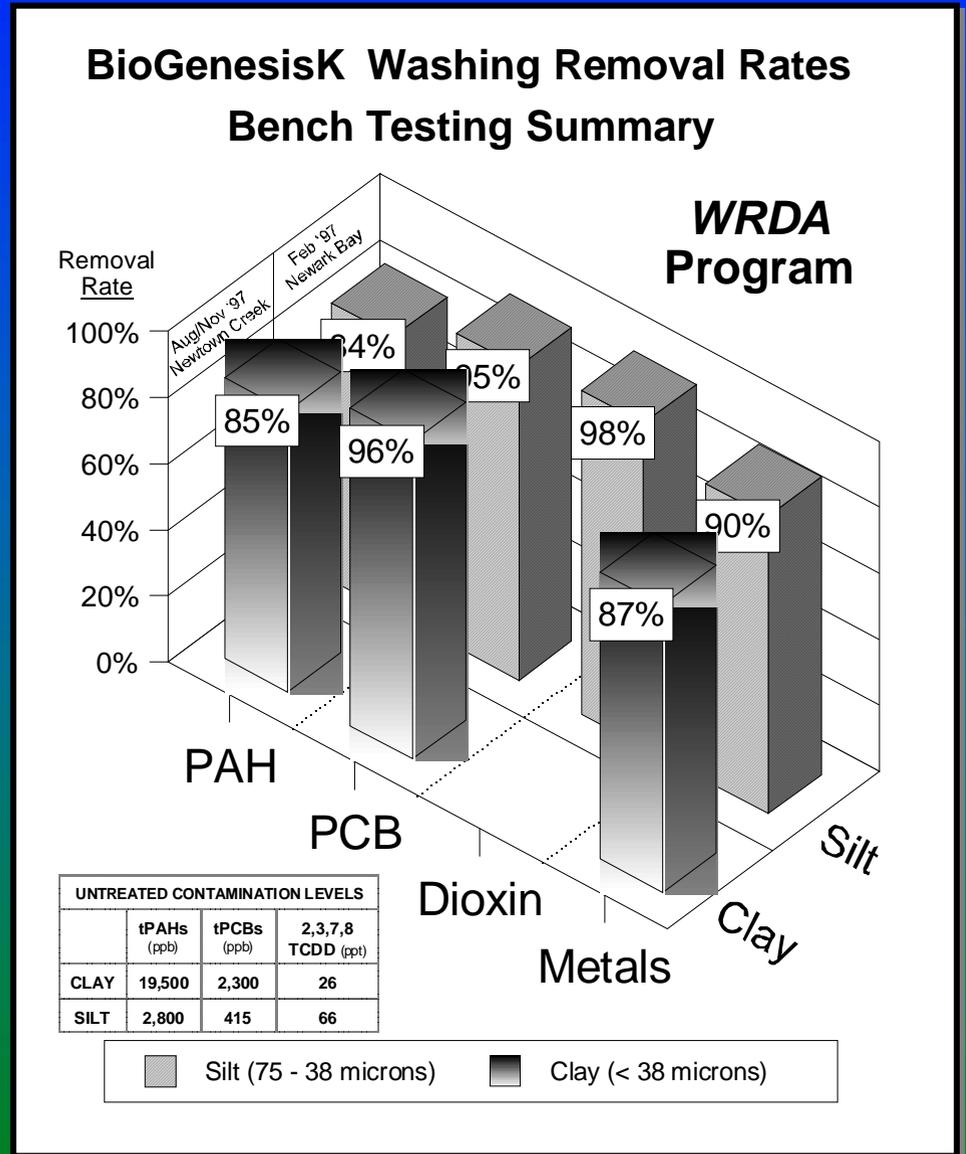
Total Petroleum Hydrocarbons
Poly-aromatic Hydrocarbons



U.S. EPA - U.S. ACE WRDA Program (Water Resources Development Act)

