



Acquisition Directorate

Research & Development Center

Methods for Recovering Oil from Icy Water

Demonstration conducted at Sault Ste Marie 19-20
April 2011



Equipment Demonstrations

Oil Recovery
Methods from
Icy Water



Sault Ste Marie,
Michigan
19 - 20
April 2011

Fire Boom



Heated Drum Skimmer



Boom Vane



Equipment Demonstrations

Rope Mop Skimmer



Using the Fire Hose to "Herd" the oil into the boom



Herding Capability



Steam Generator



Steam Generator in Trailer

Portable Steam Generator

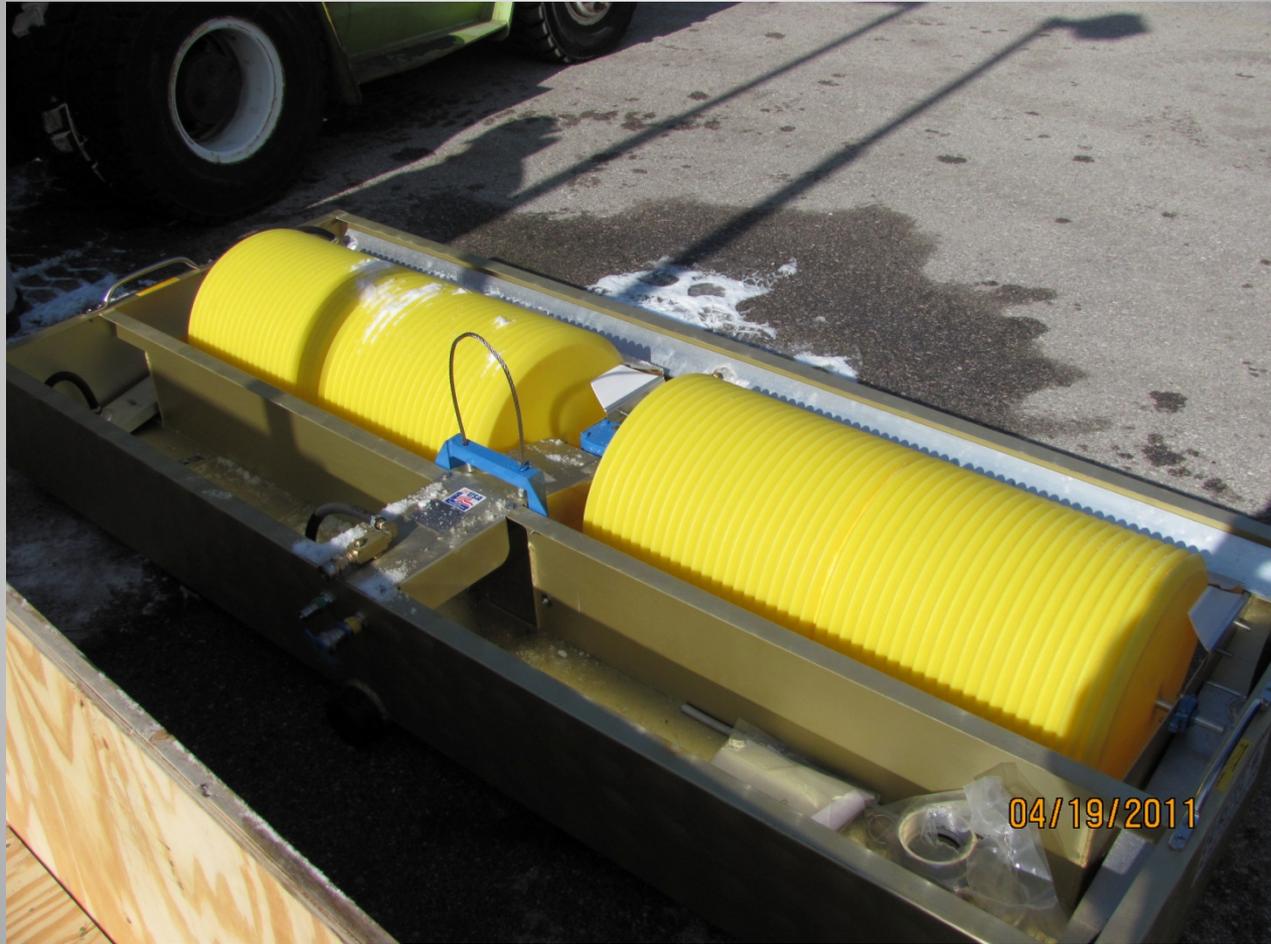


Adj. 1. oleophilic - having a strong affinity for oils rather than water, which will mean that they will pick the oil rather than the water.

