

OSPR 2011

Recent Testing, Training, and Research Conducted at Ohmsett

Bill Schmidt

Program Manager

Ohmsett

The National Oil Spill Response Research &
Renewable Energy Test Facility



Test Facility

Ohmsett is the National Oil Spill Response
Research & Renewable Energy Test Facility

Ohmsett's mission – Improve oil spill
response through testing, training, research
and development

NEW JERSEY

NEW YORK

New York City

Newark



LaGuardia

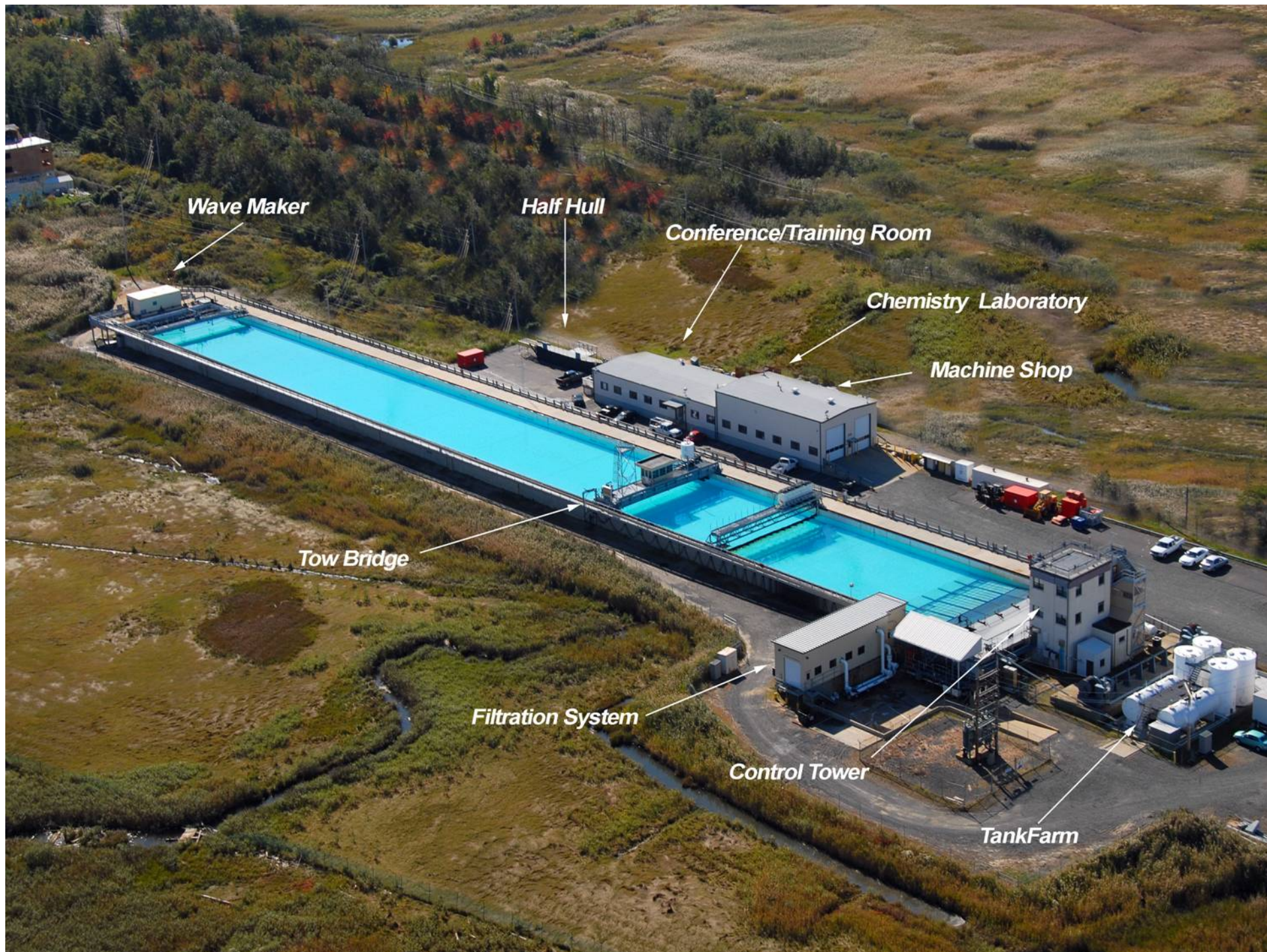
JFK



Ohmsett

Located One Hour South
Of New York City





Ohmsett: The National Oil Spill Response Research & Renewable Energy Test Facility

Operated by the United States Department of Interior
Bureau of Ocean Energy Management

Unique Capabilities

- Largest oil spill test tank in North America
 - 203 meters (667 feet) long
 - 20 meters (65 feet) wide
 - 2.5 meters (8 feet) deep
- Open ocean salinity (35 ppt)
- Moveable bridges capable of speeds up to 11 km/hr (6 knots)
- Computer controlled wave generator produces:
 - Sine waves
 - Harbor chop
 - Pierson-Moskowitz spectrum waves
 - JONSWAP spectrum waves
- Full Scale Testing, Training, Research and Development with oil



Ohmsett's Role in Standards Development

- Ohmsett collaborates with other organizations to help develop and improve standards
- Organizations include:
 - ASTM F20 Subcommittee
 - U.S. Coast Guard

Skimmer Nameplate Capacity Protocol

- American Society of Testing and Materials (ASTM) developed a new Skimmer Test Protocol
- Test Protocol Objectives
 - Simple
 - Inexpensive
 - Provide ideal conditions
 - Collect oil at the skimmer's maximum possible rate
 - Deliver repeatable data