1995 - 1998

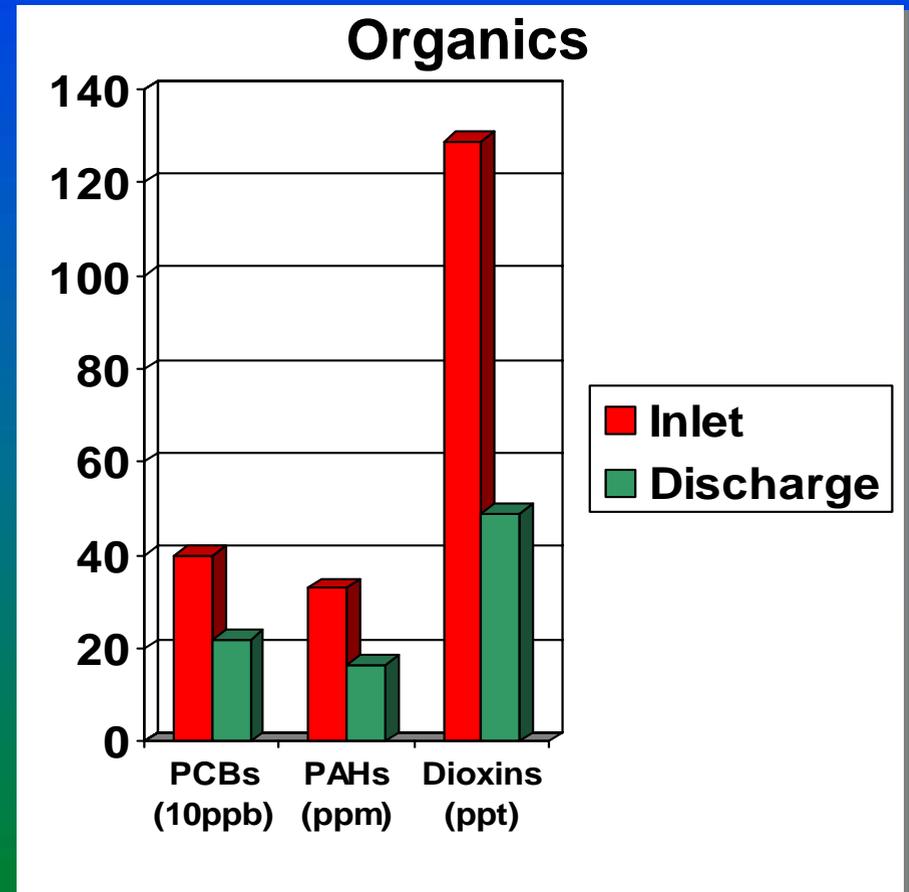
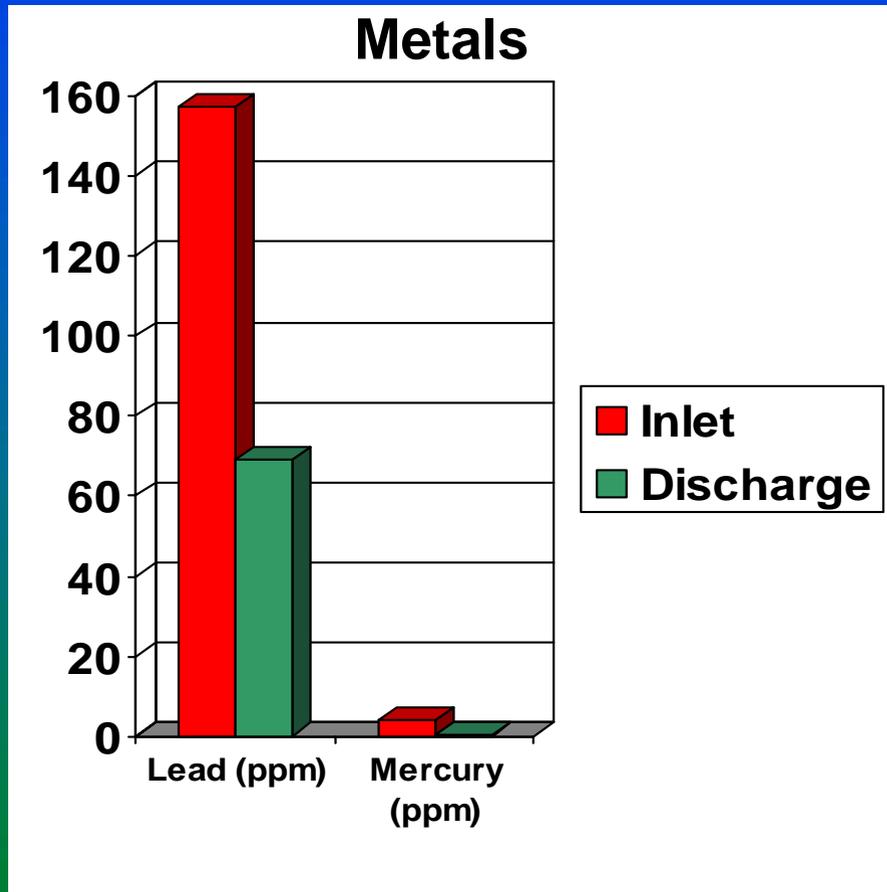
- Bench testing
 - Consistent results
 - Average 92% on silt
 - Average 89% on clay



