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Dredging in Sediment Containing MEC

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Dredging

The excavation, transportation and disposal of sediment while constructing new waterways, maintaining existing waterway dimensions, obtaining fill for land reclamation, beach renourishment, dike and levee construction, creating wetlands and marshes, obtaining materials from borrow areas, and other beneficial uses.

A wide variety of dredge plant (the dredge and auxiliary equipment) excavate, transport, and dispose of sediment



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What are Munitions and Explosives of Concern (MEC)?

Unexploded Ordnance (UXO)

Discarded Military Munitions (DMM)

Explosive munitions constituents (e.g. TNT, RDX) present in high enough concentrations to pose an explosives hazard.



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Discarded Military Munitions

Discarded, excess, or obsolete munitions that may have been buried, dumped at sea, or abandoned.

DMM may have been disposed of legally and otherwise.

May be found near Active Installations or Formerly Used Defense Site (FUDS).

What Is Unexploded Ordnance (UXO)?



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Military munitions that have been

- primed, fuzed, armed, or otherwise prepared for action, and have been
- fired, dropped, launched, projected, or placed in such a manner as to
- constitute a hazard to operations, installation, personnel, or material and
- remain unexploded either by malfunction, design, or any other cause



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Basic MEC Safety Considerations

There is no “safe” procedure for handling and disposing of MEC, merely a procedure that is considered least dangerous.

There is no “safe to move” MEC. The decision to move MEC is based on acceptance of increased risk to the worker and public.



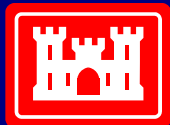
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MEC Potential

Underwater MEC sites exist in ponds, lakes, marshes, streams, rivers, estuaries, harbors, canals, seas, and oceans.

Some sites have existed for decades and are well-known, while the presence of others is learned about during dredging operations when MEC unexpectedly appears somewhere in the dredging system

MEC (including CWM) have been recovered from dredging spoils, commercial fishing catches, at-sea clam harvesting, and beach replenishment operations.



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MEC Potential

Any dredging project along the Atlantic and Pacific Seaboard should take steps to prevent the introduction of MEC into the dredge system. This includes interior waterways and harbors used by military vessels.

Ocean dumping of discarded military munitions (DMM) was a lawful and frequently used disposal method for MEC and CWM until 1973.

Many of these dump sites can be found on a maritime chart. Not all dump sites are known, and evidence exists that some MEC items were dumped inside the 3 mile limit.



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MEC Potential

New material dredging projects have a high probability of encountering MEC (new channels, deeper channels, anchorages, borrow sites, piers)

Very little guidance is available for project planning.

Dredging projects very seldom plan for the presence of MEC



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MEC Potential

MEC items can show up in many places during a dredging project (i.e. dragheads, cutterheads, pump casings, pipes, turtle screens, placement sites...).

MEC detonations have damaged dredge plants; and in a more severe case, sank the dredging vessel.



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Dredging Equipment

General dredge classification is based on the method the dredge extracts the submerged sediment (hydraulic or mechanical).

There are many different types of dredging equipment. The next few slides show a few different types of dredging equipment.