Performance Measurements

Recovery Efficiency and Oil Recovery Rate

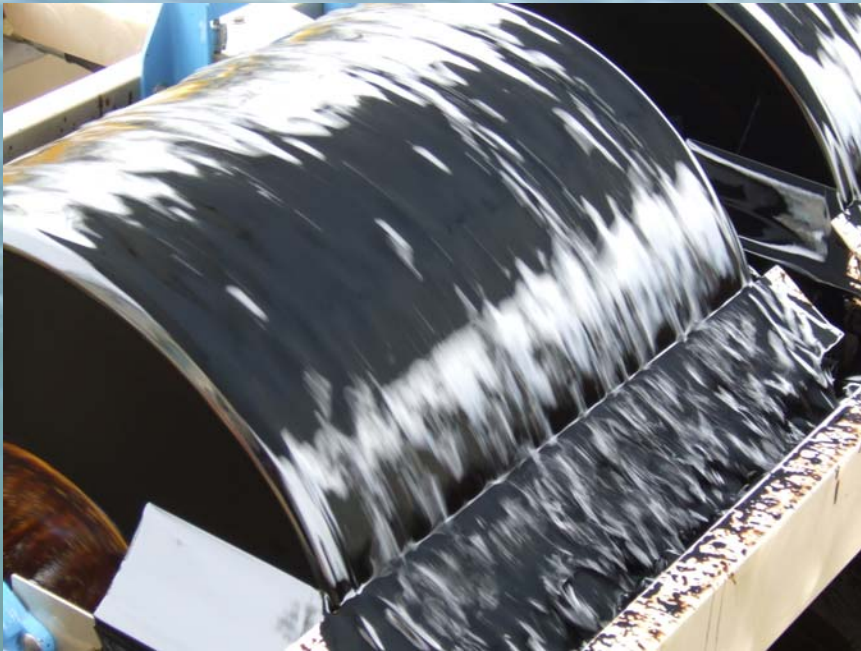
$$RE = \frac{V_{oil}}{V_{total\ fluid}} \times 100$$

$$ORR = \frac{V_{oil}}{t}$$

Skimmer Nameplate Capacity Test Setup



Skimmer Nameplate Capacity Testing



Skimmer Nameplate Capacity Test Setup



Skimmer 24 Hour Durability Test



Recirculation Diffuser Pipe

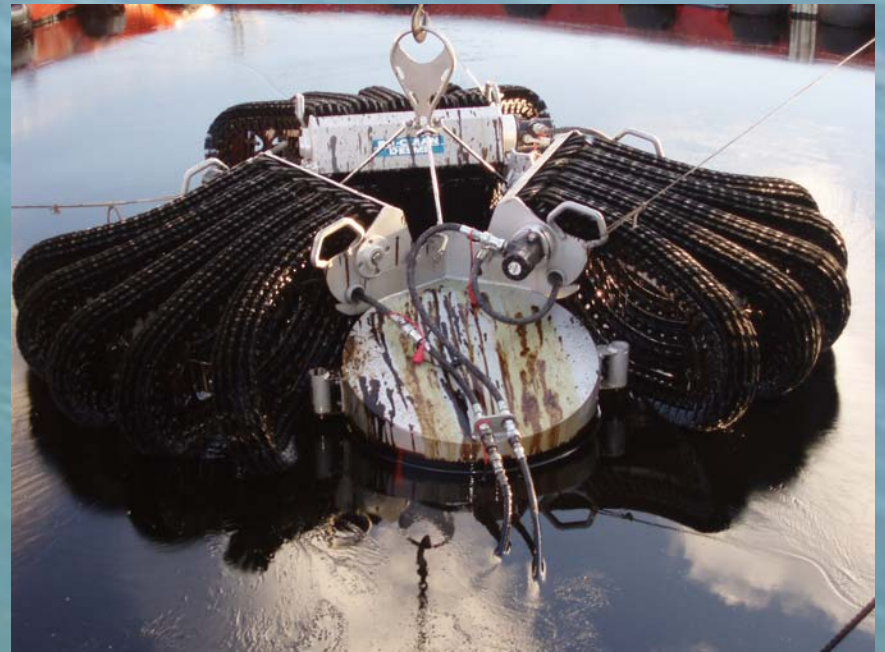




Skimmer 24 Hour Durability Test



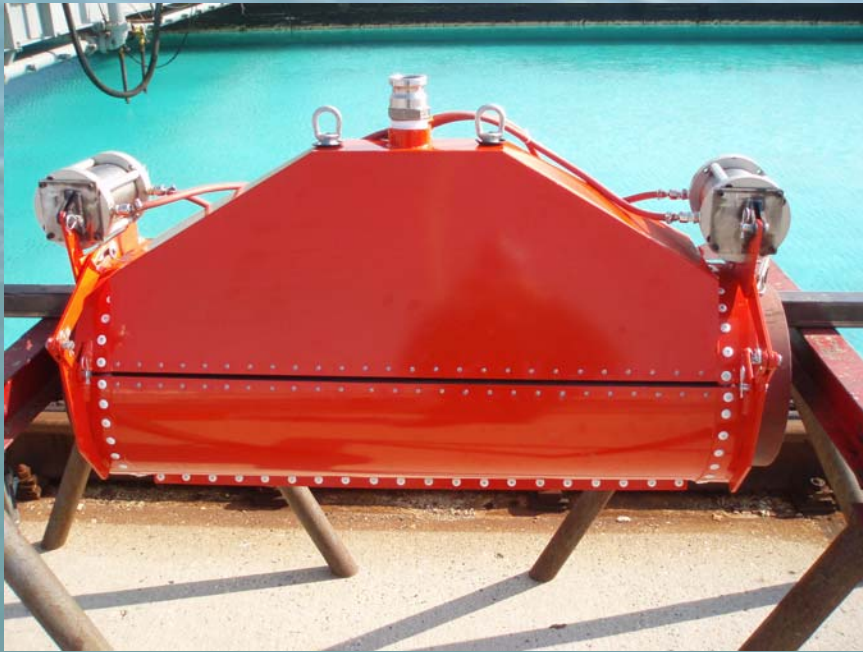
Skimmer Nameplate Capacity Test







Submerged Fluid Recovery System Windsor Innovations



Submerged Fluid Recovery System Windsor Innovations



Submersible Pump Test

- Test fluids:
 - Water
 - Hydrocal 300 (200 cP at 20 °C)
 - Sundex 790 (9500 cP at 20 °C)
- Ohmsett designed a piping system to transfer oil from a 10,000 gal tank to adjacent 10,000 g tank

Submersible Pump Test



Submersible Pump Test



Dispersant Protocol Development

- Develop a protocol for testing Dispersant Effectiveness
 - Protocol was developed in conjunction with SL Ross

