



Transportation, Offloading, and Rehandling

(Tab E)

Norman R. Francingues, MSEE

frasang@canufly.net

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Training Objectives

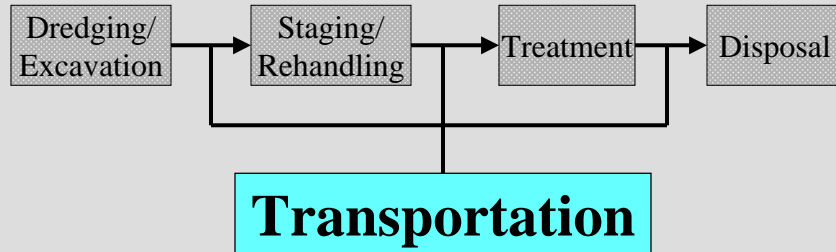
- To become familiar with different modes of transporting, offloading, and rehandling of dredged material.
- To identify uses and limitations of different methods.

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Linkages



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Transportation Modes

- Pipeline
- Barge
- Conveyer
- Railcar
- Truck/Trailer

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Generally Speaking:

- Mechanical dredges typically produce dense, near *in situ* water content material that is hauled by barge, railcar, truck/trailer, or conveyor systems.
- Hydraulic dredges produce dredged material slurries ranging from 5-20% by volume that can be transported by pipeline to either a rehandling site or disposal site.

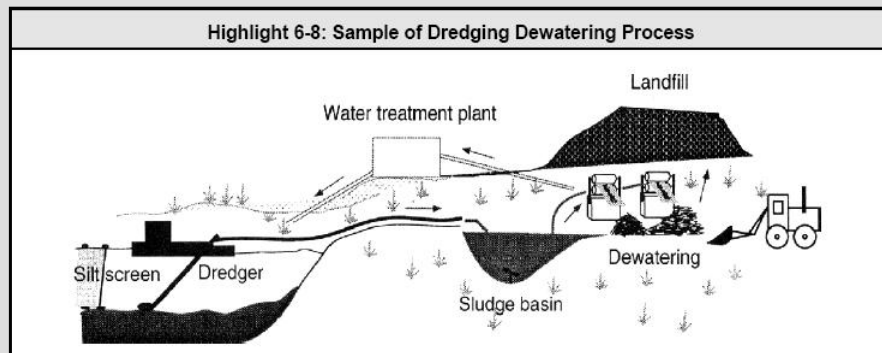
4/20/2005

Environmental Dredging Workshop
Seattle, Washington 2005



Rehandling/Temporary Storage

Highlight 6-8: Sample of Dredging Dewatering Process



Temporary storage may be needed for dewatering or other pretreatment or equalization prior to treatment and disposal.

4/20/2005

Environmental Dredging Workshop
Seattle, Washington 2005



Transport Considerations



- Transport distance.
- Scale of project.
- Method of removal – dry excavation versus dredging.
- Batch transport
 - not efficient for hydraulic dredging since pipeline transport is inherent with removal.
 - is a step in the process train for mechanical dredging but reslurry & pipeline is an option.

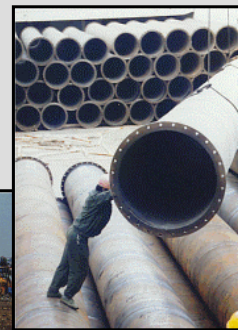


4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Pipelines



SCANDIA International



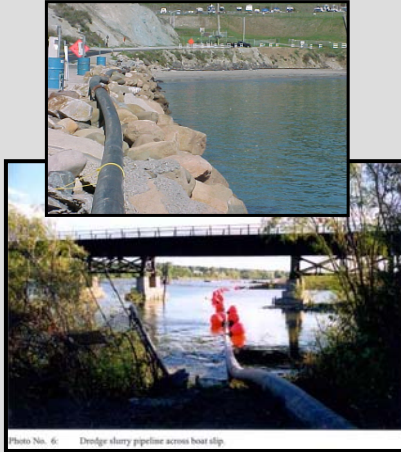
4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Pipelines

- Direct pumping to rehandling, treatment and/or disposal site when location is near.
- Typical distances only few kilometers unless booster pumps are used.



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Booster Pumps

- Used when dredge has limited hp to pump treatment or disposal site
- Must be carefully selected
- Designed for
 - Feed rate
 - Slurry concentration
 - Pumping distance
 - Pump pressures
 - Pipe diameter
 - Leakage containment



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Booster Pumps

- Next to pump discharge
 - Designed so discharge pressure does not exceed bursting strength of pipeline
- Near mid-point of pipeline
 - Designed so that the velocity pressure exceeds suction head of the pump
 - Typically at about 40% of line length from main pump



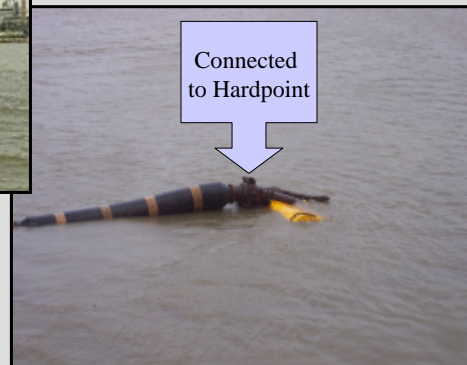
Photo No. 5: On-shore booster pump.

