Upland Disposal
Management of Confined Disposal Facilities (CDFs)

Trudy J. Estes
US Army ERDC, Vicksburg, MS
Email: Trudy.J.Estes@usace.army.mil
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 Life-cycle Stages

- Planning
- Design
- Construction
- Management
- Closure

Preliminary Site Screening
Conceptual Design
Final Site Selection
Detailed Design

Dredged Material Assessment and Management Seminar
15-17 April 2008, Sacramento, CA
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
Pretreatment

Oversize/Trash Removal

Separation/Dewatering/Drying

Dredged Material Assessment and Management Seminar
15-17 April 2008, Sacramento, CA
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>10000</td>
</tr>
<tr>
<td>Cavitation/Oxidation</td>
<td></td>
</tr>
<tr>
<td>Electrocoagulation</td>
<td></td>
</tr>
<tr>
<td>Settle / Filter Press</td>
<td></td>
</tr>
<tr>
<td>Treated Solids</td>
<td></td>
</tr>
</tbody>
</table>

Dredged Material Assessment and Management Seminar
15-17 April 2008, Sacramento, CA
CDF Closure

- Capping
- End uses
  - Municipal facilities
  - Recreation areas
  - Agricultural areas
  - Habitat

- Moving away from closure to sustainable use....