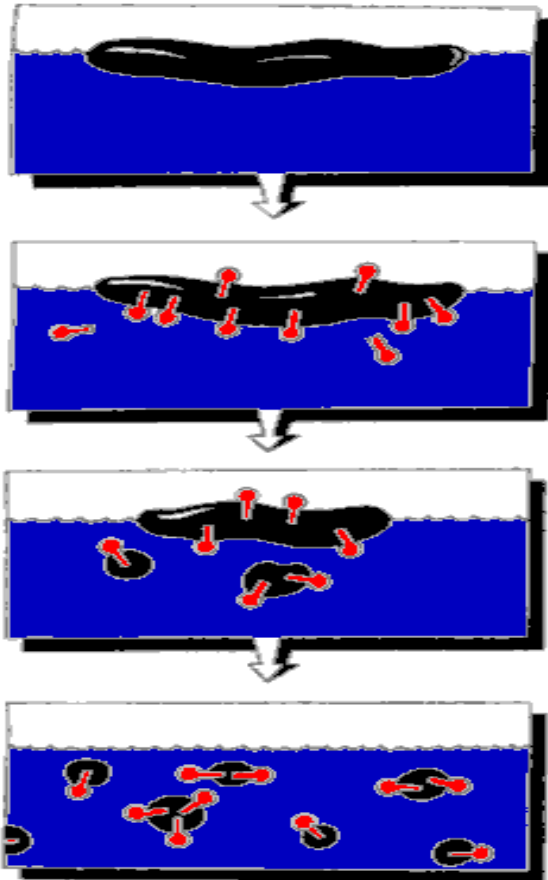
Dispersant Protocol Development

- Variables Include:
 - Sea state
 - Oil type and condition
 - Fresh or weathered oil
 - Slick thickness
 - Dispersant type
 - Dispersant dosage

Dispersant Protocol Development

- Methods used to measure dispersant effectiveness:
 - Amount of test oil dispersed into water
 - Measured with fluorometer
 - Collect surface oil one hour after dispersant application and quantify

Dispersant Overview



Untreated Slick

Application of Dispersant

Formation of Small Droplets

Dilution of Dispersed Oil

Dispersant Effectiveness Testing

- BOEM funded Dispersant Effectiveness (DE) tests at Ohmsett
- Tests included:
 - Cold and temperate conditions
 - Fresh and weathered crude and fuel oils





SMART Protocol Testing of Dispersant Effectiveness at Ohmsett



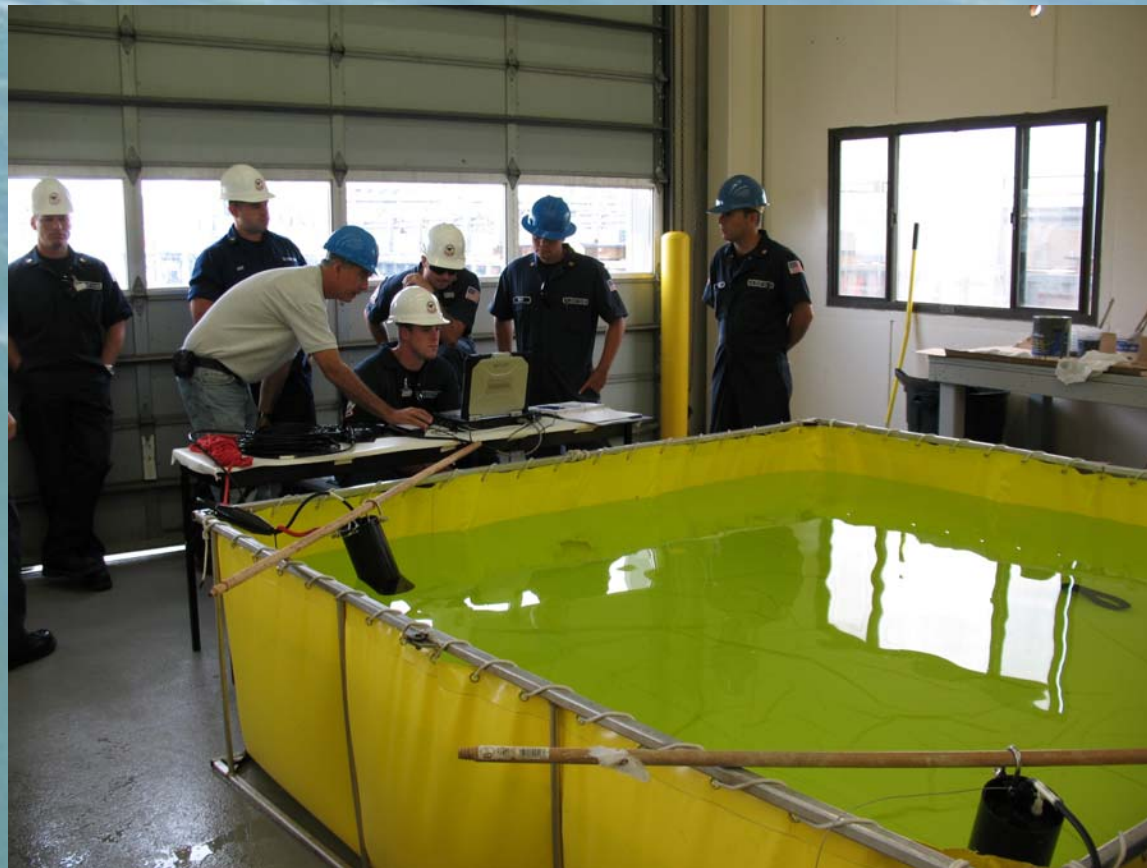
U.S. Coast Guard Special Monitoring of Applied Response Technologies (SMART) Training

- 3 day training class
- SMART protocol:
 - Monitoring program for:
 - *In-situ* burns
 - Dispersants

