HARBO TECHNOLOGIES™

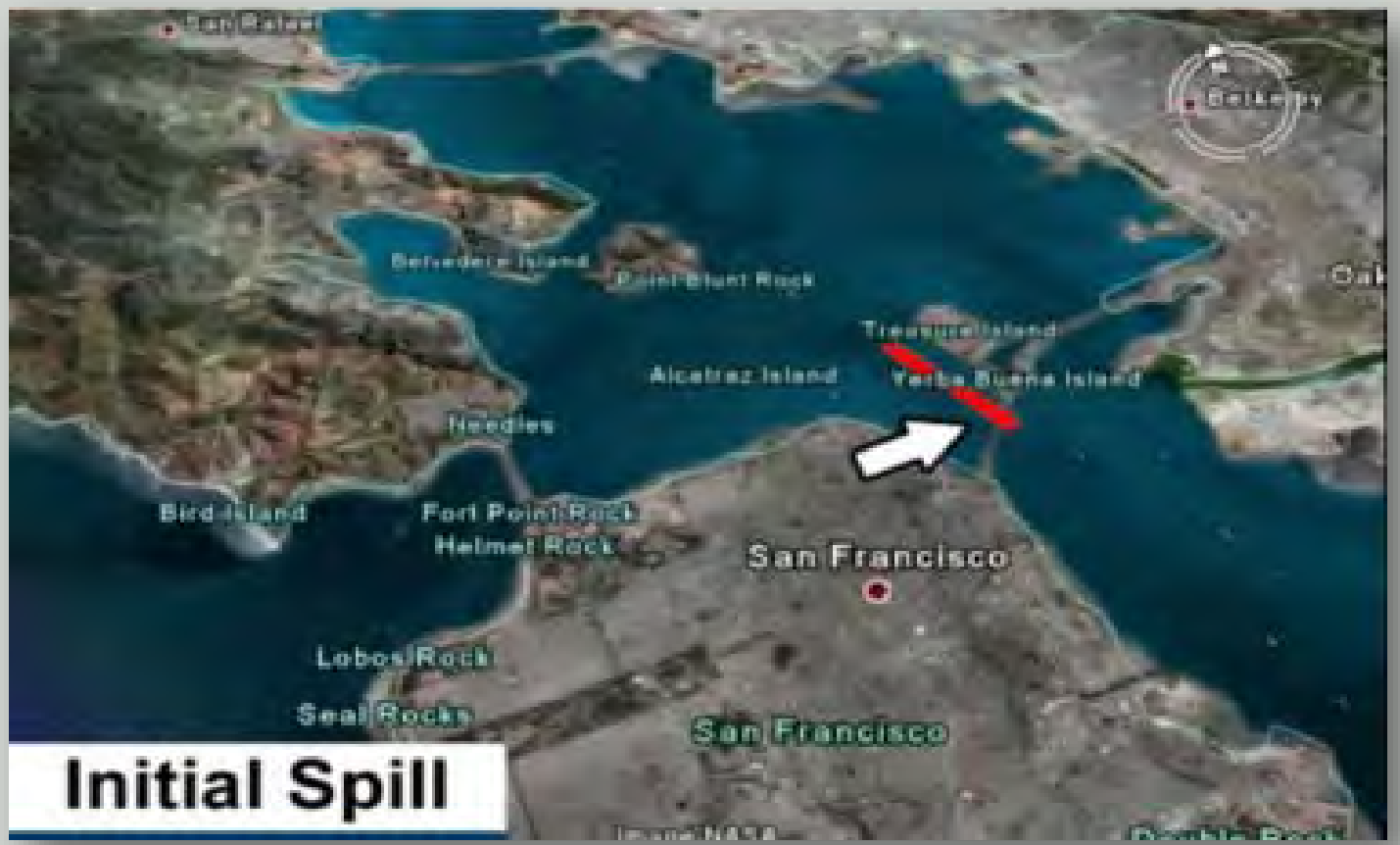
BLOCK SPILLS BEFORE THEY SPREAD

and avoid devastating consequences

Alaska oil spill symposium, March 2018

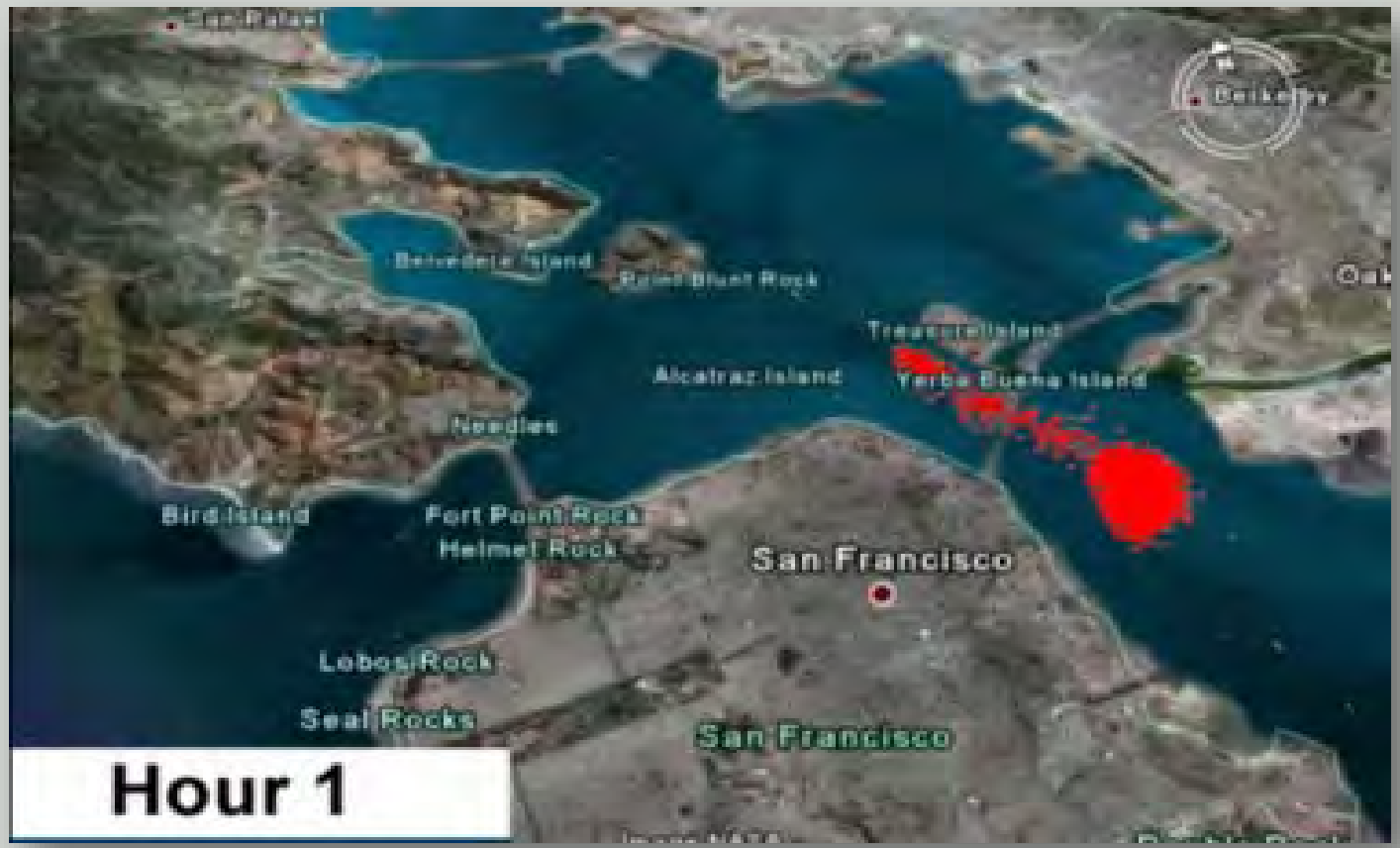
San Francisco oil spill 2007

San Francisco oil spill 2007