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Clamshell (Bucket) Dredge





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Backhoe Dredge





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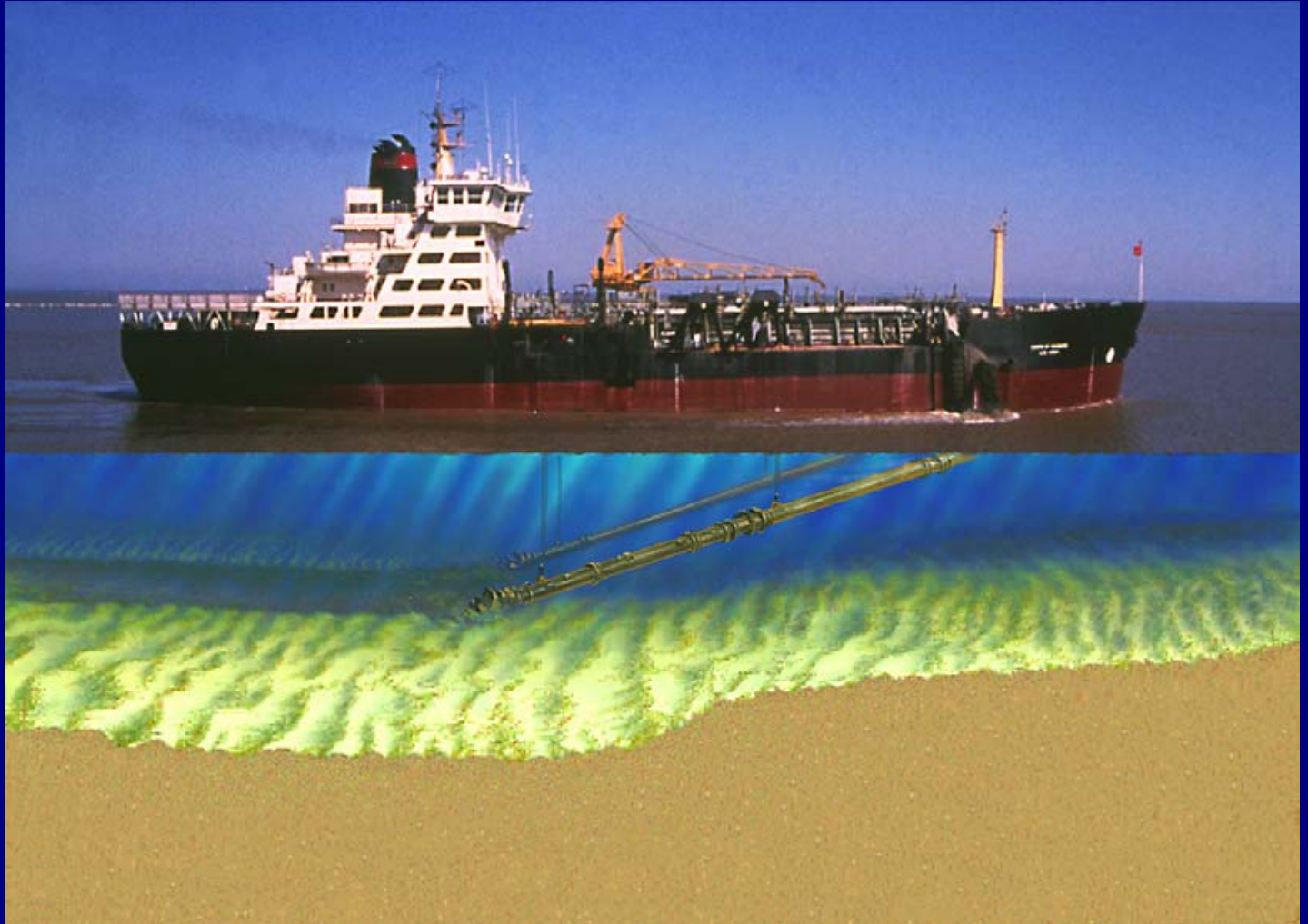
Cutterhead Dredge





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Hopper Dredge





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Planning Approaches

Archive searches

MEC Detection and Discrimination

General Considerations

Hazard Analysis

Removal vs avoidance

Production rates

Costs



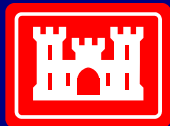
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Planning Approaches

1 Solution – Screen sediment intake and outfall (when possible)

Utilize MEC specialists in the planning and operational phases.

Essential that the correct verbiage is placed in the dredging specifications before contract award.

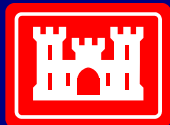


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MEC & Dredging Case Studies

Many expensive (\$\$\$\$) lessons learned are derived from dredging operations in the continental USA and international locations.

It is far less expensive to prevent the introduction of MEC than to conduct a post dredging MEC removal.



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Buckroe Beach Hampton, VA

- **Several documented beach replenishments – 1989, 1997, 2003.**
- **The 1989 and 1997 replenishments placed MEC on the beach. No screening mechanism employed.**
- **Numerous post dredging military and USACE MEC clearance projects conducted to remove the MEC.**
- **Virtually impossible to remove 100% of MEC.**
- **MEC removal in surf zones is particularly problematic.**
- **The best geophysical (metal detecting) equipment available can only detect MEC to a depth of approximately 3 feet of beach sand.**
- **Many beach replenishments place up to 8 feet of material. In areas where protective dunes are constructed the sand can be up to 22' in depth.**



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Buckroe Beach Hampton, VA

The 2003 replenishment:

2 inch screen on cutterhead dredge intake

1.5 inch screen (basket) at outfall on beach

Failure of 2 inch screen at cutterhead allowed some larger MEC items to enter dredging system. MEC items caught in outfall basket.