- Examples of this material used in oil recover
 - Polyethylene Drums
 - Rope Mope Skimmer
- Materials made of this material are lighter than water and are ideal to soak up oil on the surface



Grooved Drum Skimmer, with Two Drums (made with oleophilic materials)



Hydraulic Compressor used to power the drums and pump the waste oil from the skimmer.



Unit has
oversize
controls to
enable use
with gloves
on.



The water pump is used to fill the boiler in the steam generator.



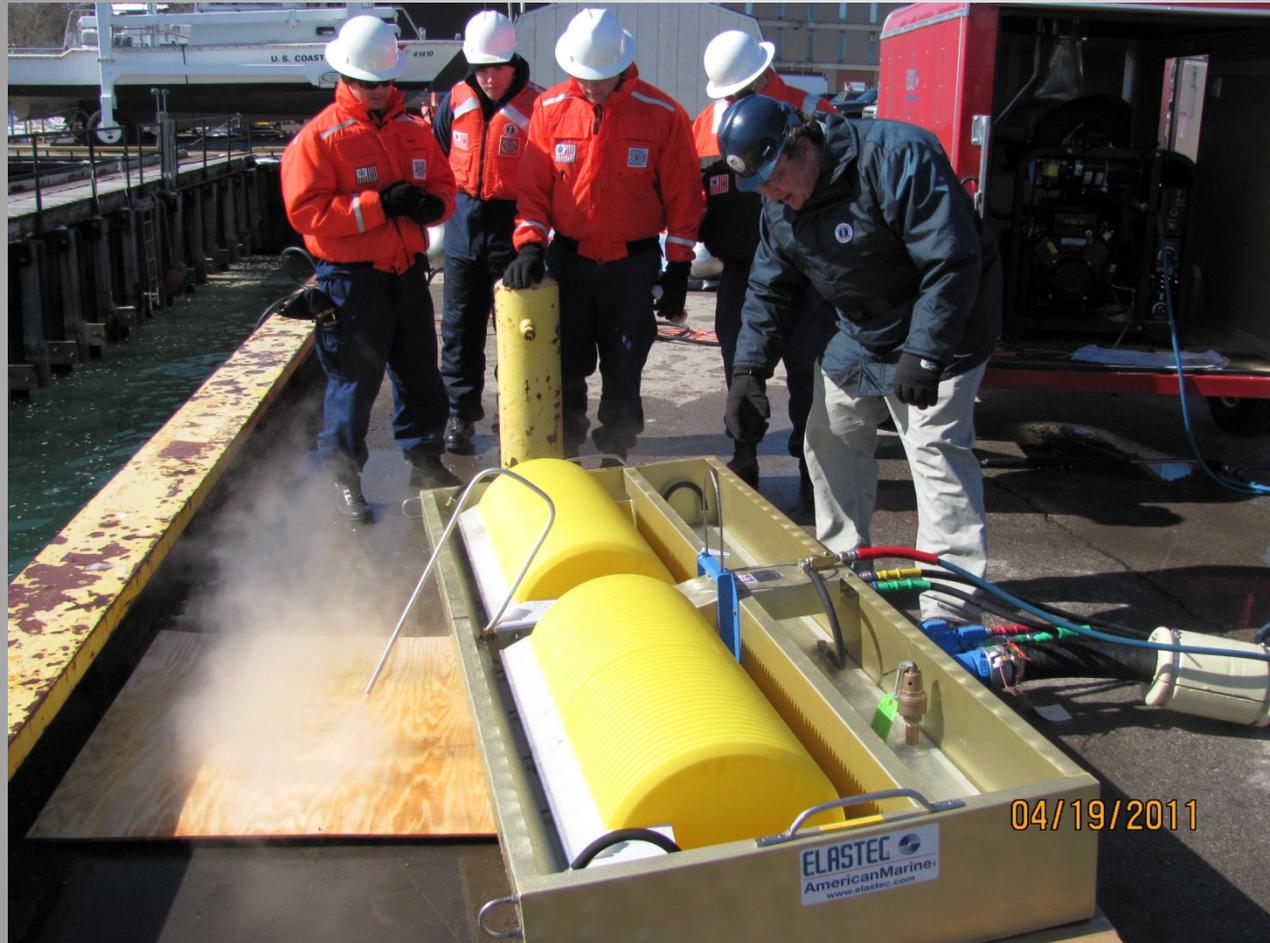
The steam generator uses 100% of the water and the boiler is constantly refilled with this pump.



