Upland Disposal
Management of Confined Disposal Facilities (CDFs)

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When do we use upland disposal?

• Logistics
  - Open water is not first option
  - Upland disposal site in close proximity

• Unsuitable for open water disposal
  - Unacceptable risk
  - Benthic toxicity
  - Dilution attainable
CDF Planning Stage

• Screen potentially suitable sites
  - Location
  - Adjacent land uses
  - Available area
  - Access
  - Ownership/acquisition
  - Transportation
  - Utilities
  - Encroachments
  - Wetlands
  - Site specific receptors
CDF Conceptual Design Stage

• Design objectives
  ➢ Retain solids
  ➢ Contain contaminants
  ➢ Material recovery

• Information/data required
  ➢ Sediment characterization
  ➢ Dredging plan
  ➢ Dredging/offloading method
  ➢ Column settling tests
  ➢ Consolidation testing

• Three step process....
Step I Capacity Evaluation

- **SETTLE**
  - Storage & clarification area
  - Outlet weir length
  - Effluent suspended solids

- **PSDDF**
  - Long term consolidation
  - Multiple placements
Step II Preliminary Layout
Step III Information Gathering

- Borrow materials
- Receiving waters
  - Flow
  - Water quality
- Site characterization
  - Geotechnical
  - Chemical
- Climate information
  - Stormflows
  - Dewatering
CDF Detailed Design Stage

- Construction/RFP level specifications
- Site appurtenances
- Dike design
  - Material specifications, side slopes
  - Construction staging
- Outlet structures
  - Size, type, number and placement
- Water management
  - Pumping or treatment requirements
- Overall Management Plan
Construction

- Site preparation
  - Grubbing
  - Grading
  - Foundation treatment
- Dike construction
- Dewatering trench
- Liners, filters
- Utilities
- Roadways
- Fencing
CDF Management Plan

• Objectives
  - Maximize storage capacity
  - Accelerate dewatering
  - Environmental compliance

• Typical Management activities
  - Dewatering
  - Vegetation control
  - Effluent monitoring
  - Material recovery
  - Dike raising
  - Closure and capping
Dewatering

- **Perimeter trenching**
  - Long reach excavator
- **Cross trenching**
  - Typically 100’-200’ on center
  - Low pressure tracked vehicles
  - Requires crust formation
- **Mechanical dewatering**
  - Rare - material processing
  - Off-site disposal
- **Vertical drains**
- **Underdrains**
Material Recovery

- Beneficial use = sustainability
- Recovery methods
  - Simple excavation
  - Composting
  - Physico-Chemical Treatment
Sediment Treatment

• Applicability
  - Navigation dredging - limited ($$)
  - More common to remediation dredging

• Basic Processes
  - Separation
  - Contaminant immobilization
  - Contaminant destruction

Increasing effectiveness & cost
Separation

- Grain size separation
  - Sand recovery
- Density separation
  - Contaminant bearing phases
Contaminant Immobilization

- Contaminant binding amendments
  - Lime
  - Portland Cement
  - Fly Ash
- Mechanical mixing
  - Barge
  - Pit

(Photos courtesy of Sand Diego Unified Port District)
Contaminant Destruction

- **Thermal**
  - Rotary Kiln (RK)
  - GTI Cement Lock™ (GTI)
  - Minergy (MIN)

- **Soil Washing**
  - Biogenesis (BG)
Beneficial Use Products

- Rotary Kiln (RK)
  - Construction-grade light-weight aggregate (LWA)
- GTI Cement Lock™ (GTI)
  - Construction-grade cement
- Minergy (MIN)
  - Glass aggregate
- Biogenesis (BG)
  - Decontaminated soil
Treatment Trains

Pretreatment

Process

Residuals
Pretreatment

Oversize/Trash Removal

Separation/Dewatering/Drying
Residuals = Cost

Biogenesis Sediment Washing Mass Balance

<table>
<thead>
<tr>
<th>Treatment stage</th>
<th>Weight (Pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dredge</td>
<td>15000</td>
</tr>
<tr>
<td>Pre-Processor</td>
<td>5000</td>
</tr>
<tr>
<td>Collision Chamber</td>
<td>-5000</td>
</tr>
<tr>
<td>Cavitation/Oxidation</td>
<td>-10000</td>
</tr>
<tr>
<td>Electrocoagulation</td>
<td>-15000</td>
</tr>
<tr>
<td>Settler / Filter Press</td>
<td>-20000</td>
</tr>
<tr>
<td>Treated Solids</td>
<td>-25000</td>
</tr>
</tbody>
</table>

Legend:
- Water
- Solid
CDF Closure

• Capping
• End uses
  ➢ Municipal facilities
  ➢ Recreation areas
  ➢ Agricultural areas
  ➢ Habitat

• Moving away from closure to sustainable use…. 