

A large-scale oil spill on the ocean. Thick, dark black smoke billows upwards from several points where oil is burning on the water's surface. The sky is a pale blue, and the sea is dark blue. In the background, several offshore oil rigs and support vessels are visible on the horizon. The overall scene is one of a major industrial disaster.

Bureau of Ocean Energy Management, Regulation and Enforcement Oil Spill Response Research and Its Application During *Deepwater Horizon*

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**Bureau of Ocean Energy Management, Regulation and Enforcement
Herndon, VA**

Background Information

- The BOEMRE funds and conducts offshore oil spill response research (OSRR)
- The BOEMRE OSRR program is both national and international in scope
- 40% of OSRR projects are jointly funded with state and federal government agencies, academia, private industry and foreign countries
- Funds are appropriated from the Oil Spill Liability Trust Fund. Potential polluters support research to improve oil spill response capabilities



Ohmsett – The National Oil Spill Response Research and Renewable Energy Test Facility

Operated by the Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement

Unique Capabilities

- Largest oil spill test tank in North America
- Tank dimensions
 - 203 m long
 - 20 m wide
 - 3.5 m deep
 - 10 million liters clear salt water



Full Scale Testing, Training, and Research with Oil

- Tow bridge capable of speeds up to 6.5 knots
- Wave generator can produce 1-meter waves and harbor chop waves
- Release up to 5,678 liters of oil at 1,135 liters per minute/per run

