INTERNATIONAL UNION OF OPERATING ENGINEERS

LOCAL 25, MARINE DIVISION

D R E D G I N G

ENVIROMENTAL SEDIMENT REMOVAL
BY MEANS OF MECHANICAL DREDGING

PRESENTATION TOPICS

- WHO ARE WE? UNION & CONTRACTORS
- WHAT IS DREDGING
- TYPES OF DREDGING AND DREDGES
- ENVIROMENTAL DREDGING ADDRESSING ENVIROMENTAL CONCERNS WITH THE USE OF MECHANICAL DREDGING
- ADDRESSING COMMUNITY CONCERNS
- QUESTION AND ANSWER PERIOD

International Union of Operating Engineers

IUOE Local 25 Marine Division

DREDGEMEN

- The Operating Engineers is a progressive, diversified trade union that primarily represents Operating Engineers, who work as heavy equipment operators, mechanics, and surveyors in the construction industry, and Stationary Engineers, who work in operations and maintenance in building and industrial complexes.
- Local 25 is just one of 170 local unions of the International Union of Operating Engineers (IUOE) which represent over 400,000 members.
- Local 25 was specifically chartered in 1958 for the sole purpose of providing professional organized labor to the dredging industry.
- Local 25 covers a jurisdictional area from Maine to Texas and has nearly fifty years of dredging operational experience.
- The membership of Local 25 are employed aboard dredges, boats and all related project support vessels in all types of classifications in the maritime dredging industry.
- Basically, our members are classified as seamen and are specifically utilized in dredging operations, therefore we are also known as DREDGEMEN.

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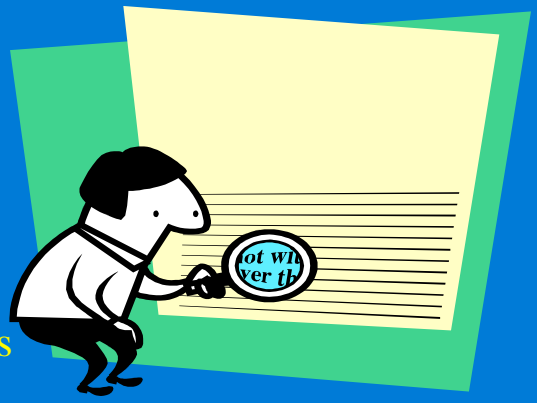
90% of our contracted labor work is financially supported by the U.S. Government through funding to the USACE specifically for Dredging Projects.

- Local 25 has many different types of Labor Contracts (a.k.a **Collective Bargaining Agreements**). Other types of contracted labor work that we cover, that is not specifically dredging or funded through the government are:

  - Tugboat Agreements
  - Ferryboat Agreements
  - Offshore Aggregates Mining Agreements
  - Oyster Shell Mining Agreements
  - Maintenance Shipyard Agreements
  - Drilling and Blasting for the purpose of Dredging Agreements
  - Offshore Pipeline and Cable Laying Agreements



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EXPERIENCE AND PROFESSIONALISM

First and foremost, an experienced dredge crew is crucial to the success of any project. Since dredging is local 25's area of expertise, our membership has the technical training and extensive hands-on experience in all types of dredging operations.

When dredging projects that deal with contaminated material sediment remediation, it has been noted that many organizations and companies who deal with these projects have stressed that having dredge operators that have experience and knowledge to perform the work can have a profound effect on the amount of resuspension of the contaminated material. This is an accurate statement that especially holds true for the use of an environmental mechanical clamshell bucket as seen in the picture on the right.

LOCAL 25 OPERATOR IN THE SEAT OF A LATTICE BOOM BUCKET DREDGE

IUOE LOCAL 25

HAZWOPER

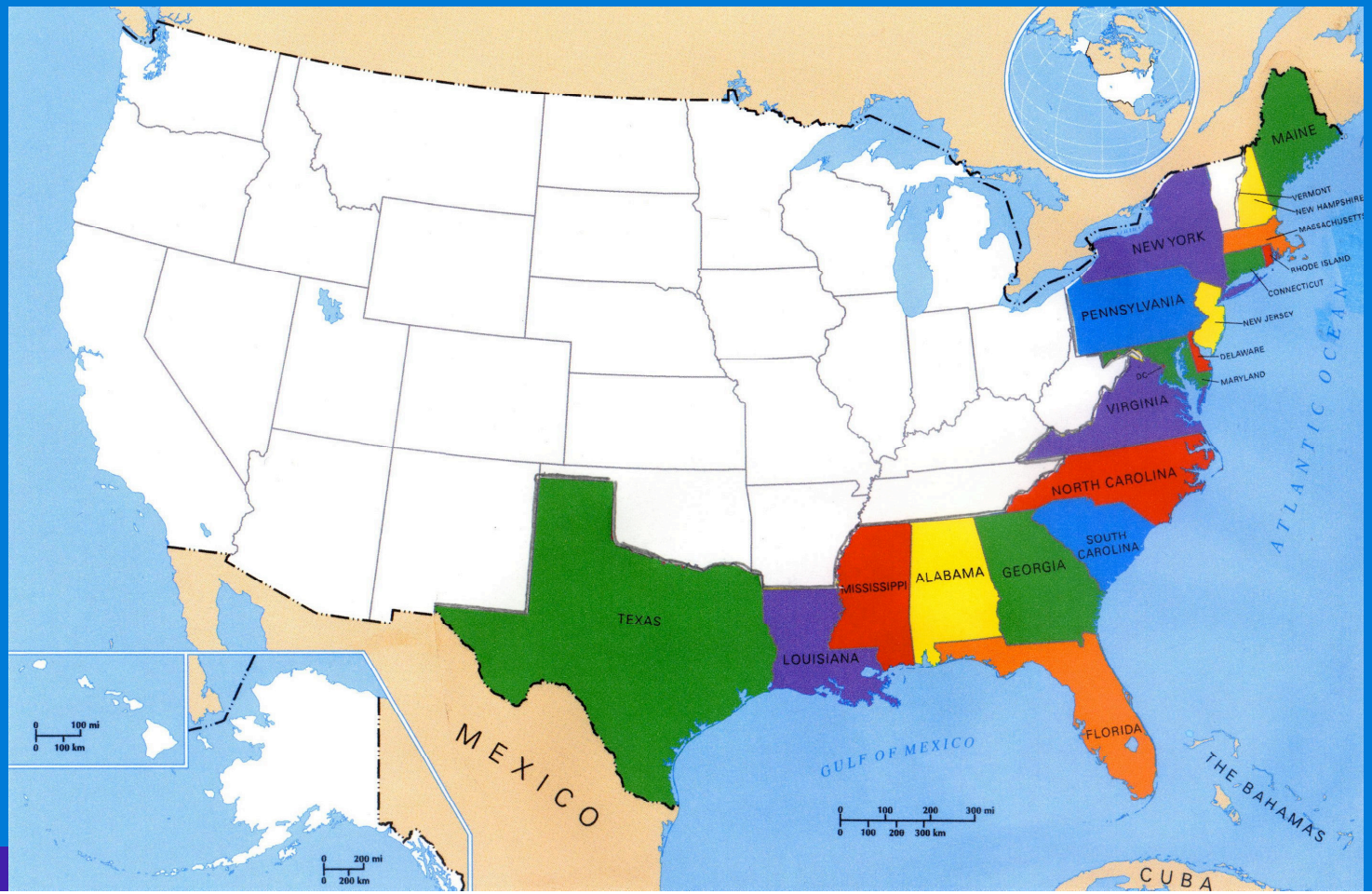
OSHA

HAZMAT TRAINING

For the Hudson River Hazardous material dredging project, our members are professionally trained for dealing with hazardous dredged spoils. The training specifically deals with best practices on how to contain dredge spoils to have the least impact on the environment and how to properly protect themselves and others from possible contamination.