Source:
Ocean Conservancy

San Francisco oil spill 2007



Source:
Ocean Conservancy

San Francisco oil spill 2007

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Ocean Conservancy

San Francisco oil spill 2007

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Ocean Conservancy

Results

160 kms of Shore

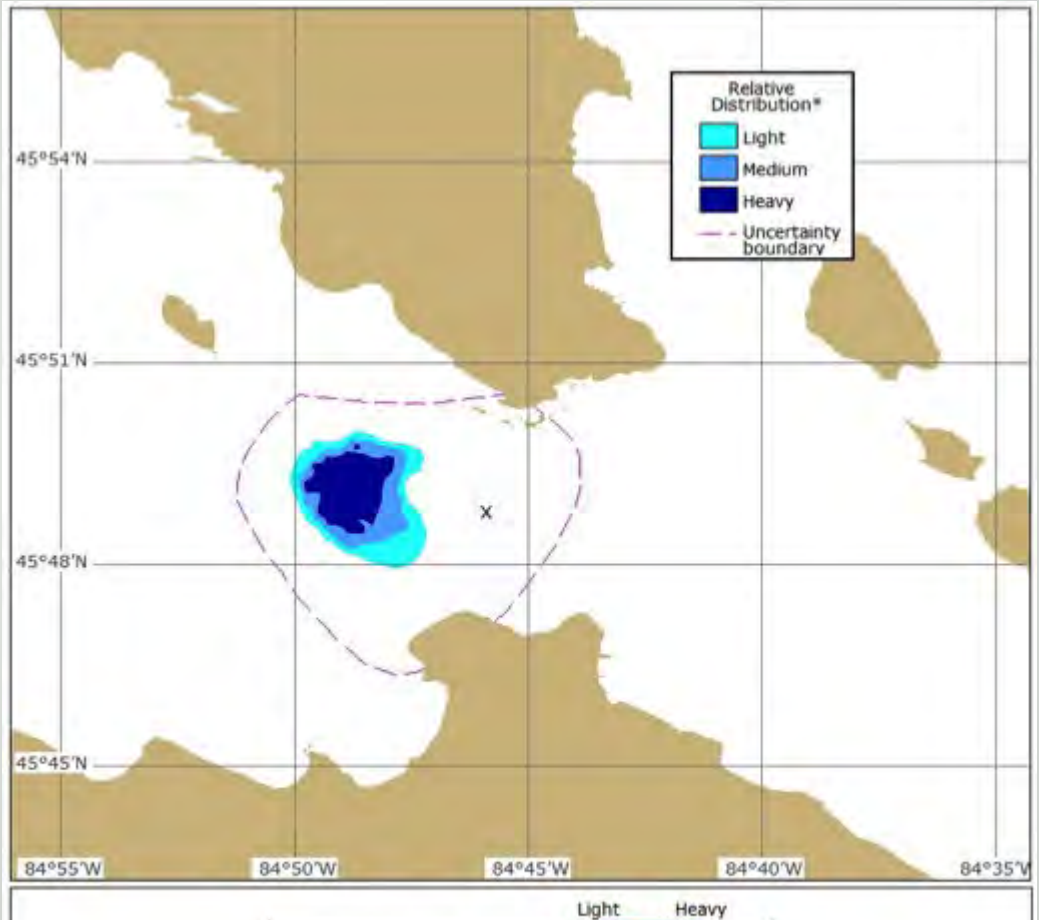
$100 M costs

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

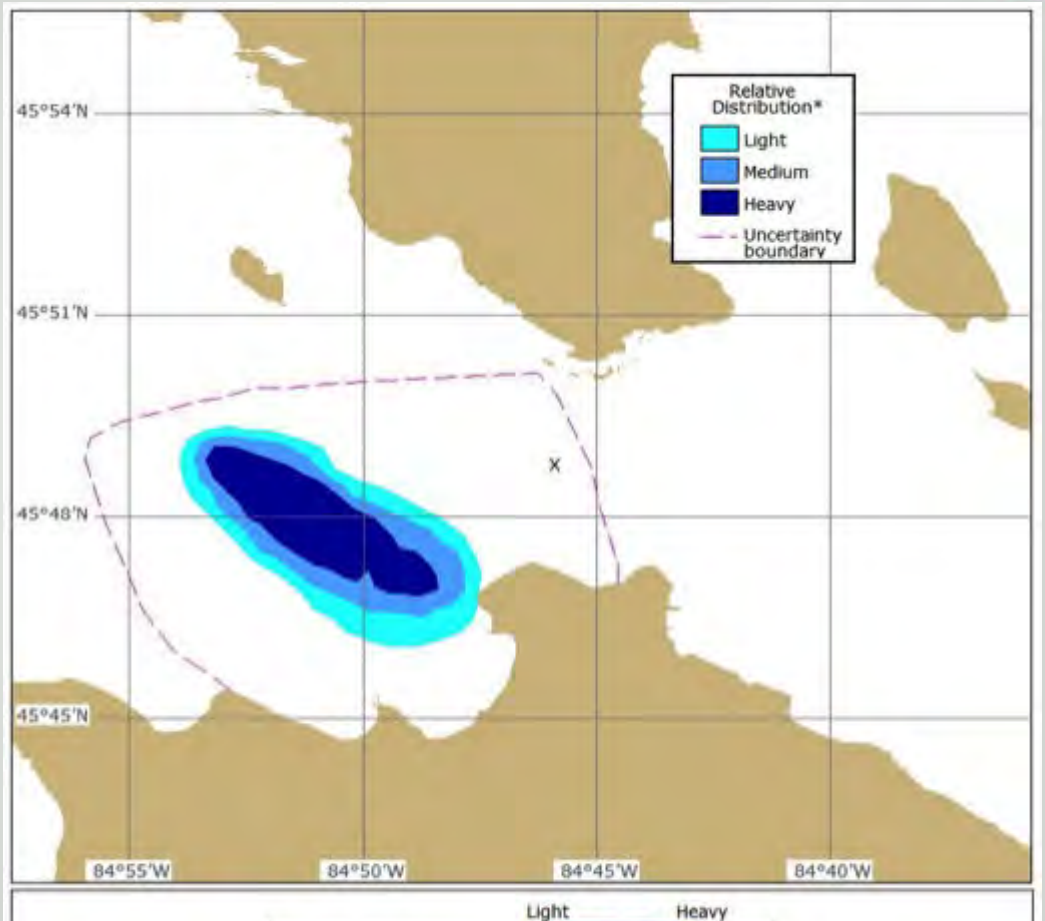
- 2 Miles Diameter
- Response equipment that was on-site



