

# THIN-LAYER PLACEMENT PROJECT SHEET



## Ward Cove, AK

August 2016

**Location:** Ward Cove

**Type:** Sediment remediation/thin layer capping

**Area:** 28 acres that were part of an 80 acre area of concern

**City:** Ketchikan

**County:** Ketchikan Gateway

**Agencies:** US Environmental Protection Agency, Alaska Department of Environmental Conservation, US Army Corps of Engineers

**State/Province:** Alaska

**Country:** United States



Taken from Northwest Coast Energy News (<http://nwcoastenergynews.com/2013/09/29/4850/clio-bay-ward-cove-alaska-benchmark-log-remediation/>)

### Background

Ward Cove is located on the north side of Tongass Narrows, 5 miles north of Ketchikan, AK. The cove is approximately 1 mile long and 0.5 miles wide. The total area of the cove is 250 acres from which 80 acres were designated as an area of concern (AOC) by the USEPA due to historical releases from the Ketchikan Pulp Company. Contaminants of concern included ammonia, 4-methylphenol, and sulfide. USEPA determined that the contaminated sediments were not toxic to human or wildlife (USEPA, 2000). The site posed a risk for benthic macroinvertebrates, therefore, the primary objectives of the remediation efforts were to reduce the toxicity of the contaminated sediments and to stimulate colonization of the remediated areas by benthic macroinvertebrates (Becker et al. 2009).

### Project Description

In 2001, a 6 to 12 in. thin layer cap was used to enhance the natural recovery of 28 acres of contaminated sediments. The remaining 52 acres were remediated using monitored natural recovery. The cove had approximately 16,000 sunken logs from which 680 tons needed to be removed as part of the remediation efforts. The water depths in the remediation areas range from 15 to more than 115 ft and the tidal range exceeds 15 ft. Some areas of the cove contain a thick layer of organic-rich sediment which have a low bearing capacity and have negatively affected benthic organisms.

The thin layer cap material was defined as fined-grained (particle diameter ranging from 0.08 to 0.43 mm) to medium-grained sand (particle diameter ranging from 0.43 to 2.0 mm) with non-plastic silt (particle diameter ranging from 0.005 to 0.08 mm and plasticity index < 4). (Hartman Consulting Corporation, 2000). Approximately 24,000 CY of material were placed in ENR area over a time period of 30 days (Foster Wheeler, 2001). The material was placed with a derrick barge and modified cable arm re-handling bucket, which resulted in

the most consistent and uniform placement method in the deep water of the cove. The thin layer placement implementation costs are not currently available; the only cost available is the cap material price which is approximately \$18/CY (USEPA, 2000).

The limiting factors for the thin layer placement areas included bearing capacity of the sediment, the slope of the sea floor, and water depth. Therefore, thin layer placement was considered impractical in areas with a very high density of sunken logs (> 200 logs/acre) that formed pyramids exceeding 10 ft high, water depth exceeding 120 ft, bottom slopes exceeding 40%, organic-rich sediment with bearing capacity smaller than 6 lbs/ft<sup>2</sup>, and where routine maintenance dredging was required (Merritt et al. 2009).

## Findings

Initial monitoring of the thin layer placement areas was conducted in 2004 (i.e. 3 years after remediation efforts started), which included evaluation of total organic carbon, grain size distribution, ammonia, and 4-methylphenol, sediment toxicity, and in-situ benthic macroinvertebrate communities in 15 stations. The results from the monitoring events indicated that thin layer placement improved the area significantly. At most monitoring stations, both ammonia and 4-methylphenol concentrations were very low (smaller than the allowable concentration), amphipod survival was  $\geq 90\%$ , and benthic macroinvertebrates were colonizing consistently (Becker et al. 2009). The physical and chemical data, and the benthic community metrics resulting from monitoring efforts indicated that the placed material in three different areas was either mixed with underlying contaminated sediments or unintentionally not deposited. Cost for these monitoring efforts ranged between \$200,000 and \$300,000.

This project showed that a thin layer cap could be successfully placed in deep water, and over organic-enriched sediment. Also, specialized placement equipment is not necessary for placing a thin layer cap over organic-rich sediments. The placement technique did not exceed the bearing capacity of the sediment in the thin layer placement areas.

## References

- Becker, D.S.; Sexton, J.E.; Jacobs, L.A.; Hogarty, B.; Keeley, K. (2009) Biological responses to sediment remediation based on thin layer placement near a former pulp mill in Ward Cove, AK (USA). *Environ. Monit. Assess.* 154, 427-438.
- Foster Wheeler. 2001. "Final Construction Report: Ward Cove Sediment Remediation." Prepared for the Ketchikan Pulp Company. July 2001.
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- Merritt, K.; Conder, J.; Magar, V.; Kirtay, V.J.; Chadwick, D.B. (2009) Enhanced Monitored Natural Recovery (EMNR) Case Studies Review
- USEPA 2000. EPA "Superfund Record of Decision: Ketchikan Pulp Company." ROD/ R10-00/035. Washington, DC.



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## Points of Contact

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Information on thin layer placement (TLP) case studies has been compiled as part of a DOTS/EWN project to provide a source of information, knowledge, and experience on TLP of sediment or dredged material in aquatic environments. The Thin Layer Placement Website and Map-Portal are funded by the US Army Engineer Research and Development Center (ERDC). POCs for the Thin Layer Placement Website and Map-Portal are:

- Damarys Acevedo-Mackey, PE  
[Damarys.Acevedo-Mackey@usace.army.mil](mailto:Damarys.Acevedo-Mackey@usace.army.mil), 601-634-4845
- Trudy J. Estes, Ph.D., PE  
[Trudy.J.Estes@usace.army.mil](mailto:Trudy.J.Estes@usace.army.mil), 601-634-2125



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