IUOE LOCAL 25

LOCAL 25 HAS A VAST "JURISDICTIONAL AREA OF COVERAGE", WHICH INCORPORATES THE STATES SHOWN IN COLOR BELOW:



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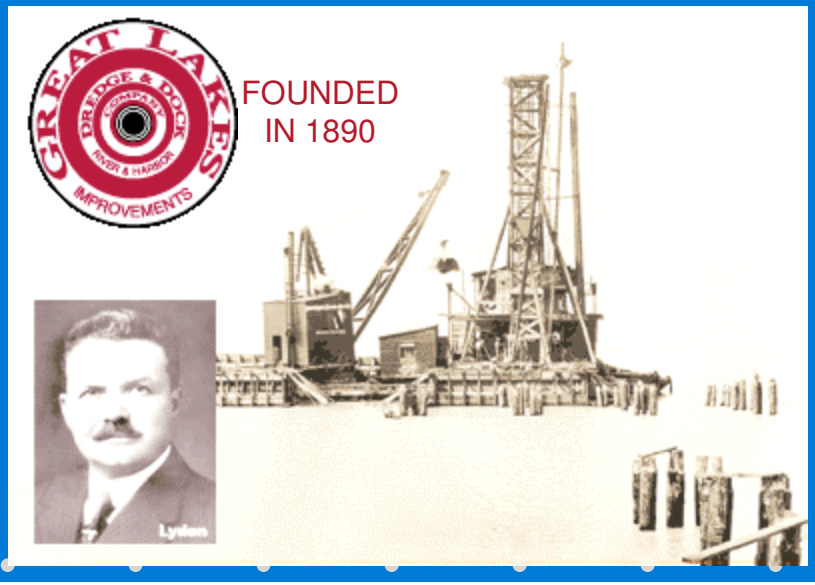
IUOE LOCAL 25 MARINE DIVISION CONTRACTORS

- Local 25 has signatory agreements with 32 contractors, which represent nearly all of the largest dredging contractors in the United States.
- Several of our larger signatory contractors have over 100 years of Dredging Experience.
- The contractors solely utilize our union as their signal largest resource for labor for the dredging industry.



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THE UNION CONTRACTORS

WEEKS MARINE

Cashman Equipment Corp.
Marine & General Contractor
ABS & Inland Barge Rentals

WGI Warren George, Inc.

GREAT LAKES DREDGE & DOCK COMPANY
RIVER & HARBOR IMPROVEMENTS

Bean EXCAVATION

MODERN CONTINENTAL Marine

LANGENFELDER MARINE INC.
LMI
STEVENSVILLE, MARYLAND

ISD
Inner Space Dredging Services Inc.
Dredging & Marine Contractor

DonJon Marine Inc.

Caldwell
Marine International, LLC.

NORFOLK DREDGING COMPANY
CHESAPEAKE, VA.

BIDCO MARINE GROUP

CASHMAN

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WHAT IS DREDGING & THE REASONS FOR IT

WHAT IS DREDGING?

In a few words, Dredging is essentially, the underwater excavation and removal of sand, soil or silt and its movement from one place to another.

DREDGING CONSIST OF THE FOLLOW TYPES OF OPERATIONS:

NAVIGATION

LAND CREATION

BEACH REPLENISHMENT

AGGREGATE MINING

ENVIRONMENTAL REHABILITATION

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THE TYPES OF DREDGING

NAVIGATIONAL DREDGING

The main objective of dredging is the creation of deeper water for the construction of new harbors, ports, basins, canals and waterways. If the natural depths in an area are increased for the first time the activity is known as “capital dredging”. With capital dredging a multitude of materials may be encountered. Soft material, such as sand, silt and clay, may well be mixed with much stiffer clays, boulders and in some cases rock.

Deepening below the pre-existing bed levels can result in sediment being moved into the deepened area by the actions of water currents and waves. The siltation then has to be removed to maintain the required depth. This type of dredging is known as ‘maintenance dredging’.

The more common reason for seeking deeper water is to improve navigation. Navigational dredging is the most common form of dredging activity and is undertaken in ports, harbors and shipping channels throughout the world. In most locations dredging is utilized for vessels with deep drafts, such as large oil tankers, bulk carriers and container ships. In other areas navigational dredging is used for U.S. Coast Guard and Naval vessels, inland waterway tug & barges, fishing vessels, ferries and leisure craft. Some of the work may involve increasing the natural depths as ships become larger or new ports are developed.

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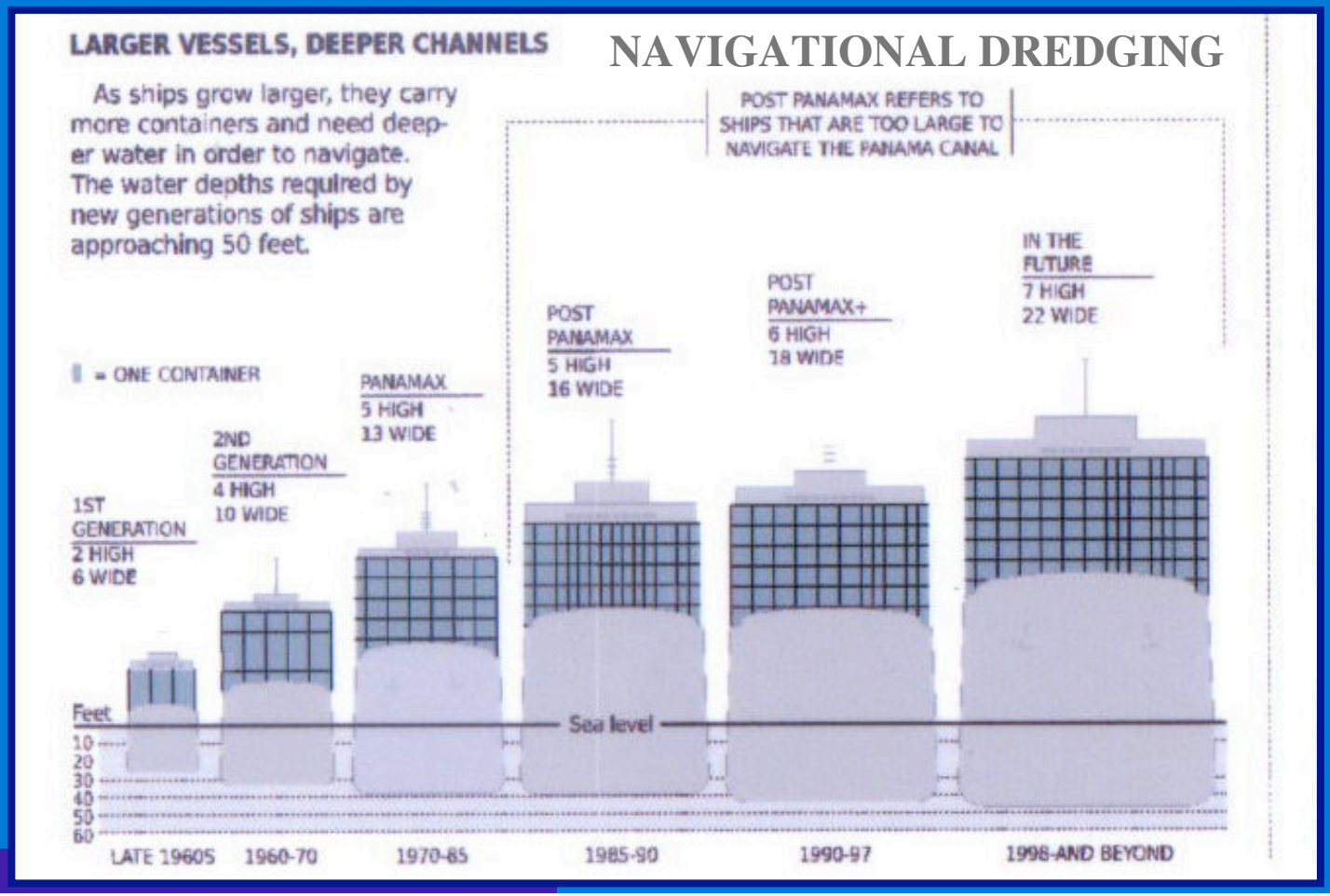
NAVIGATIONAL DREDGING CONTINUED



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NAVIGATIONAL DREDGING CONTINUED

Ongoing technological developments and the need to improve cost effectiveness have resulted in larger, more efficient ships. This in turn, has resulted in the need to enlarge or deepen many of our rivers and canals; our "aquatic highways", in order to provide adequate access to ports and harbors.