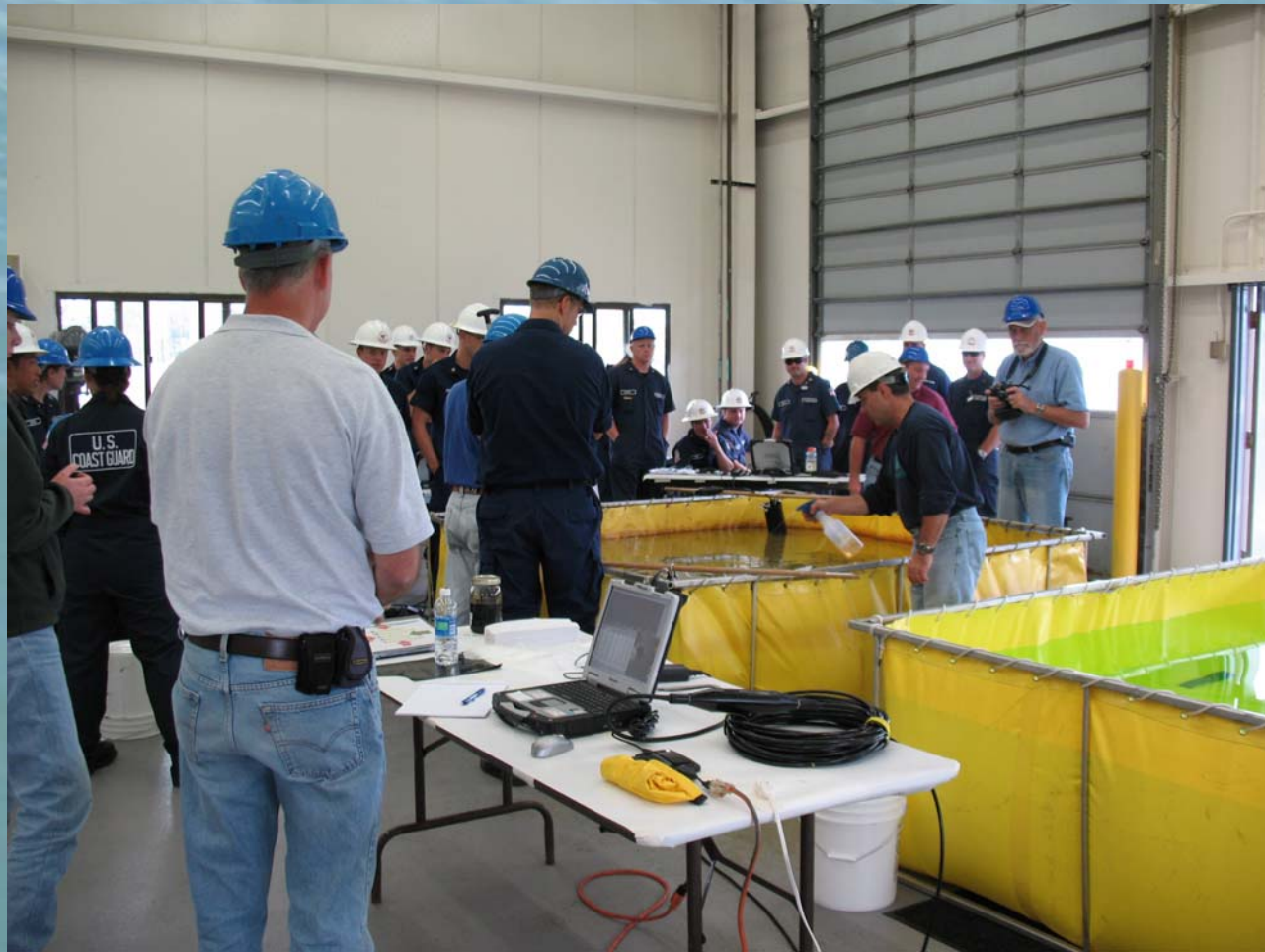
U.S. Coast Guard Special Monitoring of Applied Response Technologies (SMART) Training

- Use Turner C3 submersible fluorometers
- Setup two portable test tanks
- Tank One - Calibrate instruments using fluorescein dye
- Tank Two - Dispense Norwegian crude oil
- Apply dispersant
- Agitate surface
 - Provides mixing energy
- Collect data

U.S. Coast Guard Special Monitoring of Applied Response Technologies (SMART) Training



U.S. Coast Guard Special Monitoring of Applied Response Technologies (SMART) Training



U.S. Coast Guard Special Monitoring of Applied Response Technologies (SMART) Training



