BLOCK SPILLS BEFORE THEY SPREAD
and avoid devastating consequences

Alaska oil spill symposium,
March 2018
San Francisco oil spill 2007
San Francisco oil spill 2007

Source: Ocean Conservancy
San Francisco oil spill 2007

Source: Ocean Conservancy
San Francisco oil spill 2007

Source: Ocean Conservancy
San Francisco oil spill 2007

Source: Ocean Conservancy
Results

160 kms of Shore

$100 M costs
Mackinac straits oil spill drill

- Located in Great Lakes between Canada and the US
- Pipeline 5 crosses the straits
- September 2015 Drill
- Simulate a three-minute, 4,500-barrel release
6 Hours after the spill

- 2 Miles Diameter
- Response equipment that was on-site

Source:
NOAA
24 Hours after the spill

- 5 Miles Long
- Response manpower arrives from Detroit

Source:
NOAA
36 Hours after the spill

Source: NOAA
48 Hours after the spill

Source: NOAA
BLOCK SPILLS BEFORE THEY SPREAD and avoid devastating consequences
30 Minutes after the spill

- 800 Feet Diameter
- Spill Contained
7-15% recovery rate
Current oil boom
Requires trained crew

Danchor drill
Bulky

Danchor drill
When crews arrive it’s too late
Shift the Paradigm

- Standby at every location
- Quickly deployed
- Easily operated
- Stops the spill in time
HARBO’s system elements

- Boom
- Cartridge
- Cartridge Carrier and Chute
- Deployment Vessel
Lightest boom in the world

- Revolutionary geometry
- Weighs like the water. Rides the waves
- 4.5” freeboard + 6” draft
- Optimized for wind
- Fraction of the storage
- 600 g/meter
- Disposable
Cartridge

- 25m – 23kg; Easy to carry
- Packed in sturdy case
- Quick opening - no tools required
- Collapsible after use
- Other cartridge sizes available
Extremely portable

- 25m cartridges weigh 23kg
- 1 Cubic meter storage holds 150 meters
Immediate oil spill containment system

- Size of a lifeboat
- 500m+ of boom, deployed immediately
- Preinstalled anywhere a spill can occur (ports, shores, tankers...)
- Simple deployment - 2 operators trained in a day
HARBO’s Benefits

**Preparedness**
- Small storage footprint
- Light weight
- Short training

**Easy Deployment**
- Zero time to spill
- Quick deployment
- Two people
- No peripheral equipment

**In action**
- Hydrodynamics and Aerodynamics
- Better Oil containment
- Unlimited lengths

**Post spill**
- Quick collection
- Disposable

Preventing the Disastrous Consequences of Oil Spills. Instantly.
HARBO improves oil spill cleanup

- Less skimming needed
- Reduced quantities, effective use
- Can only be done if concentrated

Skimmers (Vacuums)  Dispersants  In-situ burning
Potential Installations

- Ports & Marinas
- Coastal Guard
- Coastal Areas
- Underwater Pipelines
- Coastal Infrastructure
- Oil Rigs
- Tankers
- Sensitive Areas
OHMSETT

- Most advanced testing facility in the world
- 660 ft. long wave pool with oil handling capabilities
- Containment, Wave, Tow and Wind
- Testing with real oil
- 30+ Different tests
- 2 x Week long testing
Port of Rotterdam Test 2017
Port of Rotterdam Test 2017
Testing in Vancouver Canada - 2017
Summary

• The missing link in oil spill response.
• A new layer of preparedness and primary containment.
• Increase recovery rates
• Significantly reduce consequences of oil spills.
• Cleanup -> Containment.
BLOCK SPILLS BEFORE THEY SPREAD and avoid devastating consequences

Alaska oil spill symposium, March 2018
Oil contained with a ~6,000 feet (2,000M) circumference boom

<table>
<thead>
<tr>
<th>Oil Thickness</th>
<th>Oil Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>~0.004” 0.1 mm</td>
<td>8,400 gallons</td>
</tr>
<tr>
<td>~0.04” 1 mm</td>
<td>84,000 gallons</td>
</tr>
<tr>
<td>~3/8” 10 mm = 1 cm</td>
<td>840,000 gallons</td>
</tr>
</tbody>
</table>

Area = 3,426,250 square feet (~318,000 M²)