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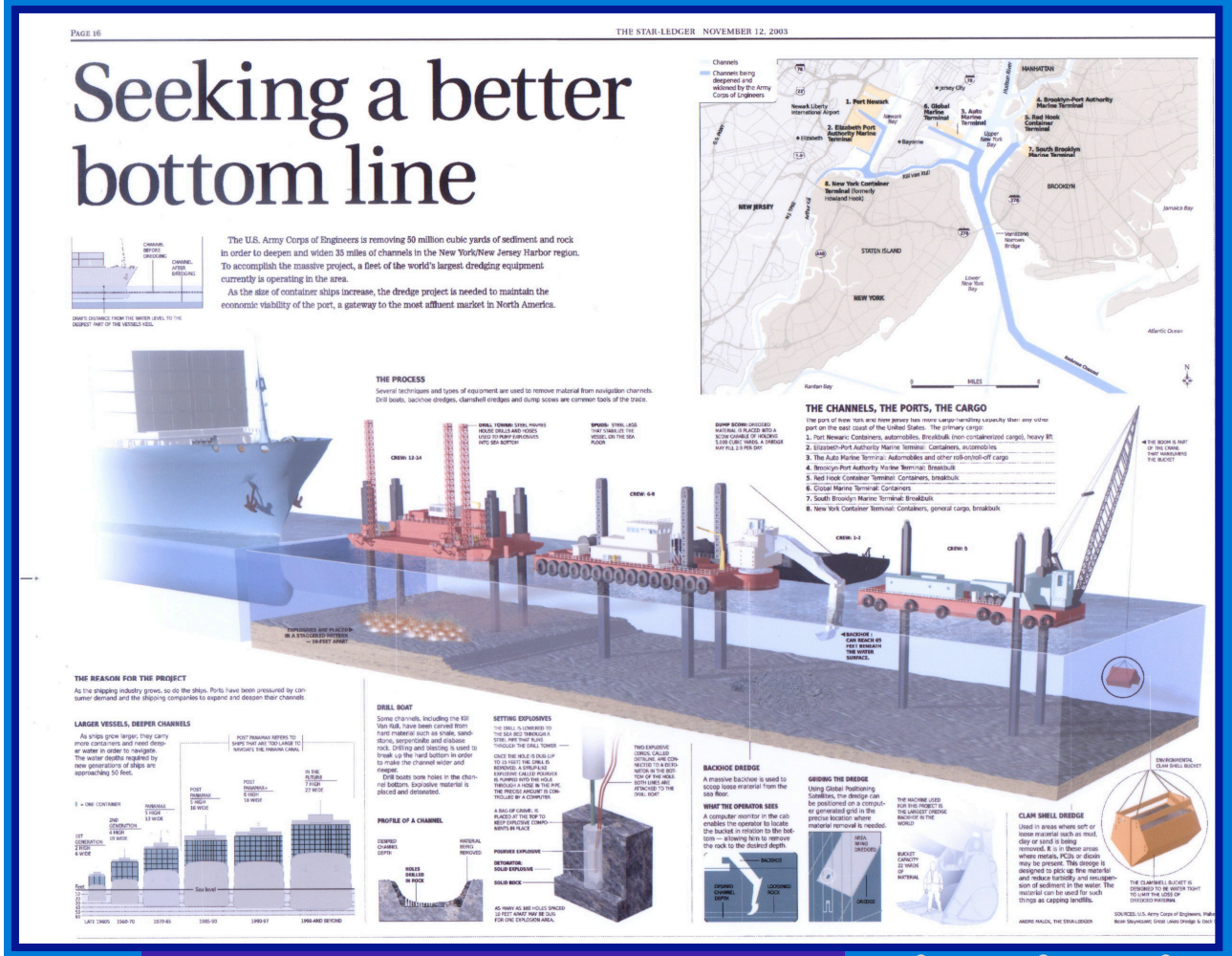
NAVIGATIONAL DREDGING CONTINUED "THE DREDGING OPERATION"



PAGE 16 THE STAR-LEDGER NOVEMBER 12, 2003

Seeking a better bottom line

The U.S. Army Corps of Engineers is removing 50 million cubic yards of sediment and rock in order to deepen and widen 35 miles of channels in the New York/New Jersey Harbor region. To accomplish the massive project, a fleet of the world's largest dredging equipment currently is operating in the area.

As the size of container ships increase, the dredge project is needed to maintain the economic viability of the port, a gateway to the most affluent market in North America.

THE PROCESS

Several techniques and types of equipment are used to remove material from navigation channels. Drill boats, backhoe dredges, clamshell dredges and dump scows are common tools of the trade.

THE CHANNELS, THE PORTS, THE CARGO

The port of New York and New Jersey has more cargo-handling capacity than any other port on the east coast of the United States. The primary cargo:

1. Port Newark: Containers, automobiles, Breakbulk (non-containerized cargo), heavy lift
2. Elizabeth-Port Authority Marine Terminal: Containers, automobiles
3. The Auto Marine Terminal: Automobiles and other roll-on/roll-off cargo
4. Brooklyn-Port Authority Marine Terminal: Breakbulk
5. Red Hook Container Terminal: Containers, breakbulk
6. Global Marine Terminal: Containers
7. South Brooklyn Marine Terminal: Breakbulk
8. New York Container Terminal: Containers, general cargo, breakbulk

THE REASON FOR THE PROJECT

As the shipping industry grows, so do the ships. Ports have been pressured by consumer demand and the shipping companies to expand and deepen their channels.

LARGER VESSELS, DEEPER CHANNELS

As ships grow larger, they carry more containers and need deeper water in order to navigate. The water depths required by new generations of ships are approaching 50 feet.

DRILL BOAT

Some channels, including the Kill Van Kull, have been carved from hard material such as shale, sandstone, serpentinite and diabase rock. Drilling and blasting is used to break up the hard bottom in order to make the channel wider and deeper.

Drill boats bore holes in the channel bottom. Explosive material is placed and detonated.

PROFILE OF A CHANNEL

SETTING EXPLOSIVES

THE DRILL IS LOWERED TO THE SEA BED THROUGH A STEEL PIPE THAT RUNS THROUGH THE DRILL TOWER

ONCE THE HOLE IS DUG UP TO 15 FEET THE DRILL IS REMOVED. A STRIP-LIKE EXPLOSIVE CALLED DETONATOR CORD IS PUMPED INTO THE HOLE THROUGH A HOSE IN THE PIPE. THE PRECISE AMOUNT IS CONTROLLED BY A COMPUTER.

A BAG OF GRAVEL IS PLACED AT THE TOP TO KEEP EXPLOSIVE COMPONENTS IN PLACE

AS MANY AS 300 HOLES SPACED 10 FEET APART MAY BE SHOT FOR ONE EXPLOSION AREA.

BACKHOE DREDGE

A massive backhoe is used to scoop loose material from the sea floor.

WHAT THE OPERATOR SEES

A computer monitor in the cab enables the operator to locate the bucket in relation to the bottom — allowing him to remove the rock to the desired depth.