Visitor Day Dispersant Demonstration



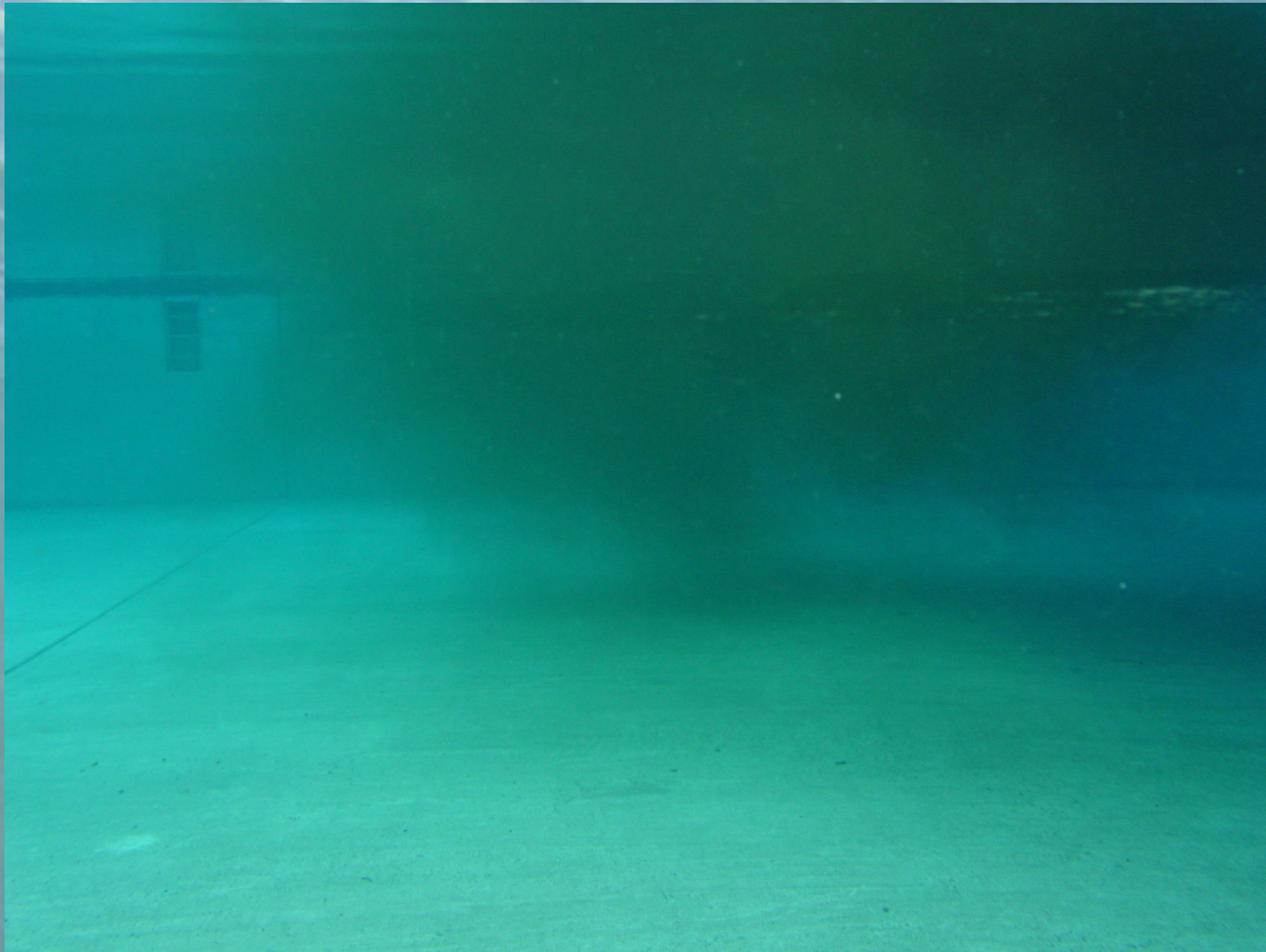
Visitor Day

Dispersant Demonstration

- Dispersant test
 - Dispersed oil cloud visible through tank sidewall windows



Dispersed Oil Cloud



Oil Herders to Improve Mechanical Recovery in Pack Ice

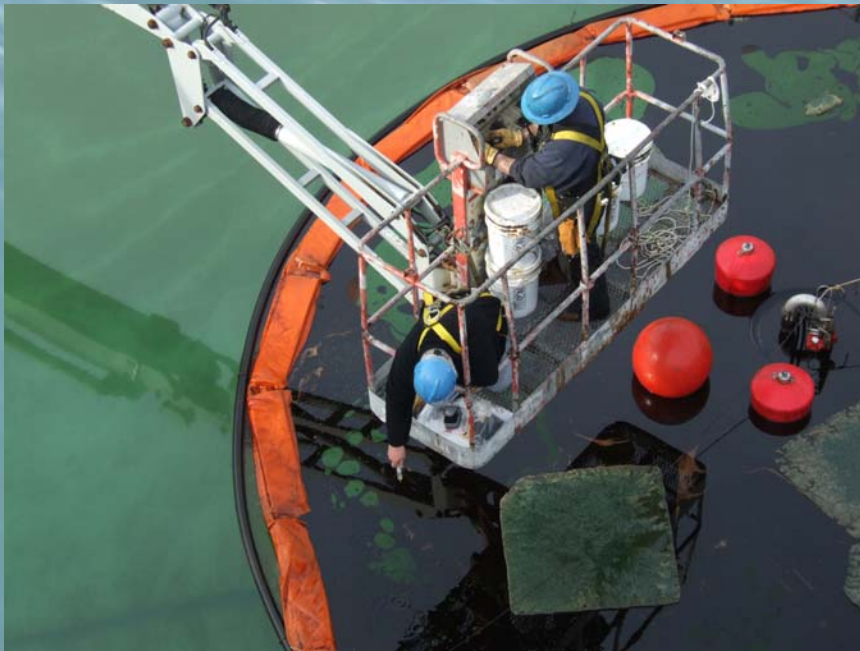


Oil Herder Demonstration

Courtesy of SL Ross



Oil Herders to Improve Mechanical Recovery in Pack Ice



Oil Herders to Improve Mechanical Recovery in Pack Ice



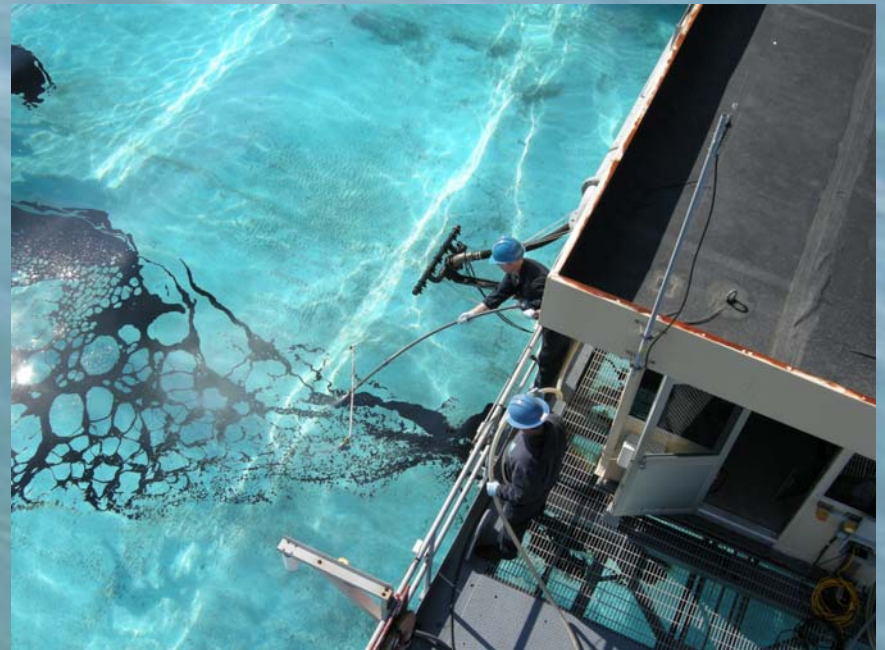
Oil Herders to Improve Mechanical Recovery in Pack Ice



Oil Herders to Improve Dispersant Operations



Oil Herders to Improve Dispersant Operations



Oil Herders to Improve Dispersant Operations



Dielectric Fluid Study by Louisiana State University at Ohmsett

- Dielectric fluid will be used in offshore wind farms
- A wind farm can contain up to 60,000 gallons of dielectric fluid
- If dielectric oil is spilled at sea:
 - Can it be recovered by oleophilic skimmers
 - Is it dispersible with Corexit 9500