A steam wand is used to spot melt the ice that may be interfering with the drum skimmer.



The curved tube pictured to the left of the drums is used to exhaust the steam after it has circulated in the tubing that is in the framework of the skimmer.



It also helps to heat oil in front of skimmer





Stripper bar in the left picture helps remove the oil from the drum

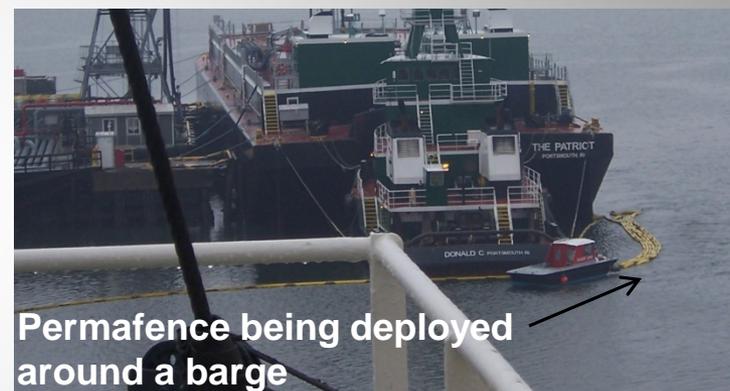
To the right is a close-up of the exhaust tube for steam that has been run through the tubing to melt the oil/ice mixture.

The hydraulic transmission, that turns the drums, is the blue item between the drums



Boom

- Boom is placed in the water to gather the oil to a more central location (corralling the oil), for clean up, containment or burning.
- Most conventional boom seen around the waterfront:
 - Curtain Boom- easily transportable and comes in a variety of sizes to accommodate many situations
 - Fence Boom- also easy to store and transport, similar to curtain boom
 - Permafence- this type is used for more permanent deployments and can be used to boom off ships in the port when transferring product. It is generally easy to clean and then be redeployed



Examples of Fire Boom

- Fire Boom is constructed so that it can resist the extreme heat that is generated when the oil is ignited.
- Some boom can be water cooled
- Since it is more robust it tends to be heavier and more difficult to maneuver into position



- But this can be an advantage when dealing with ice. With the enhanced skirt fabric and stiffening bracket it is less likely to be deformed by the ice pressing against the boom.
- It would be less likely to allow oil to flow over the top or under of the boom.