GUIDING THE DREDGE

Using Global Positioning Satellites, the dredge can be positioned on a computer-generated grid in the precise location where material removal is needed.

THE MACHINE USED FOR THIS PROJECT IS THE LARGEST DREDGE BACKHOE IN THE WORLD

CLAM SHELL DREDGE

Used in areas where soft or loose material such as mud, clay or sand is being removed. It is in these areas where metals, PCBs or dioxin may be present. This dredge is designed to pick up fine material and reduce turbidity and resuspension of sediment in the water. The material can be used for such things as capping landfills.

ANDRE MAUD, THE STAR-LEDGER

SOURCES: U.S. Army Corps of Engineers, Palisades Interstate Park Commission, Great Lakes Dredge & Dock Co.

1. SURVEY THE SITE
2. PLANING
3. MOBILIZATION OF EQUIPMENT
4. DIGGING AND REMOVAL OF SOFTER MATERIAL
5. DRILLING AND BLASTING HARDER MATERIAL
6. DIGGING AND REMOVAL OR HARDER MATERIAL
7. SURVEY THE COMPLETED SITE
8. DEMOBILIZATION OF EQUIPMENT

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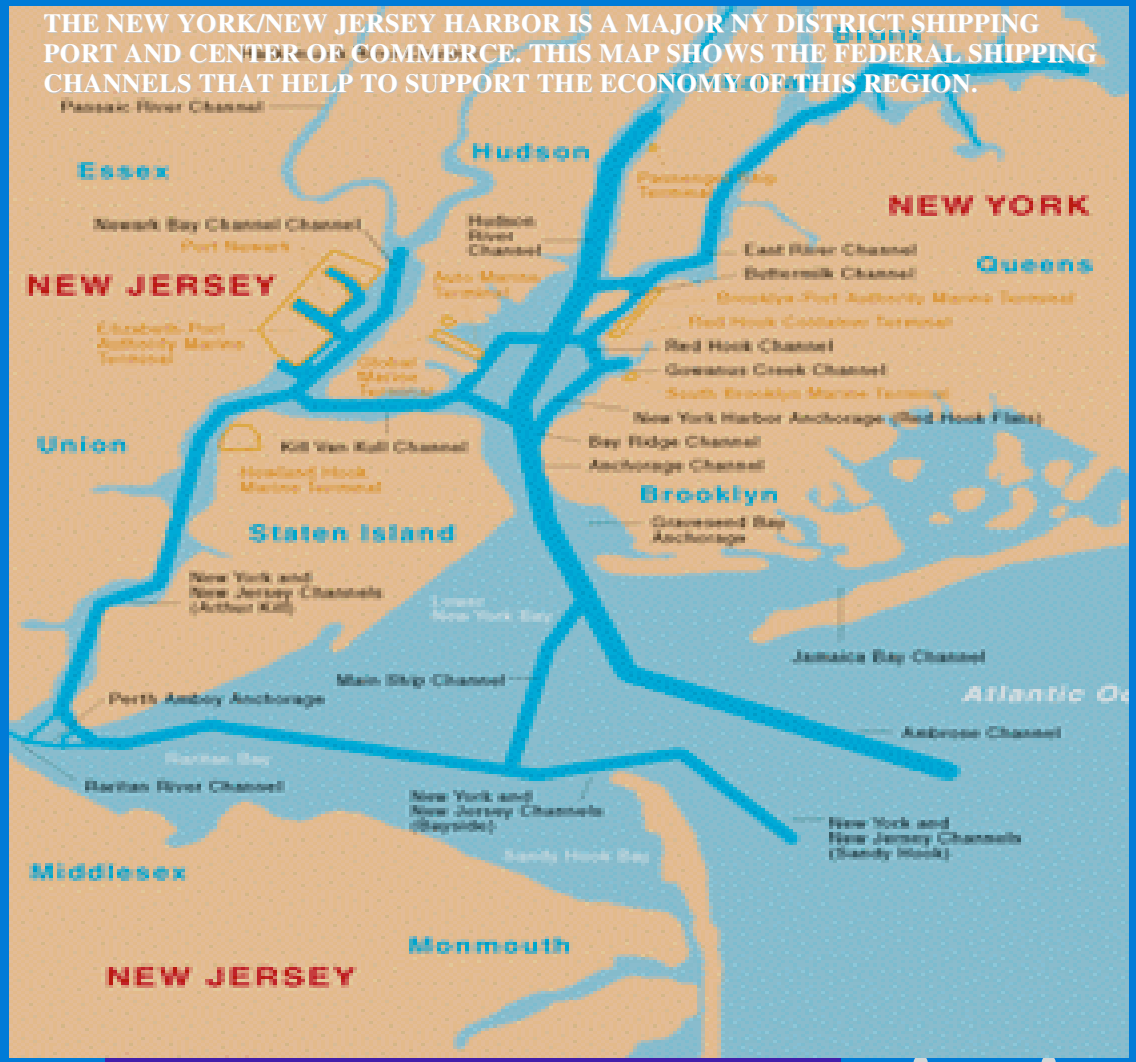

THE NEW YORK/NEW JERSEY HARBOR IS A MAJOR NY DISTRICT SHIPPING PORT AND CENTER OF COMMERCE. THIS MAP SHOWS THE FEDERAL SHIPPING CHANNELS THAT HELP TO SUPPORT THE ECONOMY OF THIS REGION.

NAVIGATIONAL DREDGING CONTINUED

Navigational Dredging can bring great benefit, allowing new ports and harbors to be developed, new land to be created, water transport to function safely and allow pipelines to be laid.

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THE TYPES OF DREDGING CONTINUED

LAND CREATION

LAND CREATION: The creation of new land by **hydraulic fill** is an important use of dredged material. In many coastal situations there is a great shortage of land suitable for development. One way of providing additional space is to raise the existing sea-bed levels by the placement of suitable material recovered from another location. The dredging site may be one where there is a need for deeper water associated with the new land, but more usually is some natural deposit of sediment which can be dredged easily and quickly. After transport to the area to be reclaimed, the material is pumped ashore as a suspension. The sand quickly settles to leave a compact base for such projects as new industry, housing, transport infrastructure and port development. The emphasis is very much on moving large volumes of material as quickly and as economically as possible.

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THE TYPES OF DREDGING CONTINUED

BEACH REPLENISHMENT

BEACH NOURISHMENT is another aspect of dredging where the prime objective is achieved by the recovery of suitable material. Where coastlines erode and degrade an alternative to the construction of such hard forms of protection as rock armor and concrete walls is the placement on the shore of natural sands and gravel's, perhaps recovered from where the eroded material has deposited. By nourishing or replenishing the beach the natural balance is maintained. This type of work requires dredges able to place the sand on what is often a shallow and exposed coastline. The creation or enhancement of wetlands by using finer sized dredged material is another potential beneficial use, as is the construction of offshore berms and islands.