Dielectric Fluid Recovery Test Setup



Recovery of Midel 7131 Dielectric Fluid (Dyed Red)



Dielectric Fluid Recovery Disc Skimmer



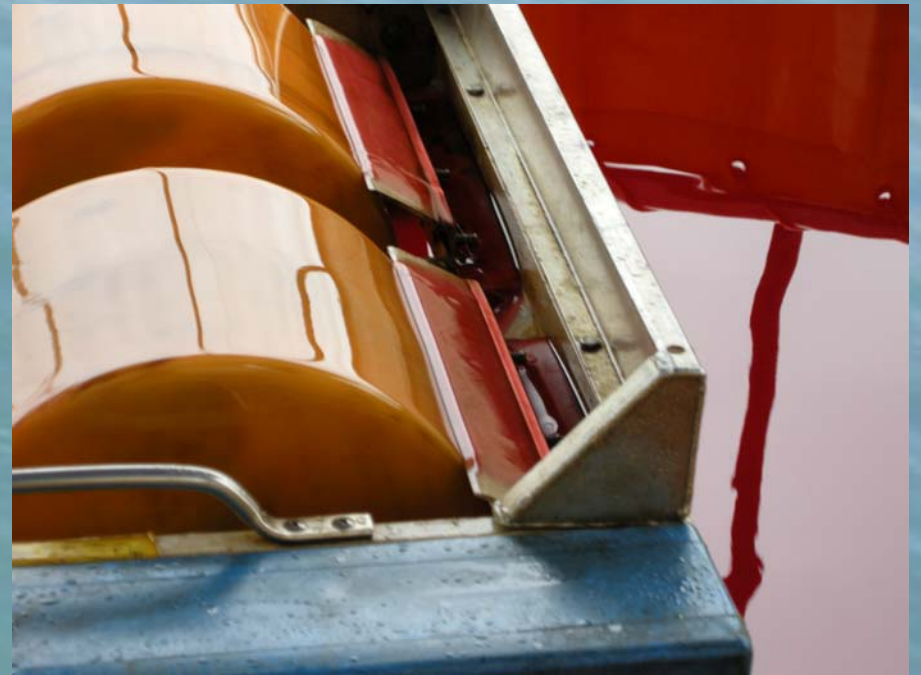


Dielectric Fluid Recovery Rope Mop





Dielectric Fluid Recovery Drum Skimmer





Dielectric Fluid Dispersant Test



Dielectric Fluid Dispersant Test





Remote Oil Spill Detection Testing

- Joint venture:
 - U.S. Bureau of Ocean Energy Management (BOEM)
 - California Department of Fish and Game, Office of Spill Prevention and Response (OSPR)
 - Ocean Imaging
- Test a portable aerial sensing imager to measure oil slick thickness

Remote Oil Spill Detection Testing

- Oil 'targets' deployed in Ohmsett's main test tank
- Targets contained known quantities of oil
- Sensing equipment mounted in Ohmsett's Main Bridge crow's nest
 - 10m above the targets

Ocean Imaging Remote Detection of Oil Spills



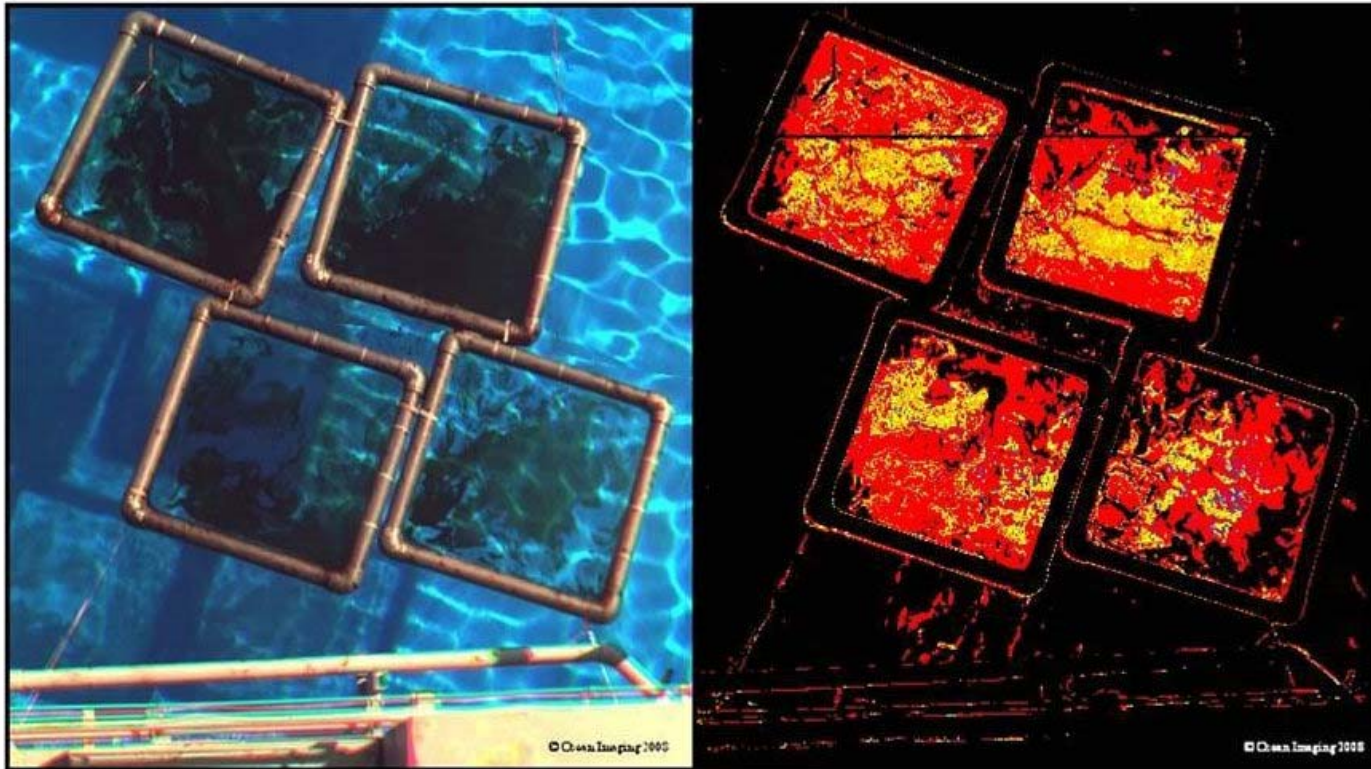
Ocean Imaging

Remote Detection of Oil Spills



Ocean Imaging

Remote Detection of Oil Spills



Ohmsett Oil Thickness Testing

Oil Thickness (mm)

