Operating Methods and Strategies

(Tab J)

Dr. Michael R. Palermo
Mike@mikepalermo.com

4/20/2005

Environmental Dredging Workshop
Seattle, Washington 2005

Training Objectives

• Learn terminology for SMUs, dredge prisms, and dredge cuts,
• Learn considerations for vertical and horizontal sequencing of work
• Learn considerations of method of operation
Operational Considerations – Outline

• Sediment Management Units, Prisms, and Cuts
• Sequencing Removal
  – Vertical sequencing
  – Horizontal sequencing
• Operations Plan

SMUs, Prism, Cuts, etc.

How to slice and dice:
• Sediment Management Units
  – Large areas with differing characteristics
• Dredging Prisms
  – 3-D geometric volume of sediments to be dredged
• Dredging Management Unit
  – Units within an SMU with specified unique final cutline elevations
• Cuts
  – A specific production cut within a DMU
• Compliance Demonstration Areas
  – Area sampled to confirm dredging effectiveness

Note: There is no standardized definitions of these terms
Sediment Management Units

- Usually based on larger areas with differing characteristics

Dredging Prisms

- 3-D geometric space for volume of sediments to be dredged
- Can be composed of areas with multiple cutline elevations

Source: Elmer and Lally (EPA Forum)
Dredging Management Units

New Bedford Harbor – DMUs used for:
• Projecting annual resource requirements;
• Improving accuracy of material balance calculations;
• Specifying sequence of removal;
• Providing data to bidders on sediment types for each unit; and,
• Monitoring remedial progress.

Dredging Management Units – New Bedford Example

Dredging Management Units - Head of Hylebos Example

Dredging Cuts

- Cut - a specific area and associated depth of cutline
- Area a function of sediment data and dredge operating factors
- Set final cutline at lowest points of contamination
- Box cuts to follow slopes

Source: USACE Dredging Fundaments 2004
Implications of Dredge Cuts

- Dredges can’t easily follow slopes
- Box cuts result in increased sediment removal to achieve desired results
- Sloughing of box cuts are problematic
- Layback slopes may be needed for deeper cuts
- Account for potential increases in volumes

Compliance Demonstration Areas

- Area sampled to confirm dredging effectiveness
- Spacing of borings drive size of acceptance units
Sequencing Removal

• Vertical sequencing
  – Within a DMU
• Horizontal sequencing
  – Sequencing of DMUs

Vertical Sequencing

For a given Dredging Management Unit:
• Cutlines selected to remove contaminated sediment and meet CULs
  – NOT to achieve a given cutline elevation or volume (don’t let the contractor “drop the bottom” to meet an elevation target)
• Selection of thickness/ number of cuts
  – Drives equipment selection
  – Will influence the residual concentration
  – Consider flowback of residuals
• Cleanup passes
Horizontal Sequencing

- Riverine – work upstream to downstream
- Estuarine – more complicated
  - Remove hot spots first
  - Work upstream to downstream wrt predominant flow regime
  - Partial removals over entire area (last cuts with lower concentrations due to overdredging)
  - Schedule around tidal cycles for critical DMUs

Overdredge Allowances

- Overdredge allowance should be tighter for ED as compared to Navigational Dredging
- 6 inches is the “state of the practice”
- Incentives – Bonus for minimal overdredge
- Disincentives - Penalties for excessive overdredging
Overdredge Allowances

Profiles

Source: Elmer and Lally (EPA Forum)

4/20/2005  Environmental Dredging Workshop
Seattle, Washington 2005

Overdredge Allowances

Example of Overexcavation

Source: Elmer and Lally (EPA Forum)

4/20/2005  Environmental Dredging Workshop
Seattle, Washington 2005
Methods of Operation

Manistique – outriggers used to control positioning of auger dredge

Methods of Operation

Manistique - Diver operated suction using dredge pumps
Operations Plans

- Should be a written document, approved by the PM
- Mob/ Demob
- Equipment for production and cleanup passes and for debris removal
- Mode of operation of equipment
- Logistics for rehandling and transport
- Should delineate SMUs, DMUs, Cuts, etc.
- Should identify sequence of work
- Management actions and contingencies

QUESTIONS?