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“ILLINOIS” Cutter Head





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Discharge to the Beach





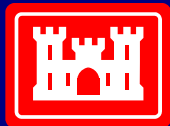
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Buckroe Beach, VA

MEC caught in Screening Baskets

- (1) 37mm projectile
- (4) 40mm projectile
- (3) 75mm projectile
- (5) 76mm projectile
- (3) M1907 PTF

(PTTF = powder train time fuze)



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Buckroe Beach Estimated Cost Of MEC Support

1991-2003:

**6 TCRAs conducted at Buckroe Beach.
The last two averaged \$500K each.**

2003:

**Approx \$320K for MEC contractor support
Approx \$30K for USACE OESS support**



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Surf City NJ

Coastal Storm Damage Reduction Project (CSDRP)

Long Beach Island – 18 miles long

Residential Homes/Public Beaches

Designed to eliminate/reduce damage during coastal storms

880,000 cu yds of sand

Pumped from 2.5 miles offshore

Beach Berm 8ft thick, Dunes 22ft high



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Surf City NJ

Coastal Storm Damage Reduction Project (CSDRP)

Hopper dredges employed.

No evidence that MEC is present in borrow area during environmental study.

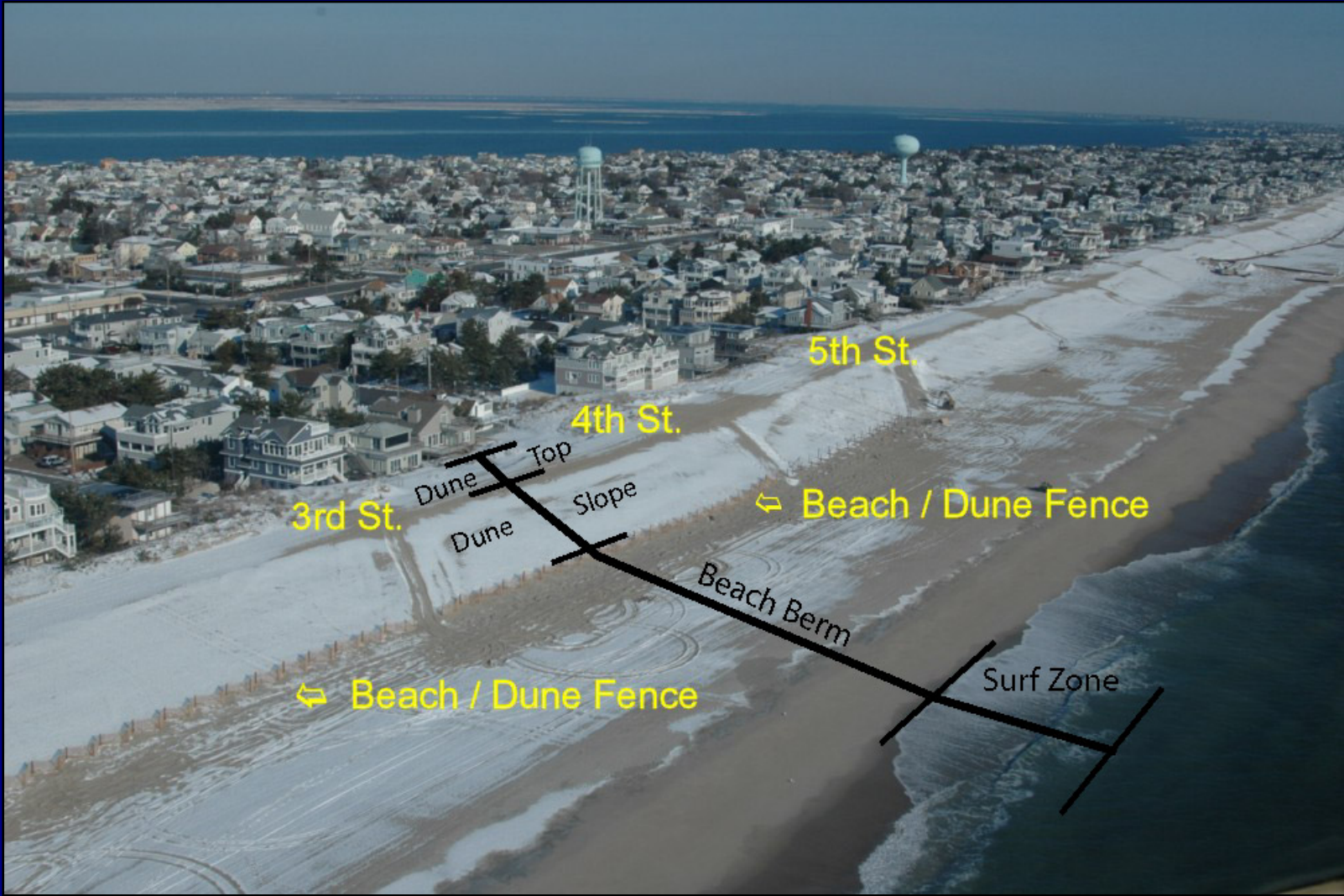
4 inch turtle screens employed.

