

NAS NORTH ISLAND - NAVY REGION SOUTHWEST NAVY ENVIRONMENTAL LEADERSHIP PROGRAM

CLEANUP

ENVIRONMENTAL CLAMSHELL BUCKET

LEAD ACTIVITY

Naval Air Station (NAS) North Island

STATUS

Complete

MISSION

Perform environmentally sensitive dredging operations

REQUIREMENT

The Navy conducts dredging related to various activities, such as environmental remediation. A method that increases production while minimizing sediment disturbance and wastewater production is required.

DESCRIPTION

The Environmental Clamshell Bucket, designed by Cable Arm Inc., was used by NAS North Island to remediate a mercury spill in the San Diego Bay along the North Island quay wall near Berth Oscar. Dredging activities were accomplished using the Environmental Clamshell Bucket, which has a simple mechanical design with few moving parts. The state-of-the-art clamshell design features overlapping side plates to reduce sediment loss on closure and instrumentation that allows for precision placement of the bucket during operation, low-turbidity during lifting, and controlled containment during dumping.



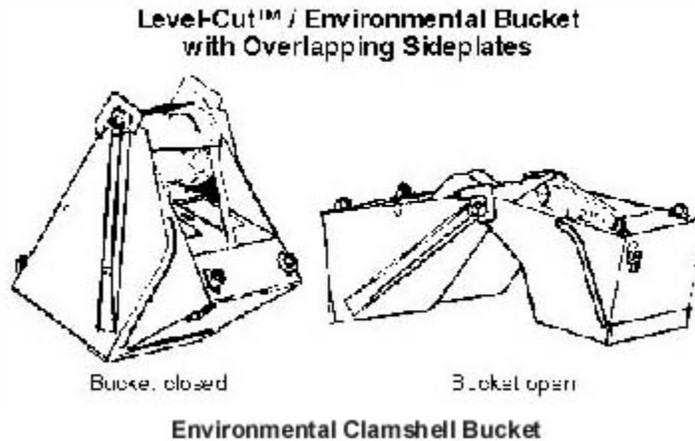
Environmental Clamshell Bucket

The Environmental Clamshell Bucket differs from traditional dredging machines by:

- Achieving a high solids-to-liquid ratio that maximizes sediment recovery
- Eliminating potholes and depressions due to the horizontal level cuts across the sediments
- Allowing water to pass through its top moveable vents as it submerges, thereby contributing to the reduced turbidity (two to three times less than traditional units)
- Securing closure of the bucket by being equipped with electronic sensors and compressible seals

The bucket was lifted into place with a 100-ton crane and was operated with a hydraulic control system stationed on the quay wall. Vertical and horizontal positioning of each bucket location was recorded by a survey system comprised of a prism mounted on top of the crane's boom and a total survey station on the quay wall.

The primary advantage of the Environmental Clamshell Bucket is the increased production rate while maintaining minimal sediment disturbance and wastewater generation. This method successfully removed mercury-impacted sediment from 32 percent of the sampled grid locations. The remaining mercury-impacted sediment, and free phase mercury, was removed by divers by manually dredging the spill area and using various equipment,



including eyedroppers, to collect the free phase mercury. The primary disadvantage associated with the use of the Environmental Clamshell Bucket is that the bucket does not operate at 100 percent efficiency when used in locations where floors of water bodies contain debris or when working with sloped surfaces. Such debris restricts the bucket from closing completely and allows sediments to escape into the water.

BENEFITS

This equipment provides the following benefits over traditional methods:

- Increases production rate
- Minimizes turbidity by creating less sediment disturbance
- Achieves a high solids-to-liquid ratio that allows material to be more readily available for treatment

ACCOMPLISHMENTS/CURRENT STATUS

Date	Activity
OCT 1996	Environmental Clamshell Bucket used for three months to remove spilled mercury from Bay sediments near Berth Oscar located at NAS North Island

FUTURE PLAN OF ACTION & MILESTONES

Not Applicable

COLLABORATION/TECHNOLOGY TRANSFER

The Environmental Clamshell Bucket can be used at other Navy dredging sites when appropriate.

BIBLIOGRAPHY

- OHM, Preliminary Draft Removal Action Close-out Report, Emergency Removal Action for Mercury Spill at Berth Oscar NAS North Island, 1997.

RELATED GOVERNMENT INTERNET SITES

None available

RELATED NAVY GUIDEBOOK REQUIREMENT

Not applicable

UPDATED: 01/23/02