U.S. EPA - U.S. ACE WRDA Program (Water Resources Development Act)

1999 – 2000

Pilot Project in Kearny, New Jersey

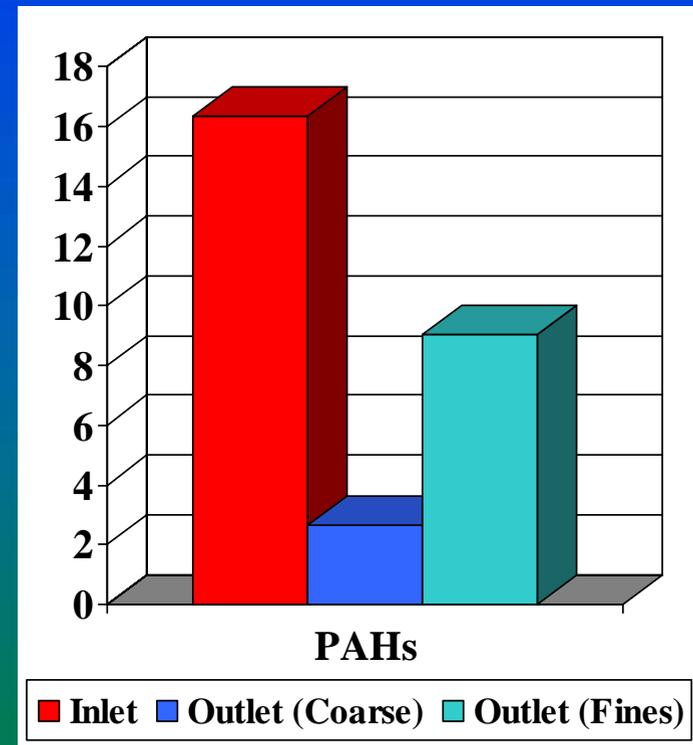
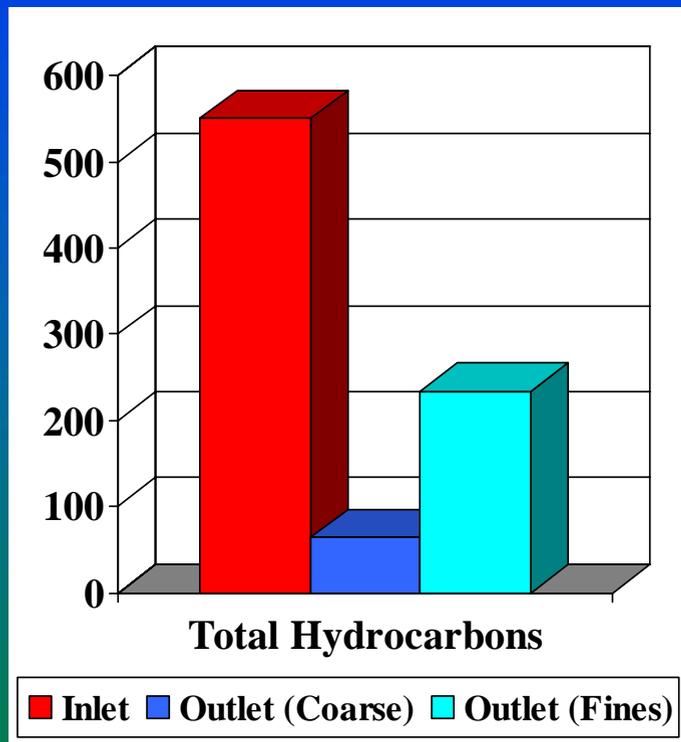


Sediment grain size: 55% silt, 42% clay

Sediment Treatment Pilot Project

Port of Venice, Italy

Organics Reduction - Batch 1 (mg/kg d.w.)