Source:
NOAA

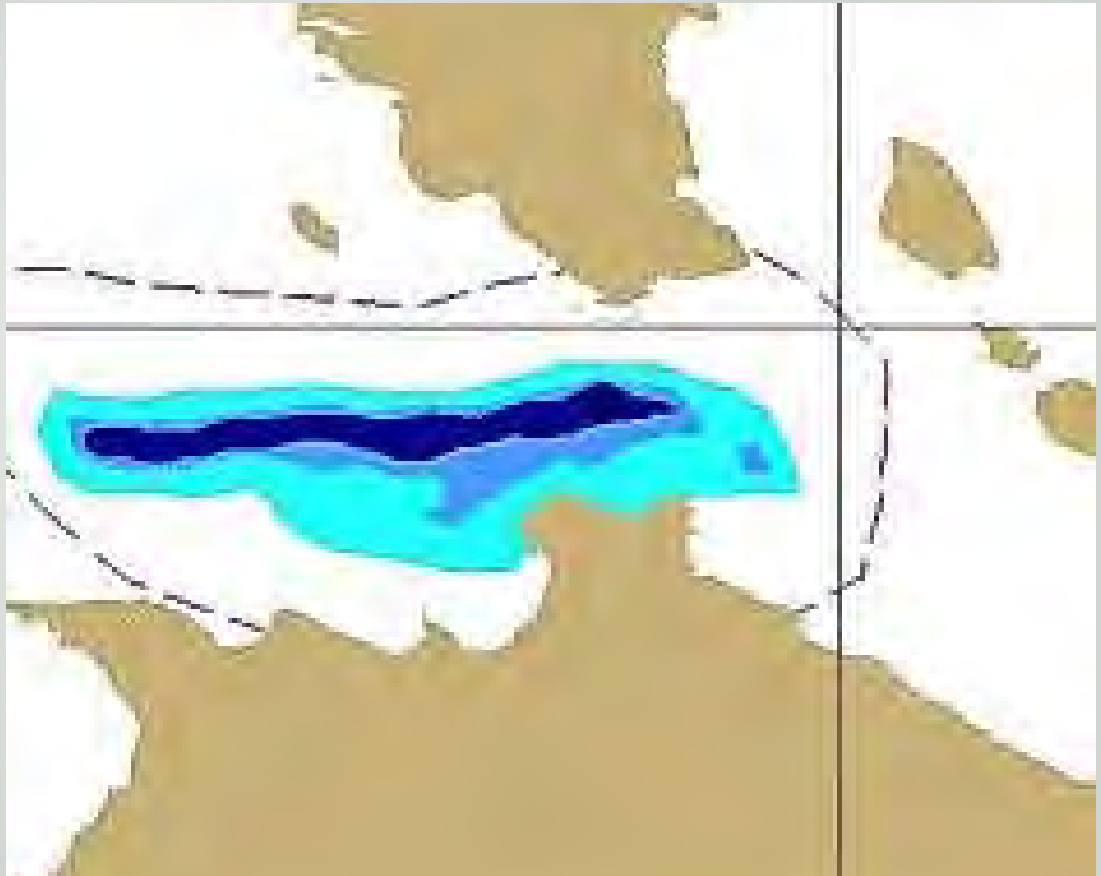
24 Hours after the spill

- 5 Miles Long
- Response manpower arrives from Detroit



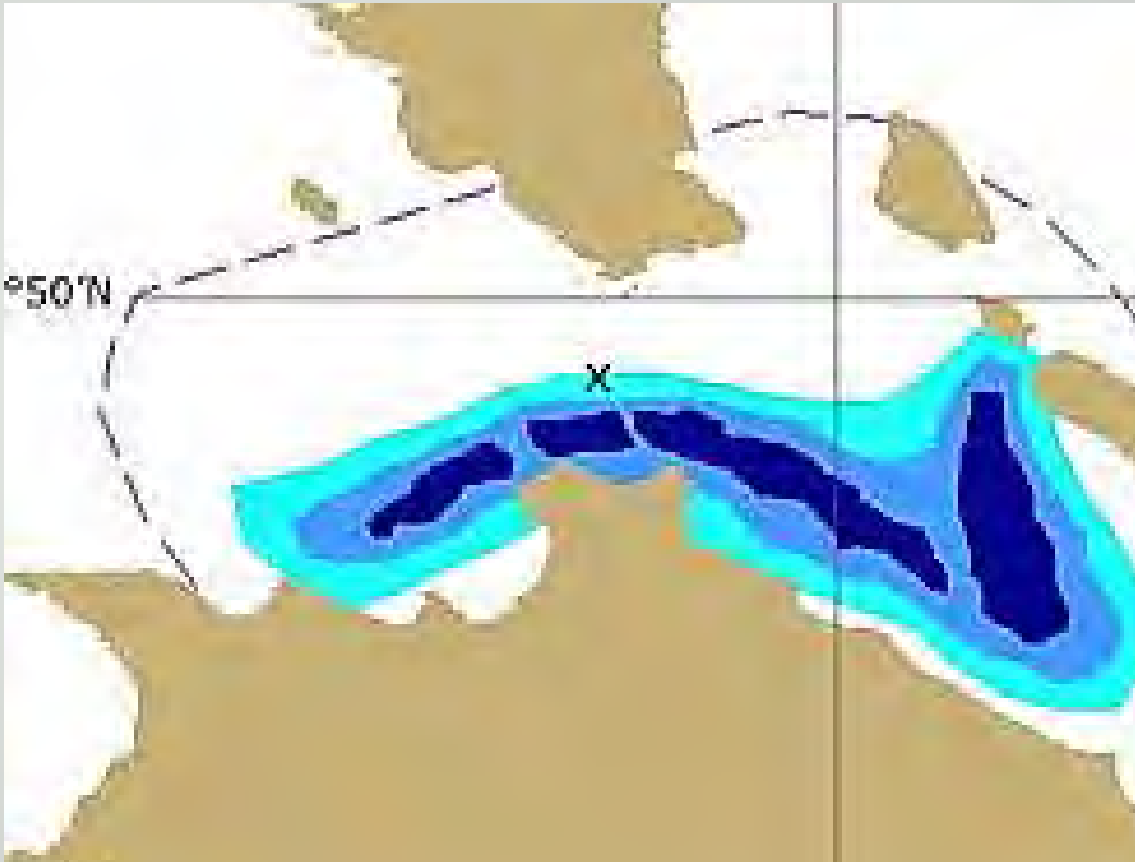
Source:
NOAA

36 Hours after the spill



Source:
NOAA

48 Hours after the spill

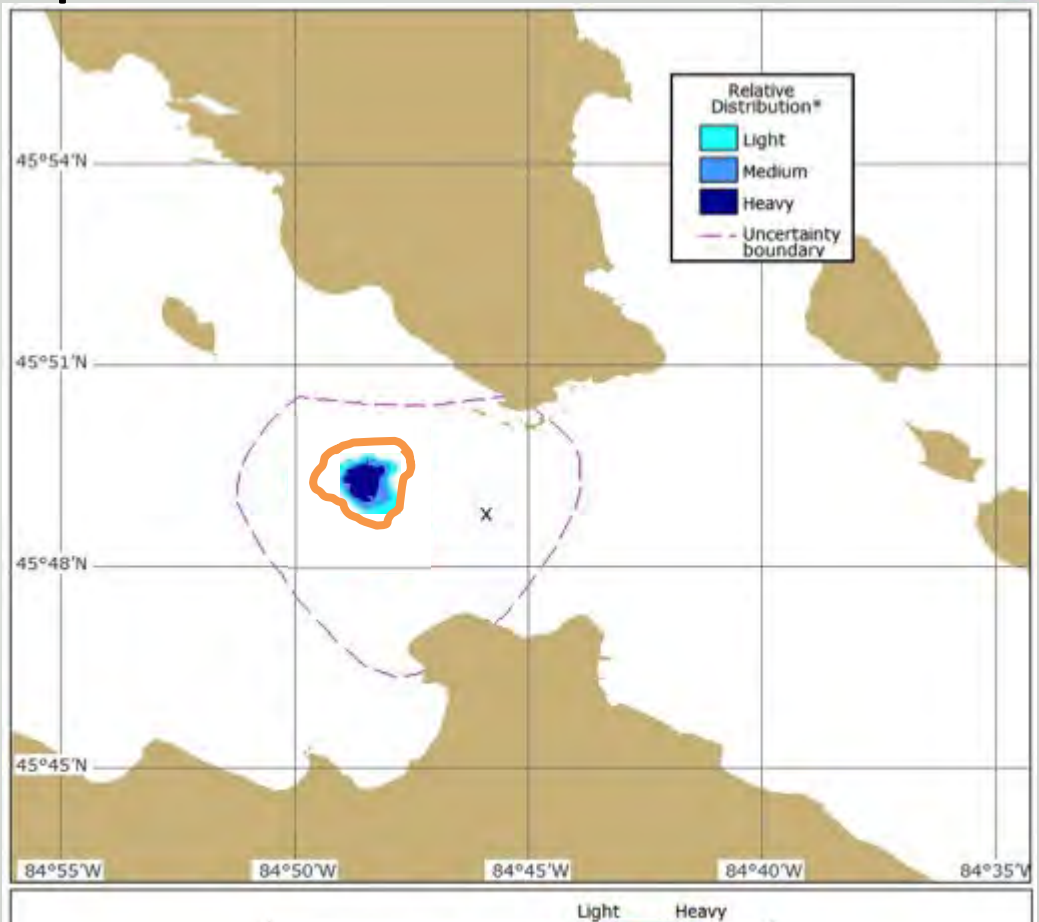


Source:
NOAA

HARBO TECHNOLOGIES