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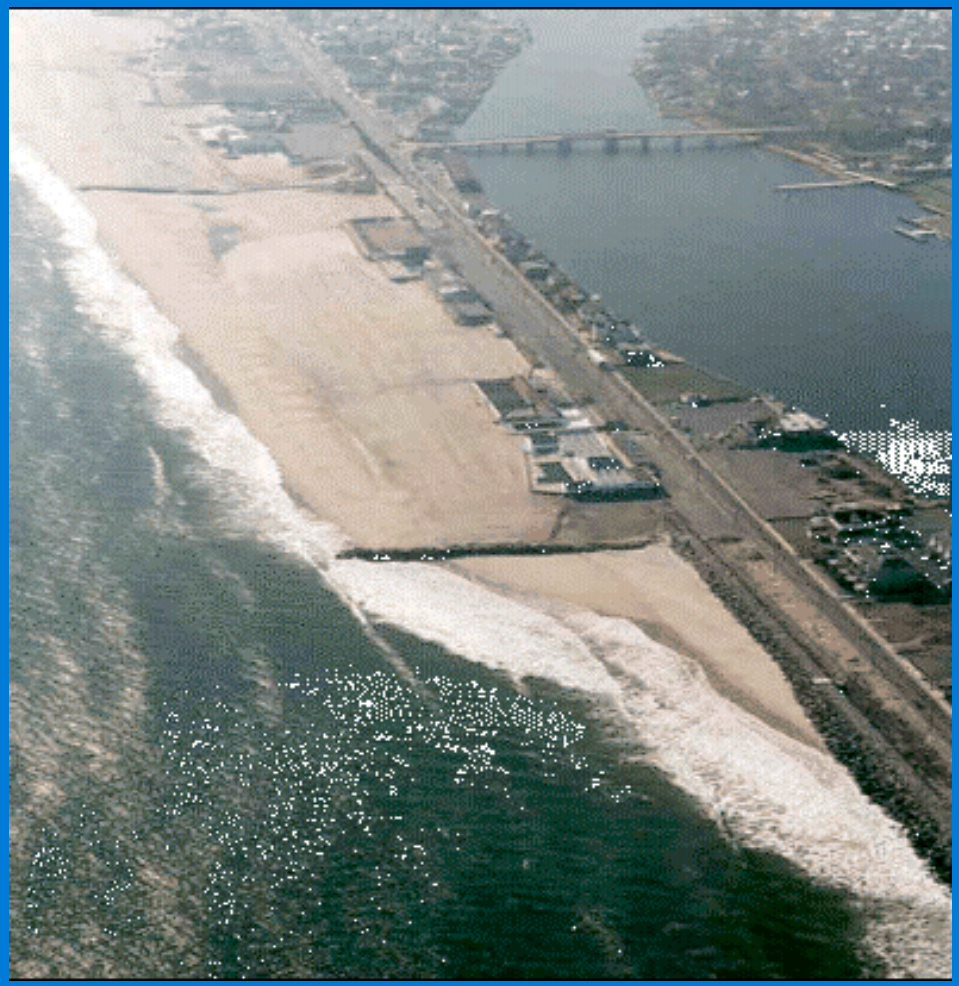

BEACH REPLENISHMENT CONTINUED

New Jersey's 130-mile shoreline is vital to its economy. It brings in over $10 billion a year, half of the State's revenue from tourism.

EXAMPLE OF A BEACH REPLENISHMENT PROJECT

LOCATION:

SEABRIGHT, NEW JERSEY

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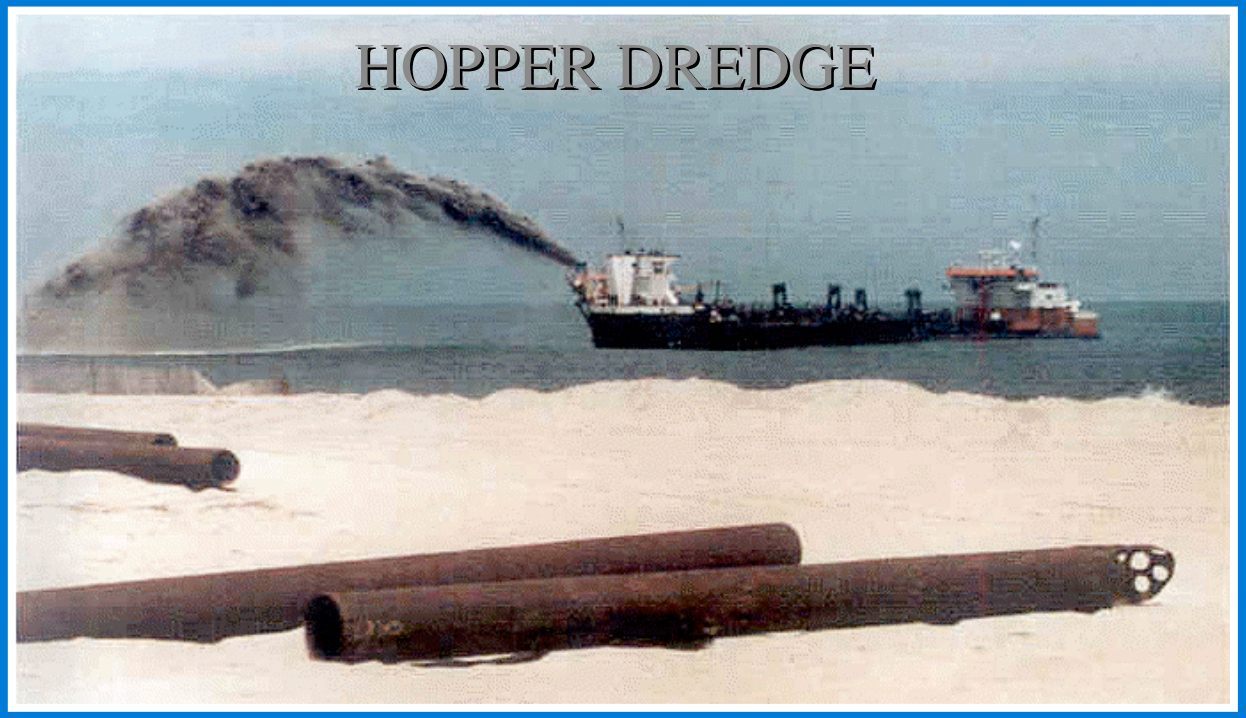
BEACH REPLENISHMENT CONTINUED



Dredges can bring great benefit for those that utilize the sandy beaches or those that benefit from the commerce and revenue created by vacationers.

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HOPPER DREDGE

TUGBOAT

BULL DOZERS PUSHING SAND

PIPELINE PUMPING WATER AND SAND

CUTTER SUCTION PUMP DREDGE

DUSTPAN DREDGE

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THE TYPES OF DREDGING CONTINUED

DREDGE MINING - AGGREGATE DREDGING

Aggregate dredging is the recovery from material from underwater, which has some value or use. In this instance dredging can be regarded as a form of mining. The dredges involved in this type of mining are highly specialized for a particular operation. They may include some form of on-board storage of the recovered material. A much more common material excavated by dredging is sand and gravel for use in concrete manufacture and construction site fill. Sea-dredged aggregate is a valuable alternative to land-based sources of these construction materials.

The U.S. marine-aggregate dredging industry is one of the largest in the world and lands many millions of tons of sand and gravel each year. Aggregate dredging also takes place in many inland waters, including rivers, lakes and ponds. Aggregate dredges are usually specially designed and constructed for the particular operation and/or aggregate.

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THE TYPES OF DREDGING CONTINUED

REMEDIAL "ENVIRONMENTAL" DREDGING

In short, environmental dredging is the safe and precise removal of contaminated sediment.

A successful environmental dredging project achieves the following goals:

. Minimize the re-suspension of contaminants
. Completely removes all contaminated sediment
. **Minimize the amount of water removed**
. Reduces over-dredging

As displayed in the previous slides, there are several kinds of dredges for several types of projects. Not all dredges are deemed satisfactory for environmental clean-up projects. Each type of dredge will vary in project specific cost and effectiveness.

As with any strategy to address contaminated sediments, the **initial conditions of the sediment**, (the **type and extent of contamination**, **the kind of soils**, **water conditions**, etc.) play a large role in what dredges are chosen to best suit the project.

In past projects, the proper selection of the type of dredge has shown to effectively remove contaminated sediments with virtually no losses to the environment. The short-term risks of minimal sediment loss must be weighed against the long-term benefits of removing the bulk of the contamination from the ecosystem, thereby eliminating the risk of further detrimental effects at the site.