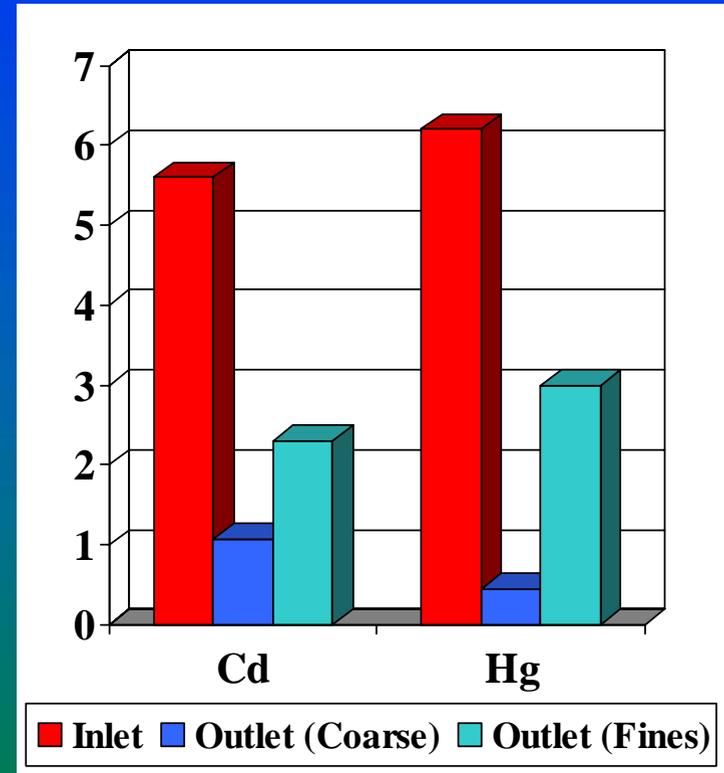
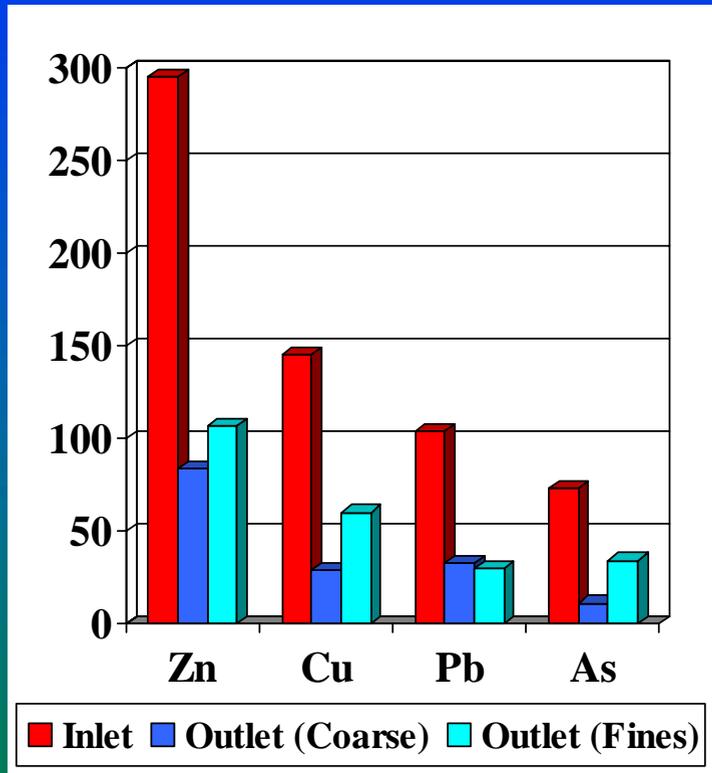
Sediment grain size: 5% sand, 66% silt, 28% clay



Sediment Treatment Pilot Project

Port of Venice, Italy

Metals Reduction - Batch 2 (mg/kg d.w.)