No MEC is found until the day after the 1.6 mile first phase of this 18 mile project is completed.



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Surf City CSDRP





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Surf City NJ TCRA SITUATION

Ordnance items found

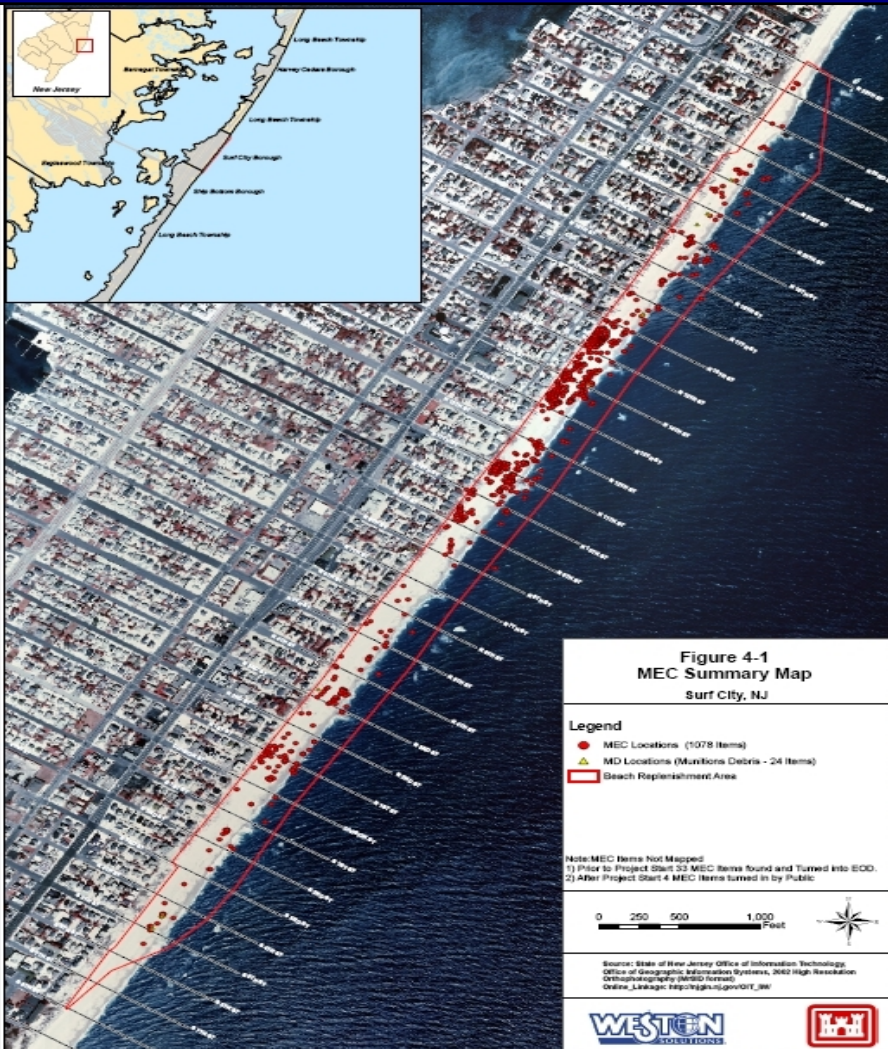
- Locals with metal detectors
- Fence installation at dune crossovers
- Beach Closure
- Public Safety
- Work Scope (Dynamic)
 - Characterize with DGM
 - Rapid Mobilization
 - Contract Mechanisms