30 Minutes after the spill

- 800 Feet Diameter
- Spill Contained



7-15% recovery rate

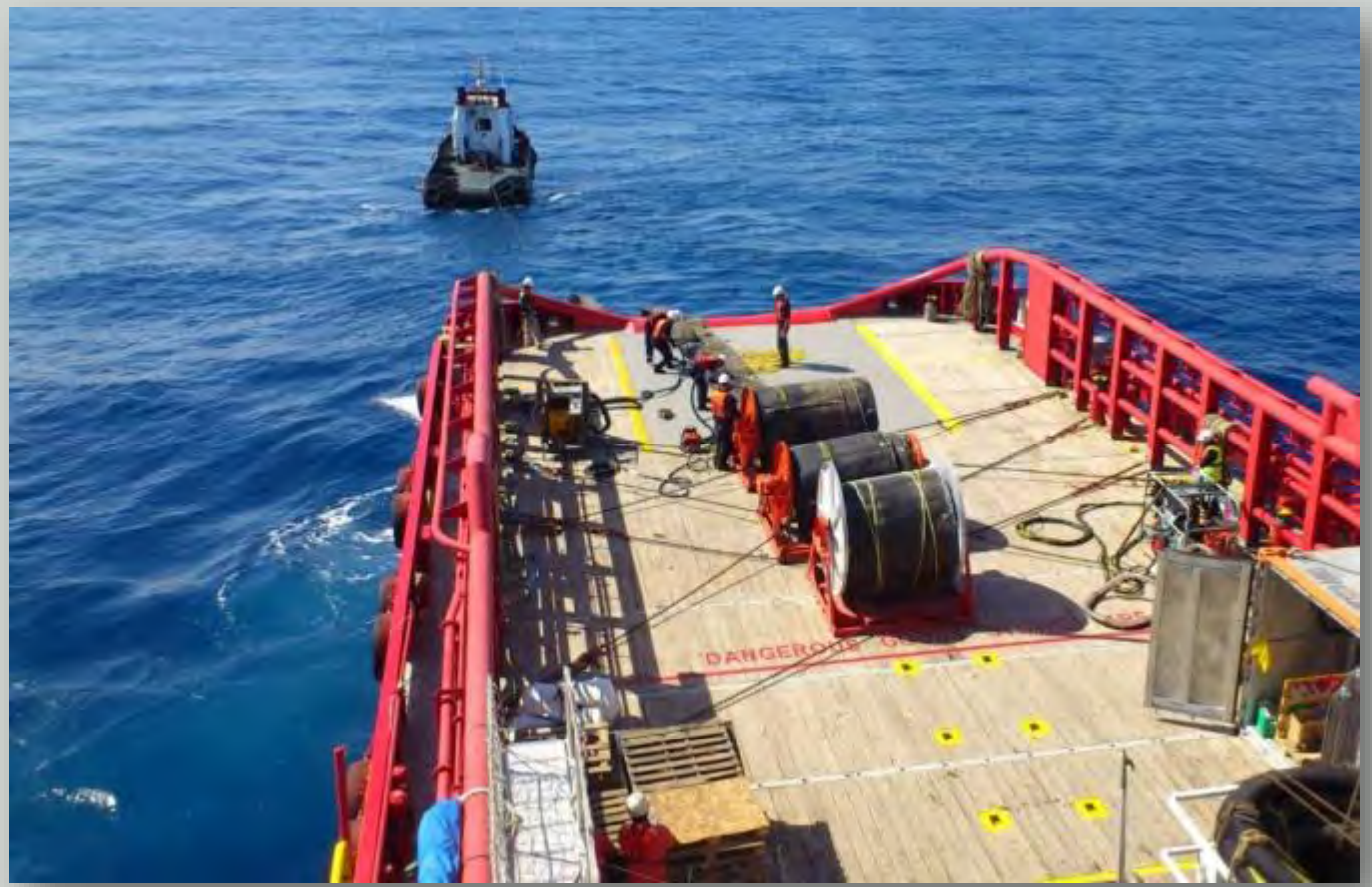
Current oil boom

Heavy

Requires trained crew

Danchor drill

Bulky



Danchor drill

When crews arrive it’s too late

Shift the Paradigm

HARBO TECHNOLOGIES

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.