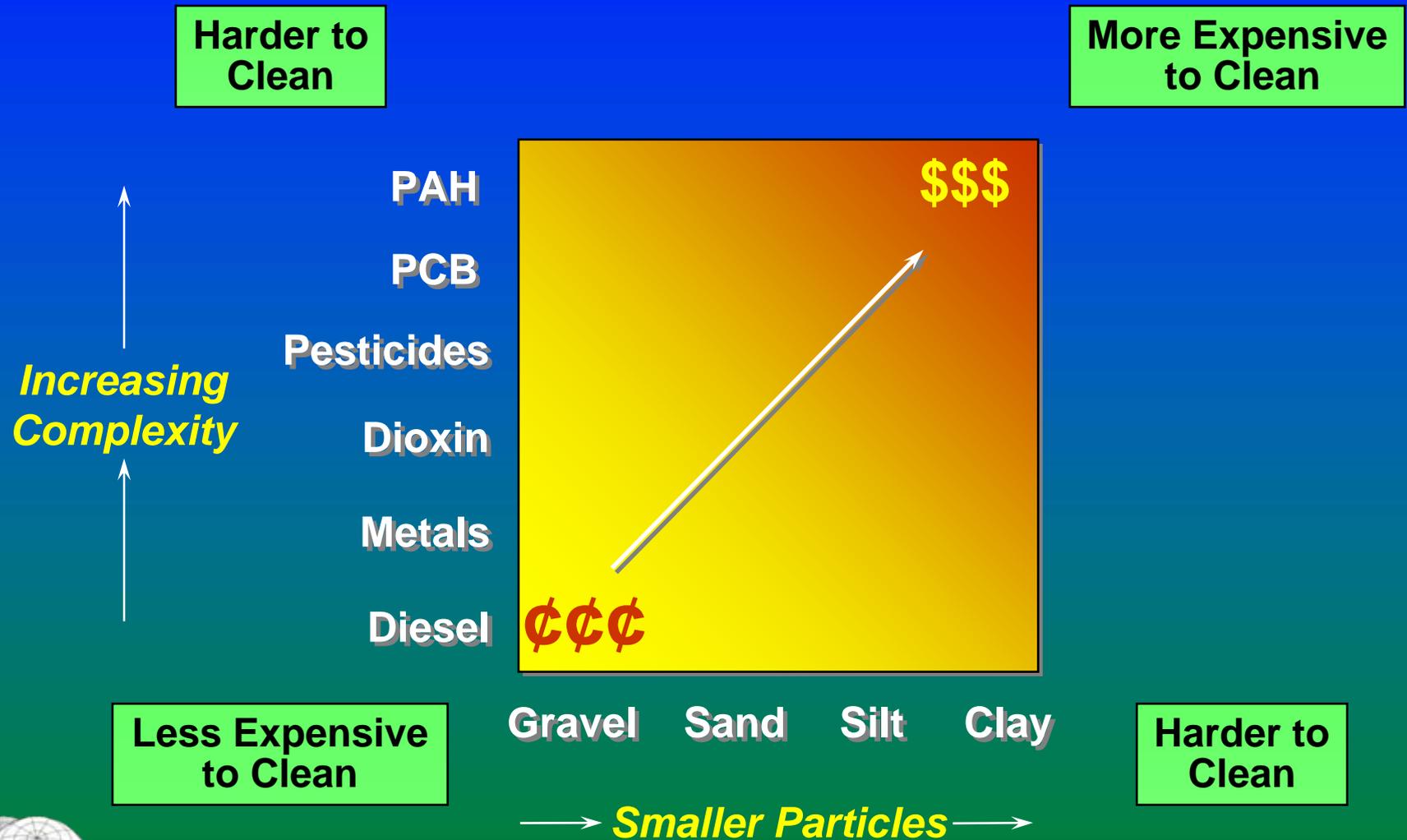


Sediment grain size: 28% sand, 54% silt, 17% clay



Treatment Cost Factors

Contaminant Type & Sediment Matrix

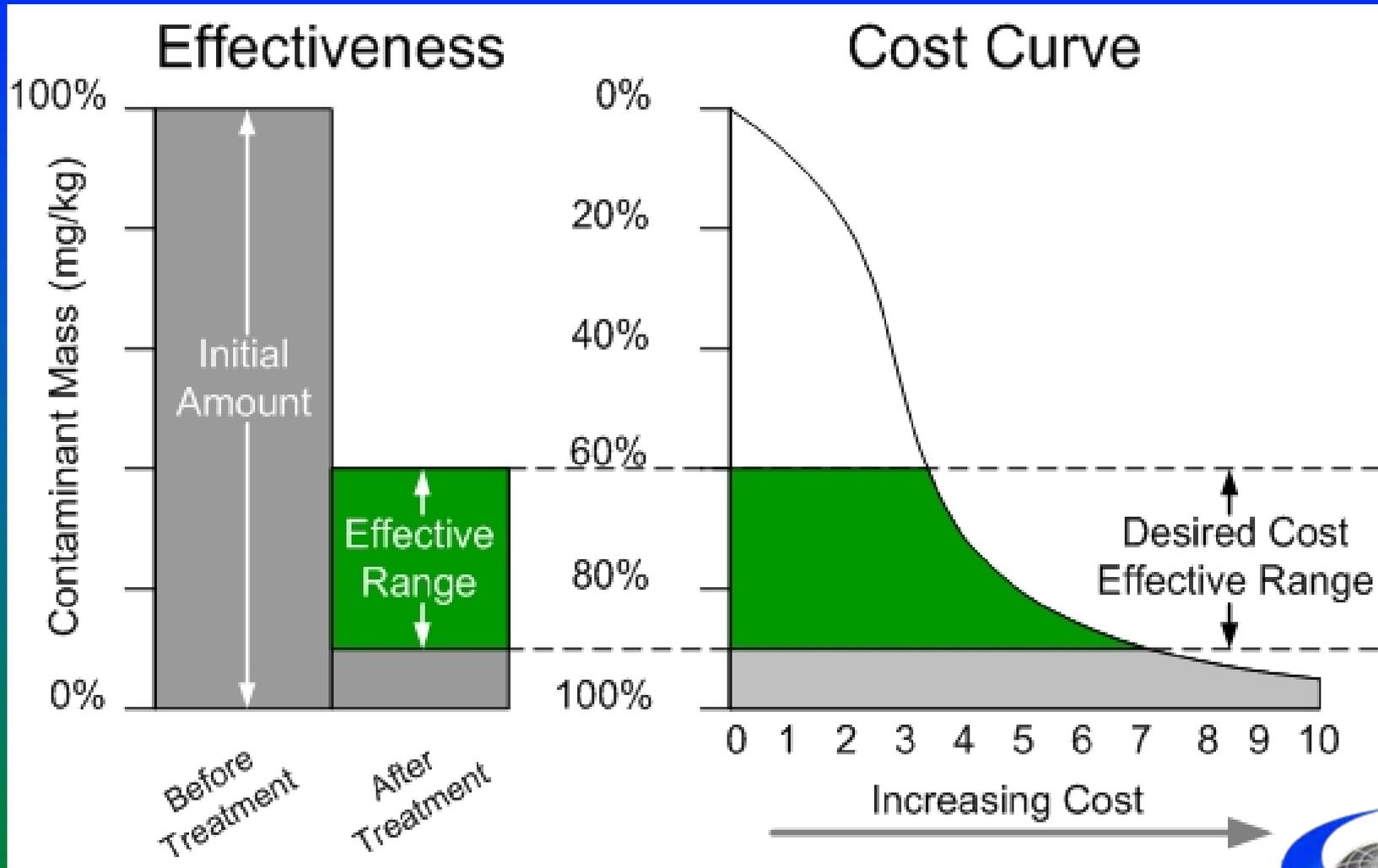


Additional Factors That Affect Processing Costs

- **Concentration level and range of contaminants in sediment**
- **Volume of sediment to be treated (i.e. project size or long term supply)**
- **Local market (volume/value) for beneficial use products**



BioGenesisSM Process Effectiveness vs. Cost



Competitive Costs

- Incineration \$200/T
- Chemical dechlorination \$200/T +
- Vitrification \$175/T +
- Bioremediation \$75-100/T
- *Soil Washing* \$50-80/T
- Thermal Desorption \$75-150T
- Solvent Extraction \$150-200/T +
- Dewatering (no disposal) \$50-80/T
- Stabilization (no disposal) \$20-50/T
- Capping \$15-50/T



Advantages & Disadvantages

■ **Advantages**

- Excellent environmental characteristics
- Excellent safety characteristics
- Simple and understandable
- Controllable, tailorable performance
- Affordable and competitive costs
- Produces beneficial use products

■ **Disadvantages**

- Lowest unit cost requires larger quantities



Thank You

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