0 to .01	.15 to .2
.01 to .05	.2 to .25
.05 to .1	.25 to .3
.1 to .15	Water

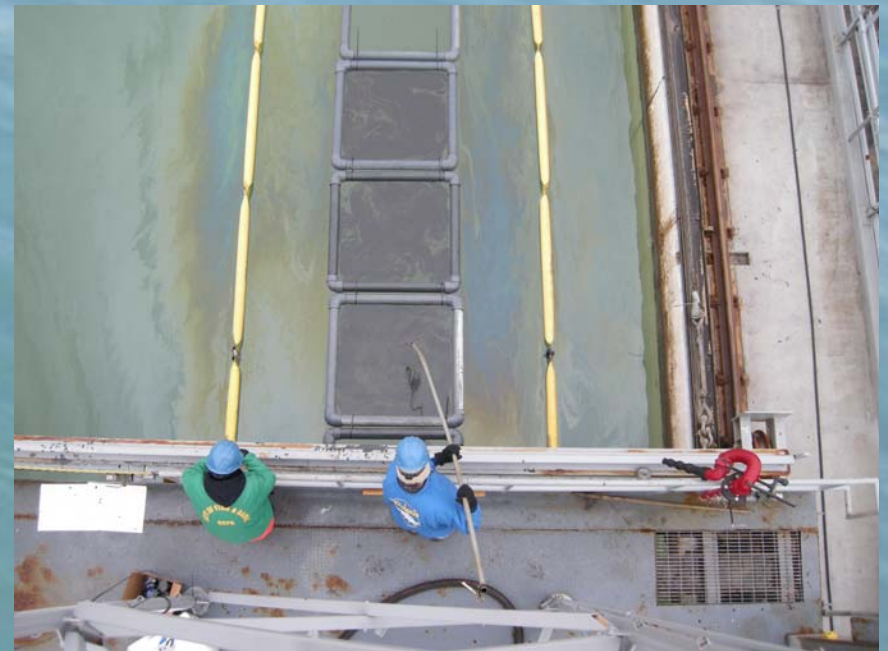
Ocean Imaging

Remote Detection of Oil Spills



Ocean Imaging

Remote Detection of Oil Spills



Ocean Imaging Remote Detection of Oil Spills



Subsurface Oil Detection Test for USCG R&D Center

- Objective:
 - Evaluate capability of proposed system to:
 - Detect heavy oil on the sea floor
 - Operate in all sea floor environments
 - Silt
 - Rock
 - Gravel

Subsurface Oil Detection Test for USCG R&D Center



Subsurface Oil Detection Test for USCG R&D Center



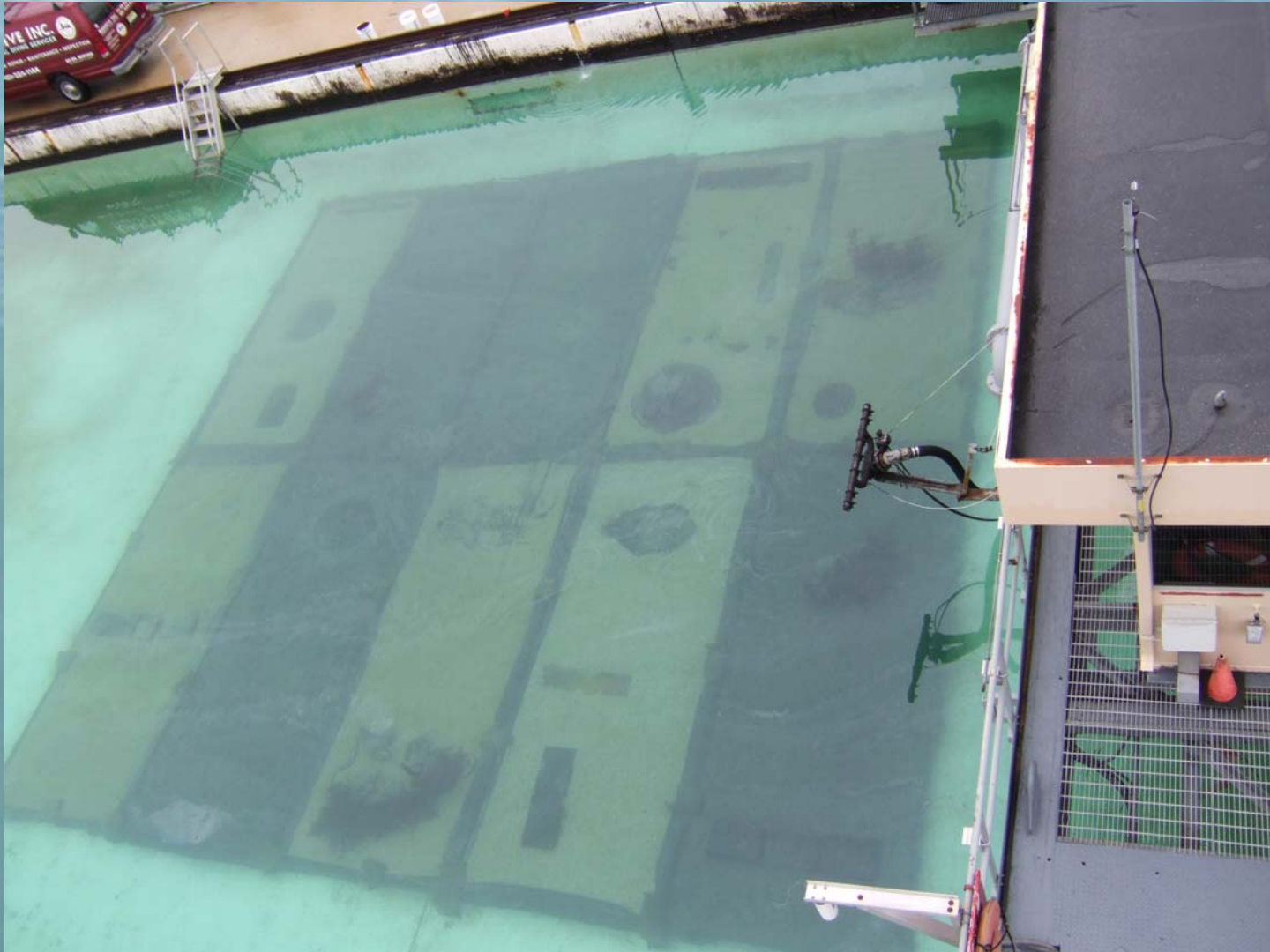
Subsurface Oil Detection Test for USCG R&D Center