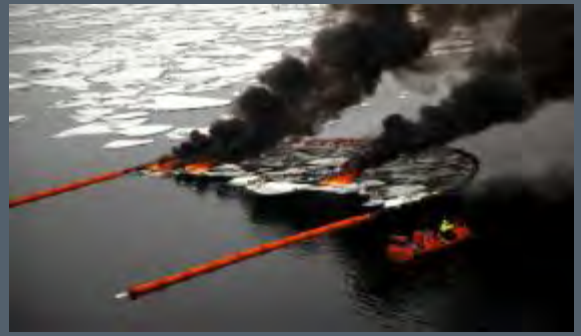
HARBO improves oil spill cleanup

Skimmers (Vacuums)

✓ Less skimming needed

Dispersants

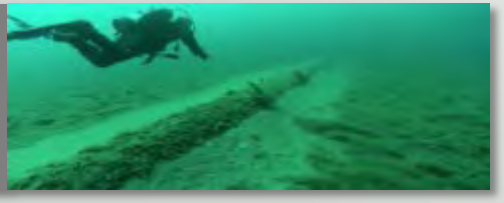
✓ Reduced quantities, effective use



In-situ burning

✓ Can only be done if concentrated

Potential Installations

Ports & Marinas		Coastal Infra-structure	
Coast Guard		Oil Rigs	
Coastal Areas		Tankers	
Underwater Pipelines		Sensitive Areas	

OHMSETT

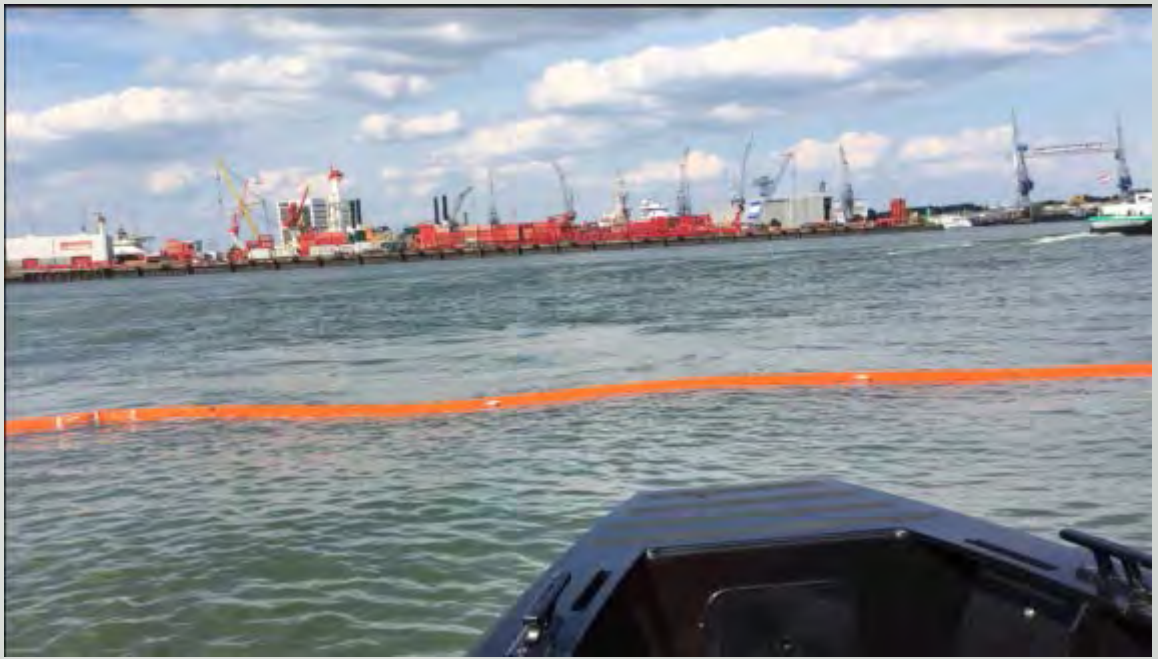
- Most advanced testing facility in the world
- 660 ft. long wave pool with oil handling capabilities
- Containment, Wave, Tow and Wind
- Testing with real oil
- 30+ Different tests
- 2 x Week long testing