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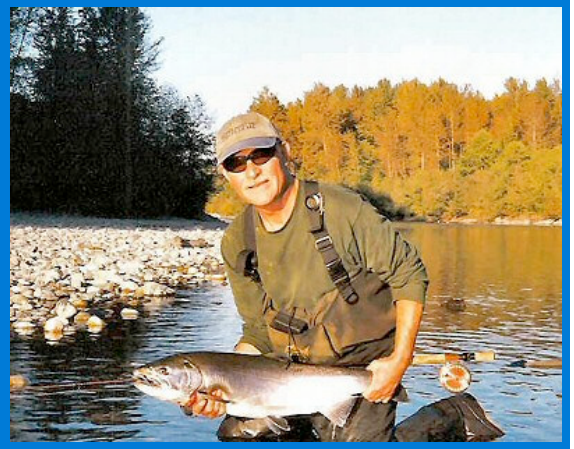
REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

We know by years of past experience, that dredging contaminated sediments up by conventional means provides the only effective removal of toxic sediments from the waterway for treatment and/or disposal and creates a safer environment.



Dredging provides the only opportunity to remove contaminants from the aquatic ecosystem, often breaking their link to the food chain. It is the fastest way of achieving cleanup goals and restoring a site. New dredging technologies enable us to remove polluted sediments more quickly, cleanly, accurately and effectively than ever before.

Many people fear that dredging will stir up contaminated sediment and release toxins into the water column or relocate them downstream. Although dredging can resuspend some contaminants, the amount is generally minimal compared to sediments that may already be releasing downstream. For example, a 1998 dredging pilot project on the Fox River in Wisconsin dredged a PCB hotspot that leached as much as 4-5 kg of PCBs to the river in a year. The dredging itself released just over 2 kg of PCBs, only half of what the hotspot would have released without the dredging. And, by removing the hotspot, the dredging prevented future PCB releases from that site.

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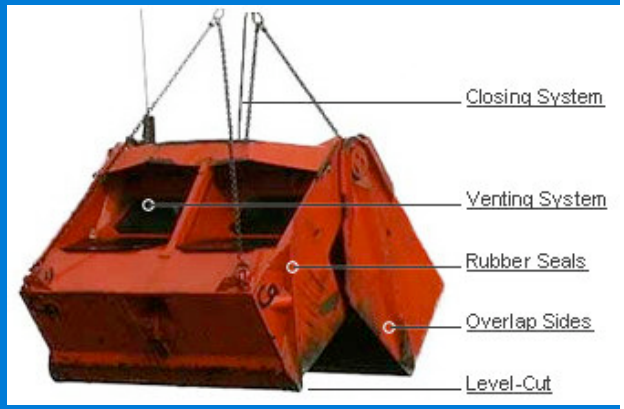
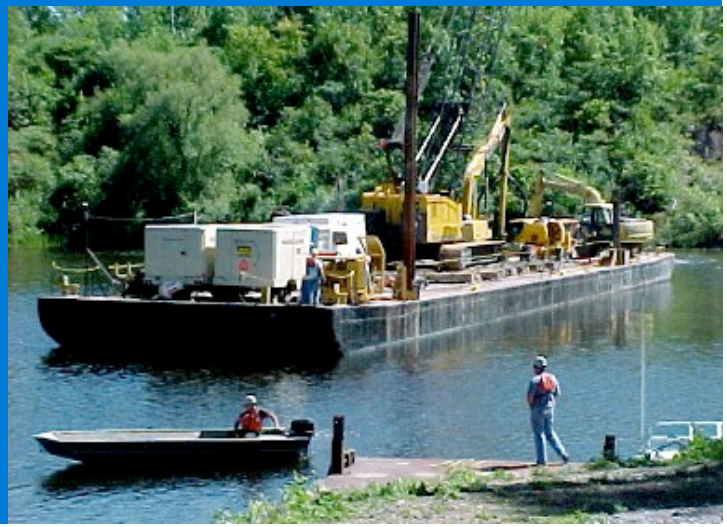
REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

It is also important to remember that, if the sediments are significantly polluted, the river bottom and river water are already degraded. Dredging may disrupt the bottom of the river, but that probably doesn't matter much if the bottom is polluted. And while dredging may slightly increase pollution levels in the water over the short-term, the contaminant levels are probably already high. In the case of the Fox River, PCB levels in the water exceed the state's water quality criteria by as much as 50,000 times. The dredging projects only raised the levels slightly for a short period of time, and they permanently removed hotspots of PCBs that were contributing to the high levels in the water.



Dredging and sediment management technologies and techniques have come a long way in minimizing resuspension and transport downstream. Shallow draft dredges designed specifically for each project will remove contaminated sediments utilizing special environmental buckets to reduce the amount of resuspension. Utilizing shallow draft dredges in conjunction with the environmental bucket have proven to successfully remove sediments with extremely low resuspension rates.



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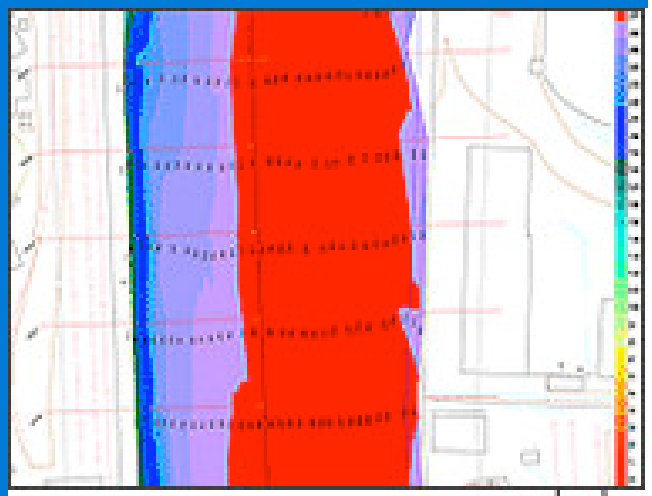
Various types of monitors (video, sonar, etc.) can provide feedback to operators as they are dredging so that they can adjust cycle speed as they go along, thus reducing the amount of resuspension of the sediment.

The latest technology for dredging utilizes Global Positioning Systems, or GPS, for added dredging precision.

CLAMVISION Cable Arm's ClamVision software, is a fully integrated dredge positioning system. ClamVision gives crane operators a real time view of the barge and clamshell bucket positions as they exist over the dredging project.

CLAMVISION displays a 3D, color coded surface derived from existing hydrographic survey data. Each bite is also recorded and color coded based on bite depth or bites left. Deeper bites cover more shallow bites for easier viewing. To further help the operator, an information box provides instant feedback showing current depth, final project depth, target depth, and current bucket depth.

Projects requiring uniform removal over a specified area can be difficult for some dredging systems. (Ex. the bottom is constantly sloping and the specifications call for 1 ft of material to be removed throughout.) ClamVision has a separate mode specifically for these situations. In this mode, color is no longer directly tied to depth, but is tied to the “distance to completion."



pre-dredge

after bites taker

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REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

A variety of methods are used to contain any sediments or contaminants that dredging stirs up. Solid barriers, like coffer dams or sheet pilings, can be placed around dredge sites to keep resuspended sediments from moving downstream. Though expensive and difficult to insert and remove, these structures will withstand strong water currents, wind, boat wakes, ice heave, and other disturbances. The effectiveness of silt curtains and silt screens will depended on the site conditions. These curtains and screens can be anchored to the bottom and held up with floats. Silt curtains do not allow water to pass through them, whereas silt screens allow water to flow through. Both types of barriers are increasingly used to contain resuspended sediment, with very good results.

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REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

CHOOSING A DREDGE

Dredges are suited to remove different kinds of sediments under different conditions. No dredge is suitable for all circumstances; each has its own set of pros and cons that may or may not meet the goals set for a particular cleanup.

Two sets of criteria must be considered when choosing a dredge:

1. The characteristics of the dredge.
2. The characteristics of the Site. Site characteristics are important because some dredges handle different kinds of sediments and water conditions better than others.