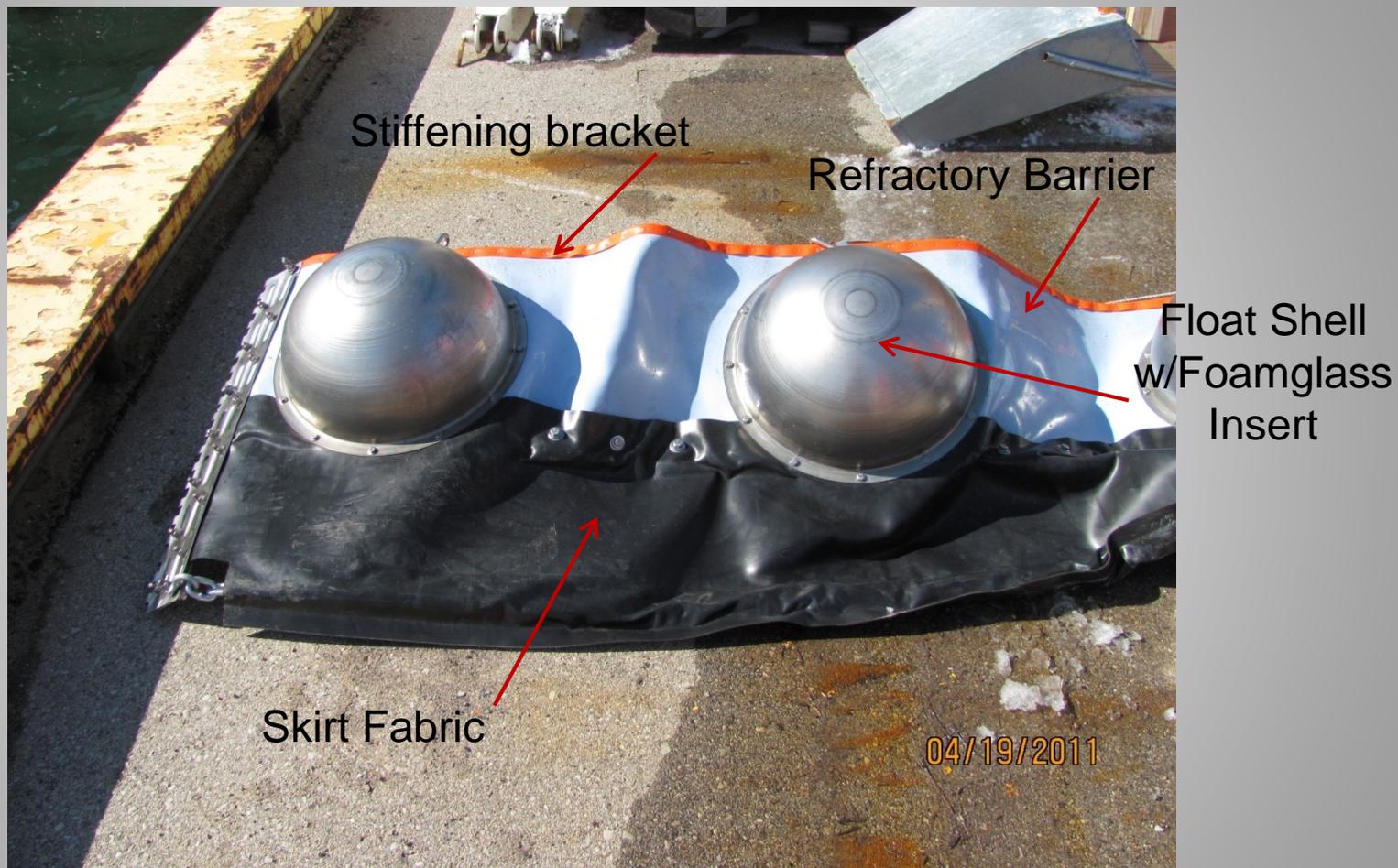
Removing the Fire Boom from the Crate



This boom is heavier and more durable than conventional boom to survive the intense heat of In-Situ Burning. (same type of boom deployed during Deepwater Response)



Close-up of the fire boom construction



Deploying of fire boom from the pier



Close up of deployed fire boom showing the link between two 50' sections of boom.



Using two boats to form a J shape to corral the oil.



Simulating the In-Situ burning



Actual In-Situ
burning in icy
water
conditions



Rope Mop Skimmer



One of the main advantages of this device is that it does not pick up water because the 'rope' is made with an **oleophilic** material



One example of a Rope Mop Skimmer deployment configuration



Can be used in openings in ice



Herding

Using the Tug to Deploy the boom while anchored from the pier



Setting the anchor for the boom

04/20/2011 10:12



Boom Deployment



04/20/2011 13:05



Assembling the fire pump that will be used to move the oil along the surface of the water. This process is called "Herding" the oil into the deployed boom



Using the Fire Hose to "Herd" the oil into the boom



Boom Vane



The float, may be rotated and attached to the other side of vanes to allow deployment of boom in opposite direction.