OHMSETT 2017

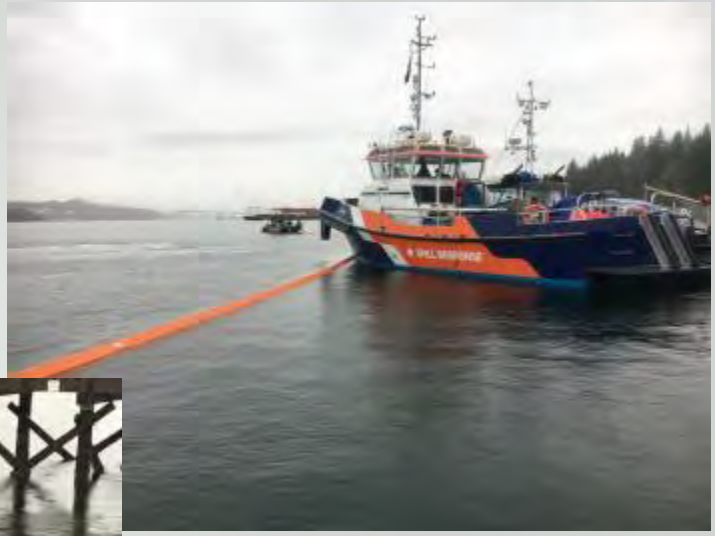
Tel Aviv Test 2017

Port of Rotterdam Test 2017

Port of Rotterdam Test 2017



Testing in Vancouver Canada - 2017



HARBO TECHNOLOGIES

HARBO
TECHNOLOGIES

Video

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.

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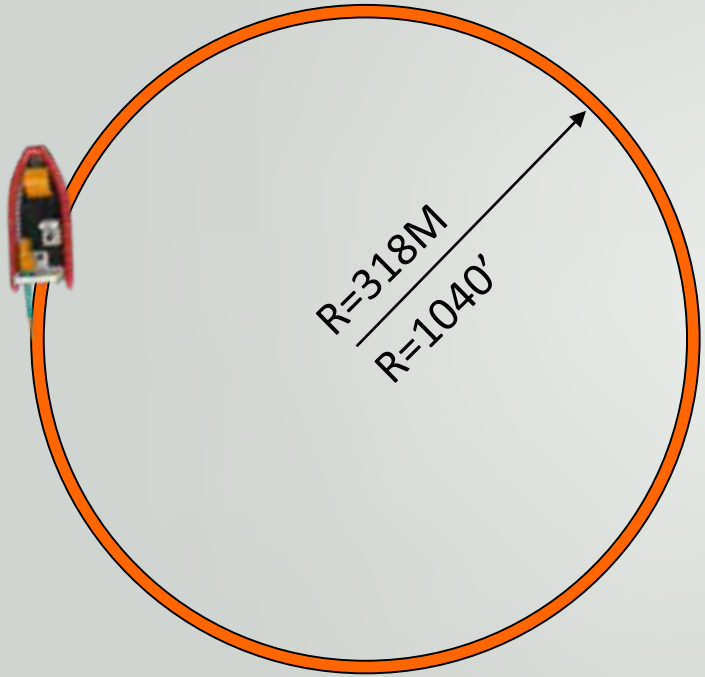
Alaska oil spill symposium, March 2018

Oil contained with a ~6,000 feet (2,000M) circumference boom



Area = 3,426,250 square feet (~318,000 M^2)

Oil Thickness	Oil Quantity
~0.004” 0.1 mm	8,400 gallons
~0.04” 1 mm	84,000 gallons
~3/8” 10 mm = 1 cm	840,000 gallons