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Floating and Submerged Pipelines



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Pipeline Deployment



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Slurry Transfer

- Mechanically dredged material may also be diluted with water and pumped through a pipeline as a slurry to nearby treatment/disposal sites.



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Slurry Transfer

- Mechanically dredged material may also be loaded into a hopper equipped with a piston pump



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Transport By Barge



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Barge

- Mechanically dredged material is placed in a scow or barge for transport to a rehandling facility.
- In certain situations, pumping directly into a barge may be feasible.

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Mechanically Loading Barge



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Hydraulically Loading Barge



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Typical Offloading



**Hydraulic crane offloading barge and loading feed hopper
with raw dredged material at Claremont DMRF**

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Offloading Small Barge



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Hydraulic Pump Offloading

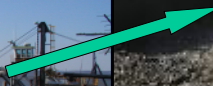


4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Hydraulic Offloader



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Debris



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Screening Debris



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Conveyors

- Mechanical conveyors can move material from barges to adjacent rehandling facilities or to move material relatively short distances.
- Material should be dewatered for transport by conveyor.
- Floating conveyors are not recommended.



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Conveyors

- Conveyor systems used in dewatering facilities



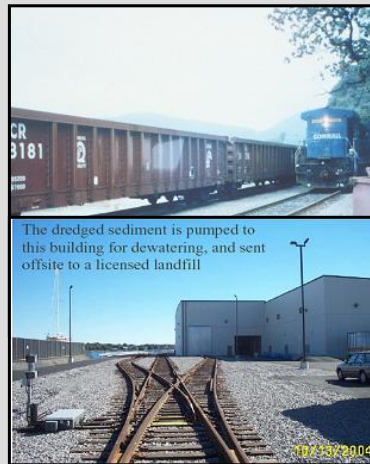
4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Railcar

- Rail spurs may be used or even constructed to link rehandling/treatment facilities to the rail network.
- Many licensed landfills have rail links, so long-distance transport by rail is potentially an option.



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Truck/trailer

- Dredged material re-handled directly from barges or railcars to roll-off containers or dump trucks for transport to treatment/disposal site.
- The material should be dewatered prior to truck transport over surface streets.
- In some smaller sites where dewatering may be difficult or the cost of disposal is not great, conditioning with materials such as lime or cement for hauling may be feasible.

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Offloading Directly to Truck



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Loading Container Box



Excavation

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Offloading Railcar to Truck



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Dewatered/ Stabilized Material



Photo No. 29: Loading of solidified sediment into trucks for offsite disposal.

28 Solidification of sediment in the west equalization basin using hydrated lime.

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Dewatered/ Stabilized Material



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Decon Truck Leaving Site



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*

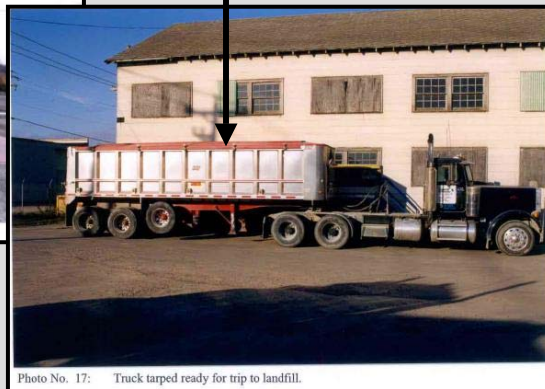


Truck Leaving Site



Weighing

Tarpe



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Truck Dumping at Disposal Site



Photo No. 25: Disposal of sediment in Cell 12A at the modified Fort James industrial landfill in Green Bay.

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Project Managers



- Should consider the compatibility of the dredge with the subsequent transport of the dredged sediment.
- Should consider potential contaminant losses to the water column and atmosphere during transport, dewatering, temporary storage, or treatment.
- Should consider the difficulty in removing all sediment from barges, especially when unloading them mechanically.

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*

(Continued)



Project Managers

- Should consider the need to treat water prior to discharge, especially when decontaminating equipment and dewatering dredged material.
- Should included the costs of water treatment in cost estimates for the alternative.
- Should recognize that water treatment costs may also affect choices regarding dredging operation and equipment selection.
- Should evaluate implementation risks, both to workers and to the community, between the various transportation methods.

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*

(Completed)



QUESTIONS?



4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*



Thank You

Norman R. Francingues, MSEE

frasang@canufly.net

4/20/2005

*Environmental Dredging Workshop
Seattle, Washington 2005*