Subsurface Oil Detection Test for USCG R&D Center



Subsurface Oil Detection Test for USCG R&D Center





Hands-on Training



Oil Spill Response Training U.S. Coast Guard

- Partnership between Ohmsett and USCG National Strike Force Coordination Center
- Instructors are experienced former USCG personnel

Oil Spill Response Training

- Includes Classroom and 'Hands-on'
- Students recover real oil, not a surrogate material
- Students use full-scale oil spill recovery equipment
- Students operate the equipment:
 - In calm conditions
 - In waves to simulate 'at-sea' conditions.

Boom Deployment Exercise at Ohmsett

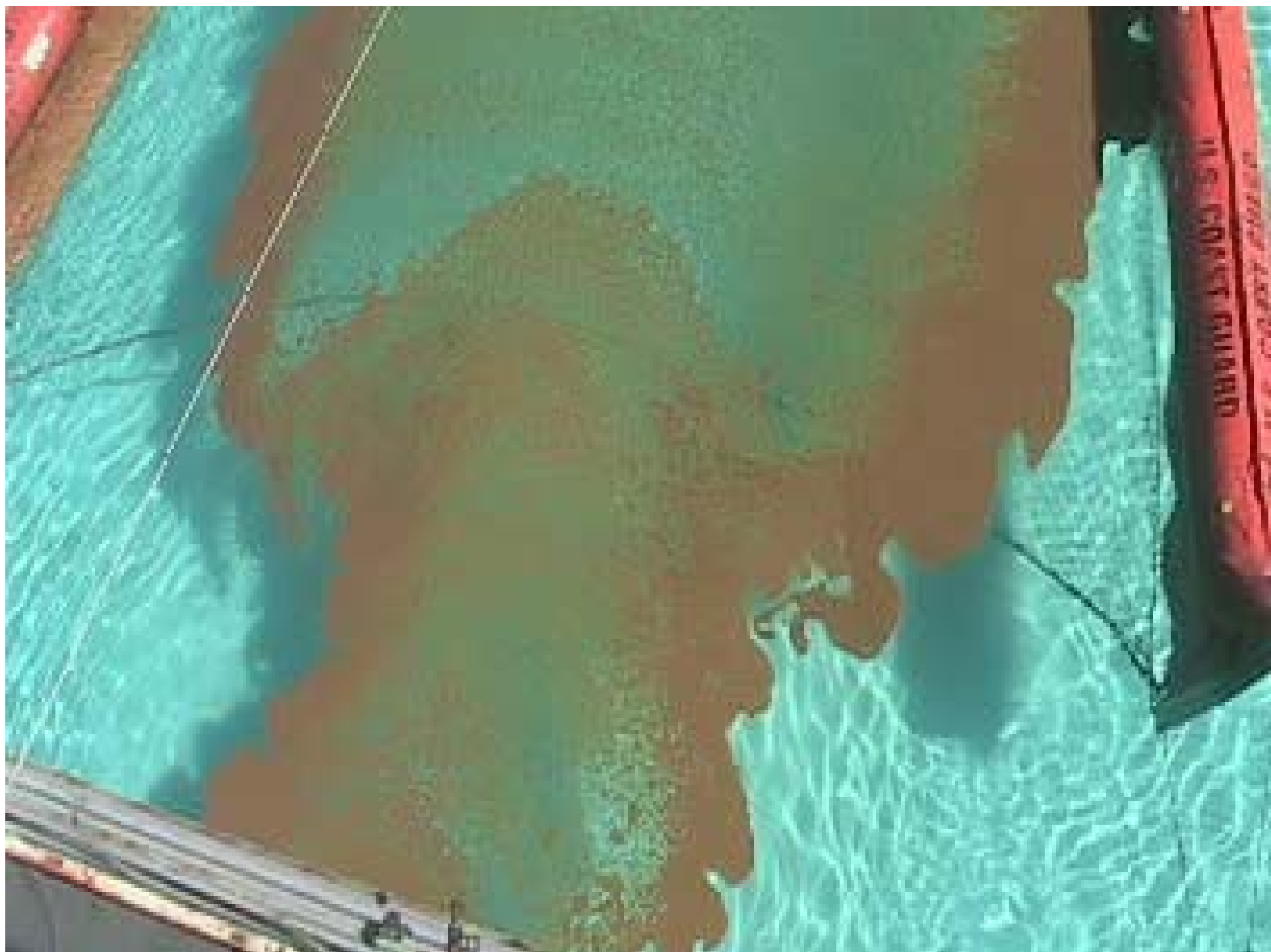


USCG Hands-on Training



USCG Oil Spill Response Training







Ohmsett Wave Generator Upgrade



Ohmsett Wave Flaps



Sinusoidal Waves



Pierson-Moskowitz Waves



Pierson-Moskowitz Waves





- Sixth major X PRIZE competition
 - Funded private spaceflight challenge
 - Funded ultra-fuel-efficient vehicle challenge
 - Now funding an oil-spill cleanup challenge



- X PRIZE will select up to ten teams to compete
- Testing will take place at Ohmsett this summer
- \$1,000,000 Grand Prize to the team with:
 - At least 70% Recovery Efficiency (RE)
 - Highest Oil Recovery Rate (ORR)



Ohmsett

The National Oil Spill Response Research & Renewable Energy Test Facility
Operated by the Department of the Interior – Bureau of Ocean Energy Management