Control Vane



Boom Vane

The boom vane allows flexibility

- Can be used when it may not be possible to deploy boom using boats. This can be done by securing one end of the boom to a point on shore (a pier or a guard rail on the side of the road) and the other to the boom vane. The boom vane will move the boom out from the shore or pier.
- It can also be used with a boat instead of anchoring it to the shore or pier
- The unit works like a kite on a string.
 - The vanes are similar to an airplane wing and are controlled by the changes in pressure that flows over the vanes.
 - The rear control vane changes the direction by pulling on the control string.

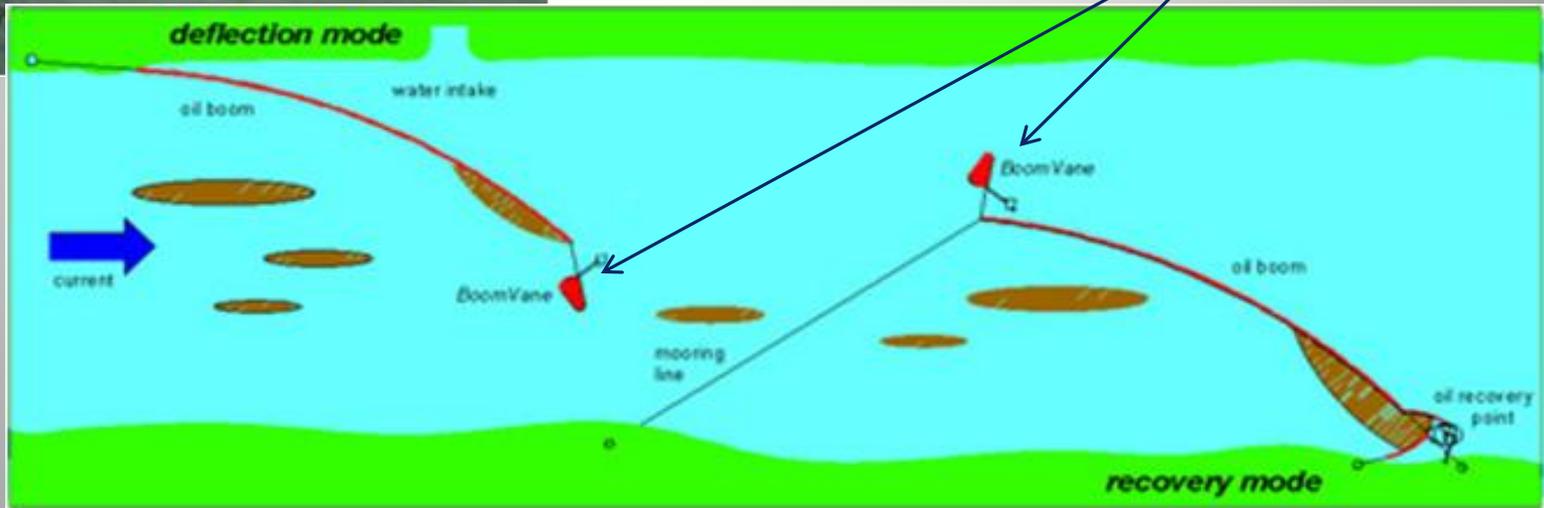


Different deploying methods using Boom Vane



One Boat with two Vane Booms

Two Vane Booms with boom Anchored to the shore



Boom Vane is very useful when another boat, or any boat for that matter, is not deployable.



Control string
(works like a kite to pull
boom offshore)



Deployed Boom with Drum Skimmer

With the skimmer placed in the apex of the deployed boom, and using 'Herding' techniques such as the river current, or fire hoses, the skimmer will then be used to separate and remove the oil from the water to an on shore holding tank



Anchor Point of Boom



Clip of Equipment in Action

