



**US Army Corps  
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Baltimore District

# Dredging and Munitions

## Response

Paul Greene  
September 2008



**US Army Corps  
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Baltimore District

**University of Hawaii**

**Oil Exploration**





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## Dredging

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The excavation, transportation and disposal of sediment while constructing and maintaining, waterway dimensions, obtaining fill/materials from borrow areas, coastal storm protection, and other beneficial uses.

**MEC - Munitions and Explosives of Concern**

**DMM – Discarded Military Munitions**

**UXO – Unexploded Ordnance**

**CWM – Chemical Warfare Material**



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## MEC Potential

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

Some MEC sites have existed for decades and are well-known, while the presence of others is discovered during dredging operations when MEC unexpectedly appears in the dredging system or spoils.

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

**ALL OCEAN BORROW SITES ARE SUSPECT!**

**Dredging projects along the Atlantic and Pacific Seaboard should take steps to prevent the introduction of MEC into the dredge system and subsequent spoils.**

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

**Many offshore dump sites can be found on maritime charts. Not all sites are known.**



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# OCEAN





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## OCEAN



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## HARBORS





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## RIVERS

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## MEC Potential

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**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 have been identified as the cause for the sinking of at least one fishing vessel.**



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## Dredging Equipment

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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

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**Archive searches**

**MEC Detection and Discrimination**

**General Considerations**

**Hazard Analysis**

**Removal vs avoidance**

**Production rates**

**\*\*Costs\*\***



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## COSTS

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**\*\*IT IS CHEAPER TO SCREEN AND PREVENT RATHER THAN CONDUCT A POST REPLENISHMENT MEC REMOVAL ACTION\*\***



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## Planning

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**# 1 Solution – Screen sediment intake and outfall and conduct periodic inspection of spoils**

**Utilize experienced 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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## LESSONS LEARNED Buckroe Beach, VA

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- Several documented beach replenishments – 1989, 1998, 2005.
- The 1989 and 1998 replenishments placed MEC on the beach. No screening mechanism employed.
- Numerous post dredging military and USACE MEC Removal Action projects conducted to reduce the MEC hazard.
- Virtually impossible to remove 100% of MEC post replenishment.
- MEC removal in surf zones is particularly problematic.
- Geophysical (metal detecting) equipment confidently detects 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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## LESSONS LEARNED Buckroe Beach, VA

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**The 2005 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 in Screening Baskets

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- (1) 37mm projectile
- (4) 40mm projectile
- (3) 75mm projectile
- (5) 76mm projectile
- (3) 1907M PTF

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16 MEC Items

(PTTF = powder train time fuze)



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## Buckroe Beach Cost of MEC Support (approx)

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**1991-2003:**

**6 Time Critical Removal Actions TCRA  
conducted at Buckroe Beach. The last  
two averaged \$500K each.**

**2005:**

**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)

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Long Beach Island – 18 miles long

Private Residences/Public Beaches

Designed to eliminate/reduce damage during coastal storms

880,000 cu yds of sand

Sand borrow site located 2.5 miles offshore

Beach Berm 8ft thick, Dunes 22ft high



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## Surf City NJ

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## Surf City NJ

Hopper dredges employed.

No evidence that MEC is present in borrow area during environmental impact study (EIS).

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 NJ Phase 1 – Time Critical Removal Action (TCRA)

### Ordnance items found

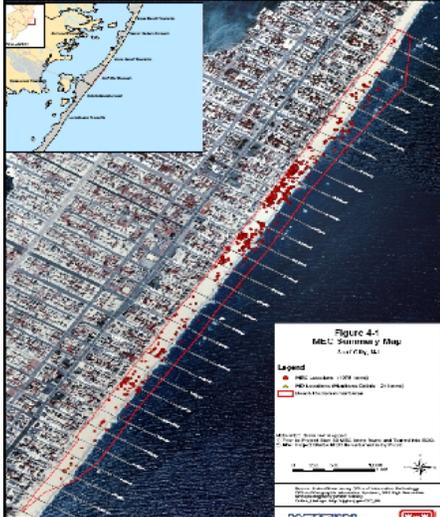
- Locals with metal detectors
- Fence installation at dune crossovers
- Beach Closure
- Public Safety
- Work Scope
  - Characterization
  - Rapid Mobilization
  - Contract Mechanisms





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## Surf City NJ TCRA RESULTS



**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.**

**Confidence level: MEC removed to  
30 inches**



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## Surf City NJ Phase 2 – Beach Monitoring

**USACE OE SS conducts daily beach sweeps of project area at  
low tide (on-site 24/7)**

**Coordinates emergency response (EOD) for MEC items**

**112 MEC items located after TCRA completed May 07:**

- 31 during monitoring phase:
  - 20 Items found by OE SS
  - 11 Items by municipal workers and citizens
- 81 after two spring 08' nor'easters  
(Selected Geophysical Mapping & Mag and Dig)



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## Surf City NJ Phase 3 - Cost of Remediation

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- **Team Recommended Remedy – Sift Berm**  
**Estimated Cost - \$12.8M**
  
- **Public Recommendation – Sift Berm & Dune**  
**Estimated Cost - \$19.88M**



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## Long Beach Island NJ MEC PREVENTION

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Screen material to 3/4 inch

Screen dredge intake at the ocean bottom (borrow area) and the outfall point.

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



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## Success Stories

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**Sandbridge VA, Beach Replenishment via Hopper Dredge:**  
Borrow area in known USN firing range (large projectiles 5")  
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, Beach Replenishment Via Hopper Dredge:**  
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')

**New York Harbor NY, Ongoing harbor deepening project. 1.5"  
screen on intake (recently changed to 1.25")**



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## Success Stories Bethany Beach CSDRP

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**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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## Beach Screening Basket

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## Beach Screening Basket

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## Bethany Beach Outfall Screen



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## Bethany Beach DE 40mm & 37mm Projo in Basket





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## So What's the Problem?

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**Culture**

**Attitudes**

**FUNDING**



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## Positive Steps

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- NJDEP requiring MEC screens on intake and outfall for all dredging projects in NJ
- DDESB planning to insert language in 6055.09 std requiring MEC screens during dredging
- USACE EM 385-1-1 inserting language in the safety manual requiring dredging districts to consult with MMDC to determine whether MEC screens are required on specific projects



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## Positive Steps

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- NAD drafting requirement for all NAD districts to consider MEC screens during dredging
- NAP requires all dredging PDT's to consult with MMDC on applicability of MEC screens during specific dredging projects. NAP requires an OESS on-site during dredging that may encounter MEC.



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