The ultimate fate of the dredged material makes the dredge characteristics important. Often, treatment and disposal methods require dredged material to be excavated and delivered at a certain rate and in a certain condition. Selecting the best dredge for the job means making sure not only that it can handle the bottom conditions, but also that it produces dredged material at the right rate and with the right characteristics for further treatment and/or disposal. Dredge-specific characteristics like availability and cost also factor in.

The dredge operator can affect resuspension almost as much as the choice of the dredge. If the dredge goes too fast, resuspension increases. If the dredge cuts too deeply, more sediment will be loosened than the dredge can handle. If the cut is too shallow, dredges with moving cutterheads may dislodge the sediments with too much energy, like an electric mixer halfway out of the batter. Bucket dredges operated to quickly will produce additional spillage.

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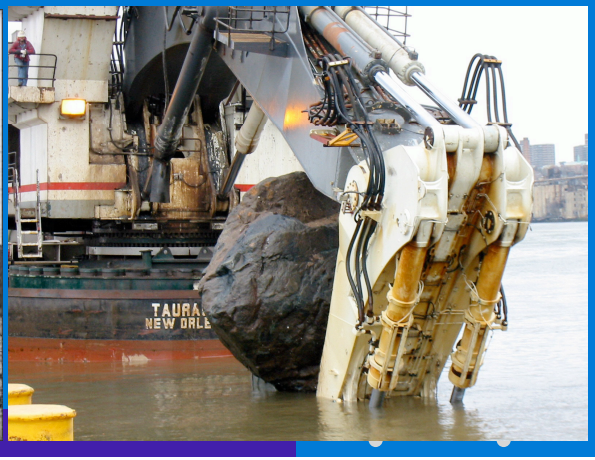
REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

SITE CHARACTERISTICS

Type of sediment - Some dredges are better suited to handle coarse sediments, some are better at handling loose sediments while others deal more effectively with packed sediments. Also, some dredges are able to handle minor debris, others cannot. ***Depth of water and sediments to be dredged*** - Each dredge is able to dredge to a certain depth. Some perform better in shallow water than others. ***Amount of sediment to be dredged*** - Some dredges are good for small jobs, others for large ones. ***Water current*** - The anchoring mechanism varies with the dredge (spuds and anchors) - Some anchors can handle currents, while others require still water. ***Site access*** - Some dredges are more maneuverable than others. Maneuverability counts when working in close quarters or where obstacles need to be avoided.



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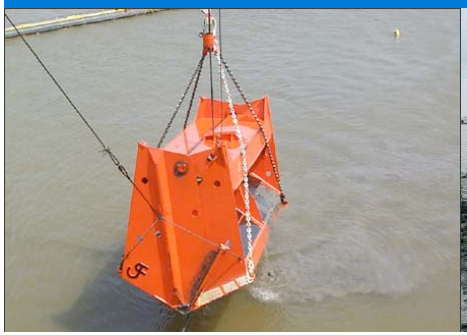
REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

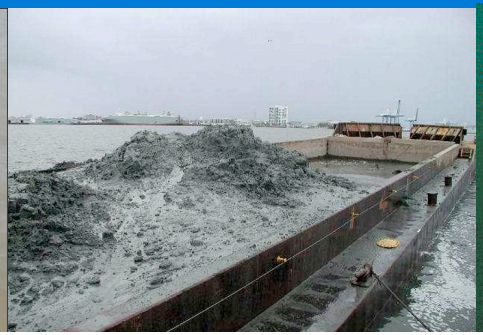
DREDGE CHARACTERISTICS

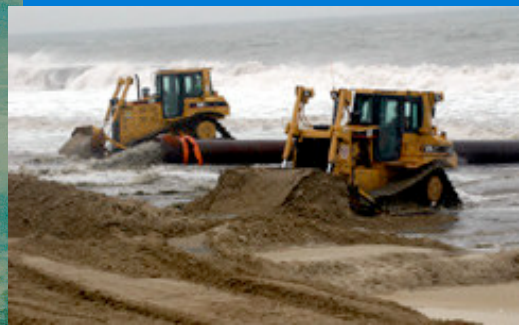
Amount of water that comes up with the dredged material - Treatment technologies can handle different amounts of water in the dredged material. When excess water is pulled up with the sediments, it adds to the cost of the project in two ways.

First, it adds extra weight and volume that needs to be transported.

Second, treatment and disposal options will likely require sediment dewatering. The extra costs may outweigh any potential benefit. Hydraulic dredges tend to bring up the most water with sediments. Characteristic are described as the percent of solids by weight. The greater the percent solids, the less water the dredge brings up.







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OPERATING ENGINEERS

QEA
Quantitative Environmental Analysis, LLC

The Quantitative Environmental Analysis for the Hudson River PCB'S Site **Phase 1 Intermediate Design Report** provides a written feasibility study on the resuspension rates at the dredge head "hydraulic cutterhead" vs. the mechanical environmental bucket. Those findings represent conservative estimates of the resuspension likely to occur during the dredging of the Upper Hudson River.

The value of **0.35%** was obtained from field studies of resuspension during **cutterhead dredging** of fine sediments in similar dredging operations that involved small particles capable of being resuspended. In comparison to **0.30%** that was obtained from a field study of resuspension during **environmental bucket** dredging that excavated the same type of fine sediments.

These studies took into effect the dredging release rate at a distance of 10 meters from the dredge head.

Mass-weighted average release rates were reported to be **0.13%** for the **environmental bucket** and **0.065%** for a conventional hydraulic **cutterhead dredge**.

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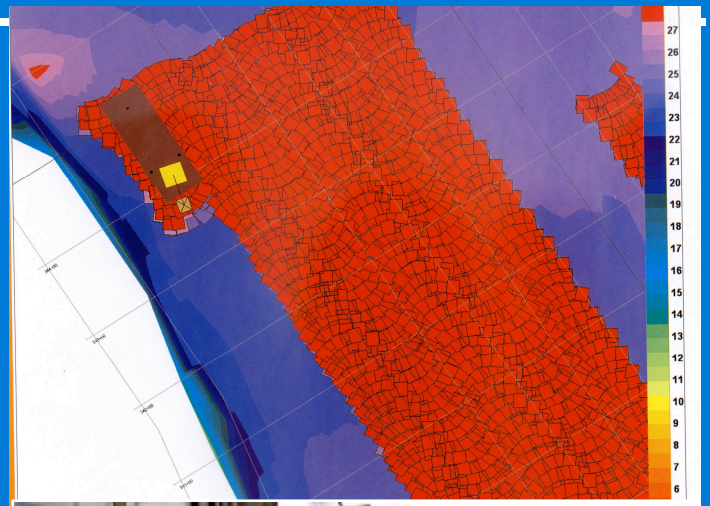
REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

DREDGE ACCURACY

The dredge needs to be very accurate for two reasons:

First, it needs to ensure that all the contaminated sediments are removed.

Second, it needs to minimize the amount of clean sediment brought up with the contaminated sediments. Clean sediments that are needlessly dredged must be transported, treated and disposed after mixing with contaminated sediments, adding to the project's cost.



REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

RANGE OF PRODUCTION RATES -

Transportation methods and treatment technologies can only handle so much dredged material at a time. If the dredge is producing dredged material too slowly or too quickly, a storage site may be needed to either accumulate enough to transport or hold sediments that must wait to be treated.

Overdredging by adding unnecessary material (such as excess water) will add to the overall cost and length of the project.