Surf City NJ TCRA RESULTS



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**1,078 MEC items
Discarded Military Munitions**

24 munitions debris items

**Disposal: all items turned over to
U.S. Army EOD at Ft. Monmouth,
N.J.**

**Only able to clear MEC to 30
inches**



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Surf City NJ MEC REMOVAL COSTS

TCRA - \$3 Million (approx)

Sift Berm and Surf Zone - \$15 Million?

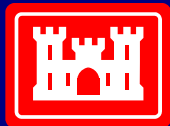
Sift 880K cu yds Placed Sand - \$25Million ?



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POST TCRA MONITORING

- **A USACE OE SS is located in SC 24/7 to conduct daily beach sweeps of project area at low tide and two other times per day (since completion of TCRA)**
- **POC for local police for items found by citizens**
- **Coordinates emergency (EOD) response for MEC items**
- **107 MEC items located since TCRA was completed in May 07. 26 during monitoring phase, 81 during sweeps conducted after two separate spring 08' nor'easters.**



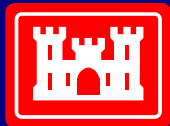
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Surf City NJ PREVENTION

Screen material down to 3/4 inch

Screen should be placed on the dredge intake at the ocean bottom (borrow area) and at the outfall point.

Intake screen may be larger than outfall screen to minimize impact on dredging plant.



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Baltimore Harbor Anchorages Deepening

Dredged 4.6 Million Cubic Yards

**Baltimore Harbor Anchorage's 3 & 4 and Turning Basin at
Fort McHenry**

Mechanical Dredging (bucket)

**Debris Screened at Hart-Miller Island Containment Facility =
7,000 Cubic Yards**



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Baltimore Harbor Dredging Debris





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Baltimore Harbor 3/4" Mesh Screen



APR 15 2003



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Baltimore Harbor Wash-down of Debris





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Baltimore Harbor Inspecting for DMM





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Baltimore Harbor Recovered DMM

Projectiles - 20mm, 37mm, 40mm, 57mm,
75mm, 3", 4", 5", 175mm

Grenades, Fuzes, Cartridge Cases, Small Arms, Drill Rounds

Assorted weapons and parts of weapons

Total – Over 1,300 items

Cost of screening operation - \$1.2 Million



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Dredging & MEC Success Stories

**Sandbridge VA, Beach Replenishment via Hopper Dredge:
Borrow area in known USN firing range
Screen on draghead – No MEC (completed 07')**

**Ocean City MD, Beach Replenishment via Hopper Dredge:
Borrow area within range fan of FT Miles coastal shore batteries
Screen on draghead – No MEC (completed 06')**

**Bethany Beach DE, CSDRP Via Hopper Dredges:
Borrow area within range fan of (former) Ft Miles coastal shore
batteries
Draghead Screen, outflow screen
12 MEC captured in outflow basket on beach (completed 08')**



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Bethany Beach CSDRP

3.2 million cu yds of sand over 2.75 miles

1.25 inch screen on dragheads

1.25 inch screening basket at outflow

37mm projectile is smallest MEC item expected in borrow area



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Bethany Beach DE, CSDRP



Pumping sediment



Inspecting inflow basket



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Hopper Dredge Draghead Screen





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Bethany Beach DE

40mm & 37mm Projo in Basket



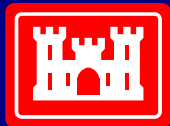


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Dredging & MEC Guidance Documents

USN and USA Explosive Safety Guidance Documents are incorporating language for Dredging & MEC

British guidance document “DEALING WITH MUNITIONS IN MARINE AGGREGATES”, issued June 06’



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QUESTIONS ?