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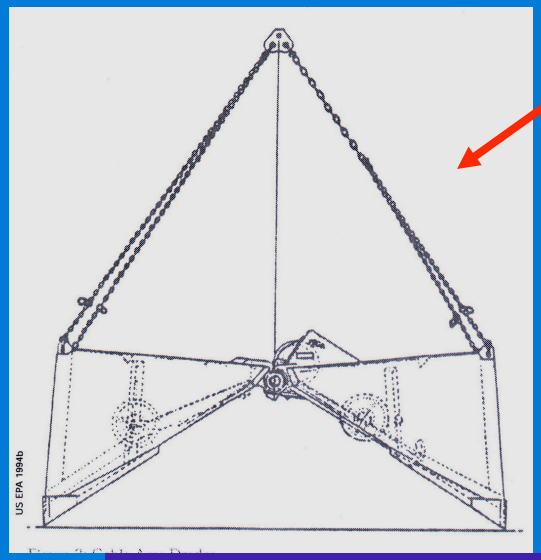
REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

RESUSPENSION

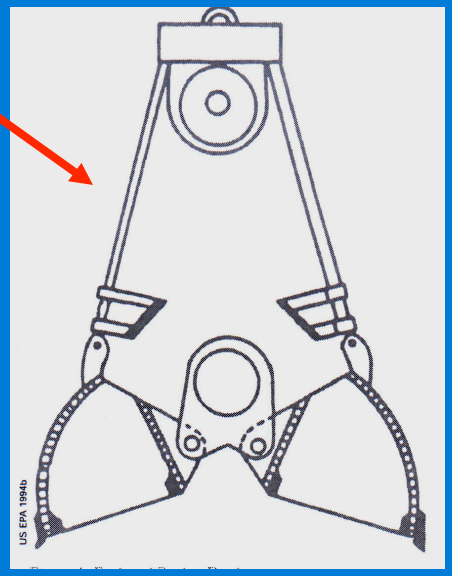
The dredge descriptions below note the resuspension issues particular to each dredge bucket. Resuspension rates, vary by the dredge, site characteristics, and the experience of the dredge operator.

These are clamshell dredge buckets that were specially designed to minimize resuspension. The clamshell dredge bucket gets its name from how it looks. As it is pulled up, the halves close together trapping the sediments inside.



The enclosed bucket and Cable Arm dredges seal shut with gaskets and tongue-in-grove joints to fully contain contaminated sediment.

The Cable Arm has the added advantage of being better able to control how far it dredges into the sediment. It can also remove sediments in layers, leaving a flat surface after dredging. It can dredge more precisely than the clamshell, bring fewer clean sediments up with the polluted ones. Enclosed bucket and Cable Arm dredges resuspend 70% less sediment than clamshell dredges.



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REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

ENVIRONMENTAL MECHANICAL DREDGES

PROS	CONS
• Widely available. • Brings up a high percentage of solids. • Has special fittings that reduce resuspension 30-40% below the traditional clamshell dredge. • Horizontally, it is a very precise digging tool. It is excellent in close quarters. • Can be used in very deep and shallow water. • Can be used various types of sediments.	• Production rate is slower compared to hydraulic dredges. • Needs high overhead clearance.

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REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

HYDRAULIC DREDGES

PROS	CONS
• Widely available. • Often very percise dredges, bring up minimal clean sidiment. • Faster than mechanical dredges in softer material.	• Tends to clog, increasing resuspension and interrupting job. • Does not handle consolidated sediment well. • Pipelines carrying sediment slurry may be navigational obstructions.

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REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

PNEUMATIC DREDGES

PROS	CONS
• Brings up sediment with very little water, up to 80% of the sediments orginal density. • Very low resuspension. • Provides continuous uniform flow of dredged sediment. • Effective at low power. • Closed system reduces environmental exposure.	• Clogs often, increasing resuspension and interupting job. • When moving around dredge site will suck up a lot of excess water

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REMEDIAL "ENVIRONMENTAL" DREDGING CONTINUED

HYBRID DREDGES	
PROS	**CONS**
• Can work with a wider variety of sediments than hydraulic dredges. • Faster than mechanical dredges • Closed system reduces environmental exposure.	• Clogs often, increasing resuspension and interrupting job. • Some cutter heads increase resuspension over hydraulic dredges. • Pipelines carrying sediment slurry may be navigational obstructions.

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ADDRESSING COMMUNITY CONCERNS

What other sediment remediation technologies have been the investigated in the past?

Potential sediment remediation technologies, including those that the U.S. Army Corps Engineers has investigated, are in-situ capping, dredging, transport technologies, pre-treatment technologies, treatment technologies, disposal technologies, and residue treatment/management technologies.

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What dredging technologies will most likely would be used for this project?

Numerous dredging technologies that currently exist will be applied to this project site to best control sediment remediation. The technologies at this project site will be the latest available and those that are time tested to produce the least environmental impact. Studies obtained from other similar site work will be incorporated on this site to include sediment removal by mechanical dredging utilizing environmental clamshell buckets, GPS bucket placement and tracking software, resuspension containment utilizing various forms of applications, dewatering, mixing and disposal.

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What levels of noise can be expected with the 24-hour/7-days-a-week dredging on this project?

DREDGES: This is a tough question to answer, because it really will depend on the specific dredge found on the site. For the most part larger dredges themselves are not at all noisy. Anyone could have a normal conversation right on the deck of the dredge with no problem hearing one another. Most larger dredges are electric diesel and therefore are actually quite in comparison to an diesel dump truck. The home owners on the shoreline should not be disturbed by the sound. Smaller more improvised dredges will tend to have an elevated noise level. As an example; if the company utilizes a small "diesel crane" on a barge, you could expect noise equal to a diesel dump truck from a distance. Throttling up and down should not be an issue due to the slow movement (cycle time) necessary with an environmental bucket. The overall operation is pretty slow.

BOATS: This could be the more nosier of the vessels due to its throttling up and down during movement of the dredge and/or barges (scows), which should be quite infrequent due to the long periods of time it will take to load a barge with material. At these times, the noise level could be like those found in dump trucks from a distance.

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What levels of pollution can be expected with the dredging equipment found on this project?

DREDGES: Produce no dust. Levels of diesel exhaust will depend on the size and type of the dredge. The cost of providing fuel for a sizable dredge is a enormous cost factor for any project and most newer or refurbished dredges are equipped with the latest diesel engines that are more fuel efficient, economical and produce less exhaust fumes than ever before. Exhaust fumes have never been an issue on any dredging project we have ever encountered. In fact our children's school buses produce about the same exhaust fumes as a small dredge. This may not even be an issue for the public as the project progresses.

BOATS: Produce no dust. Levels of diesel exhaust will depend on the size and type of the boat. Again, refurbished or newer boats are equipped with the latest diesel engines that are more fuel efficient, economical and produce less exhaust fumes than ever before.

BARGES (SCOWS): No fumes. May produce a small level of dust. Material loaded into the scow carrying material will be wet to a high degree (i.e. wet mud). In fact, dewatering this material will be a large part of the overall project. Dust could be more of a factor on the land operations rather than the dredging operations.

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What levels of lighting can be expected with the 24-hour/7-days-a-week dredging on this project?

DREDGES: Levels of lighting associated with a dredge will be minimal and not distributive to home owners. Depending on the size of the dredge will depend on the necessary deck lights needed for safety. There will be additional lighting on the boom of the crane as to assist the viewing area of the operator. The lighting on the deck is equivalent to normal porch lights and the boom lighting is equivalent to floodlights.

BOATS: Levels of lighting associated with a boat will be minimal and not distributive to home owners. Depending on the size of the boat will depend on the necessary deck lights needed for safety. There will be additional lighting for navigation and spot lights to assist the operators viewing area. The lighting on the deck and navigation are equivalent to a normal porch lights and the spot lights produce a very powerful beam of light (only used when necessary). The spot light will be a concern to homeowners if pointed directly at a home.

BARGES (SCOWS): Lighting, unless moored on an anchor, then small anchor lights will be used that are equivalent to normal porch lights.

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QUESTION AND ANSWER PERIOD