NEW YORK

NEW JERSEY

New York City

Newark

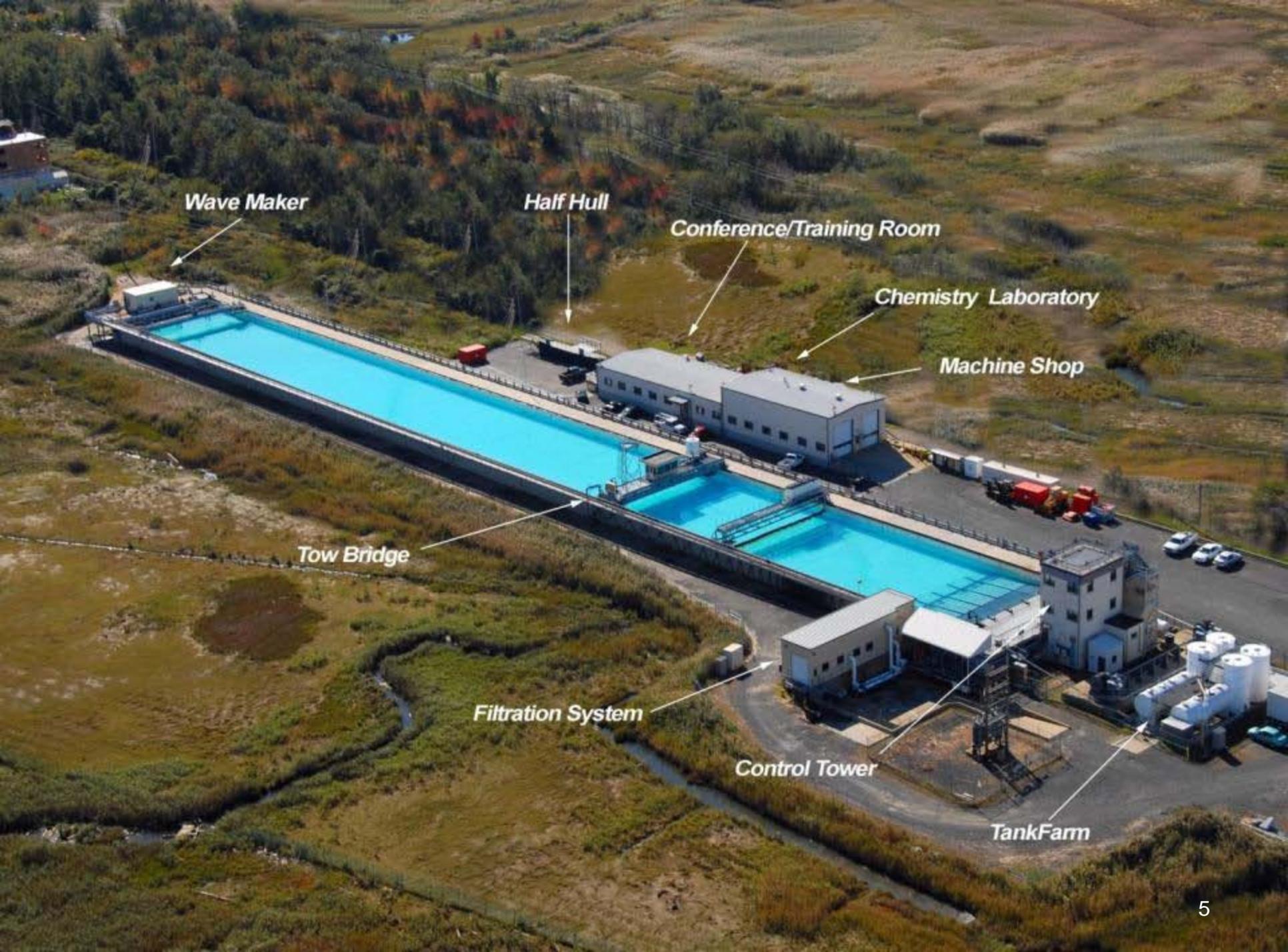


LaGuardia

JFK



Ohmsett



Wave Maker

Half Hull

Conference/Training Room

Chemistry Laboratory

Machine Shop

Tow Bridge

Filtration System

Control Tower

TankFarm



Ohmsett Testing Capabilities



Containment Booms and Skimmers



Arctic Response Technologies



Dispersants



Remote Sensing



Standards Development and First Article Acceptance Testing



Fire Resistant Boom



Responder Training



Submerged Oil



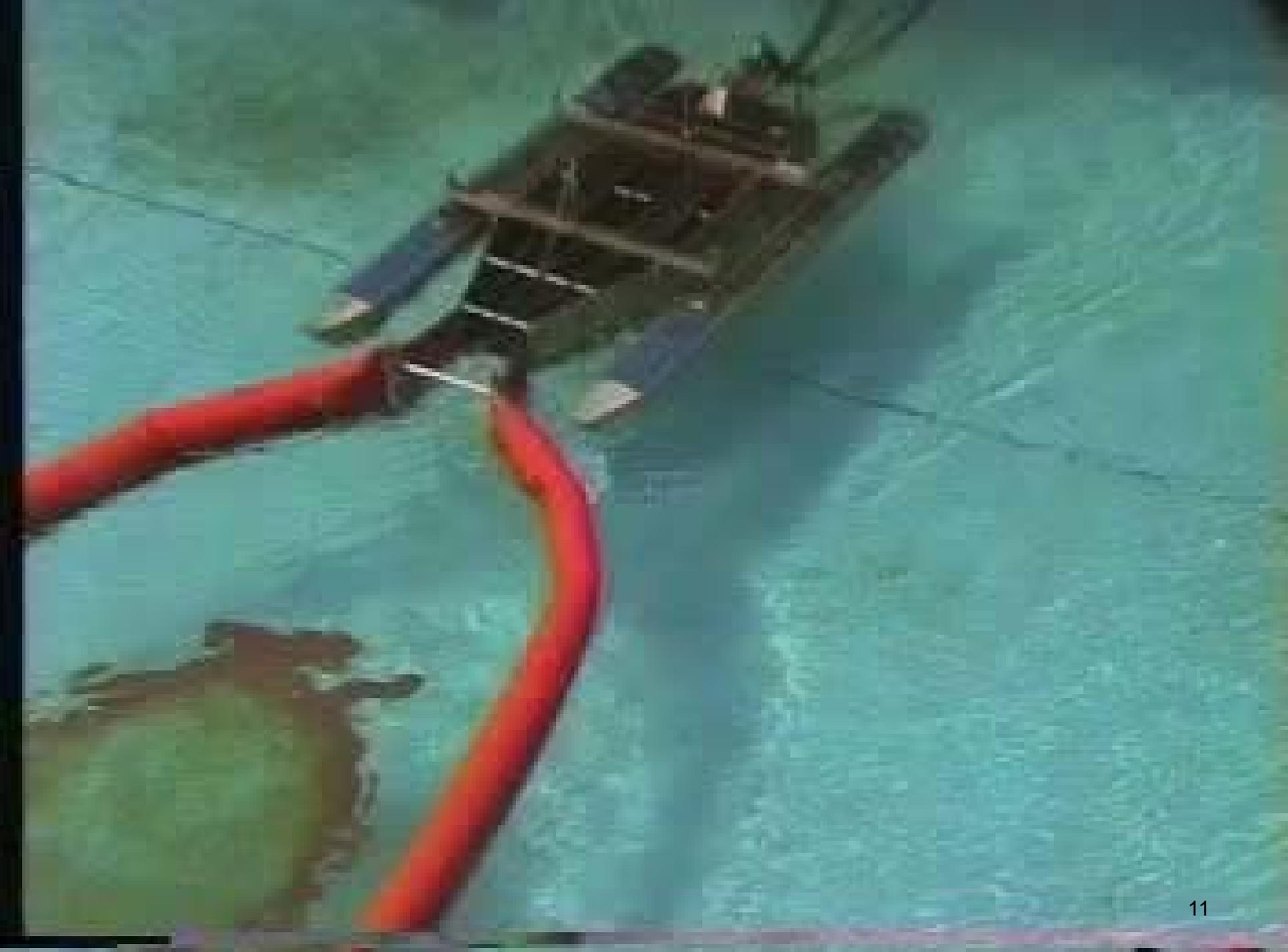
USN 01

NAVY
SPSALV

14 9:32 AM









First Responder Oil Spill Training









16 2:20 PM





Ohmsett Dispersant Experiments Conducted To Date

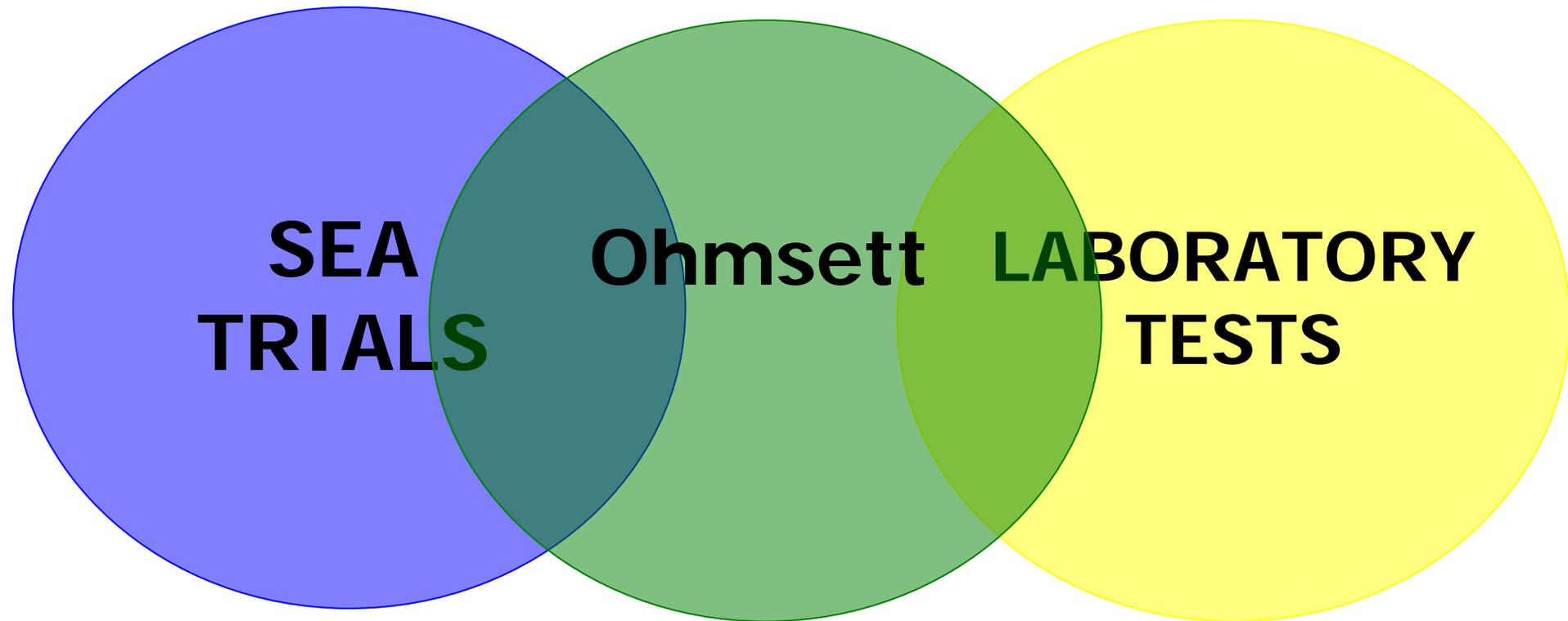
15 different dispersant effectiveness test series

- 5 of various crude oils in cold water/ broken ice
- 1 of tests in non-breaking waves
- 2 of calm seas (persistence of dispersants)
- 3 of California heavy crude oils
- 4 covering emulsions, correlating Ohmsett with at-sea experiments, SMART

Calibrated, referenced and repeatable test protocol

Conduct dispersant training and monitoring instrument R&D

Ohmsett is a 'Bridge' Between Dispersant Testing At Sea and Laboratory Tests



















10-AU
Fluorometer

TURNER DESIGNS
Sunnyvale, California

21.4 (000)

ESC 7 8 9 HOME
4 5 6 +
1 2 3 -
0 . ENT

ADJUSTMENT SCREW

Upgrade of Special Monitoring of Applied Response Technologies (SMART) Dispersant Effectiveness Monitoring Protocol

Objective: To verify the reliability of existing SMART effectiveness monitoring protocols and to recommend changes to instrumentation and monitoring methods for determining the effectiveness of oil spill dispersant operations.

Turner C3 Submersible Fluorometer selected to replace Turner 10 AU Fluorometer.



Dispersant Monitoring Equipment and Dispersant Training

New instrumentation for SMART monitoring and improvements in the protocol

Training course is to provide responders, planners and government regulators experience in basics of oil spill behavior, dispersant use and monitoring instrumentation

The course includes actual full-scale dispersant effectiveness tank exercises

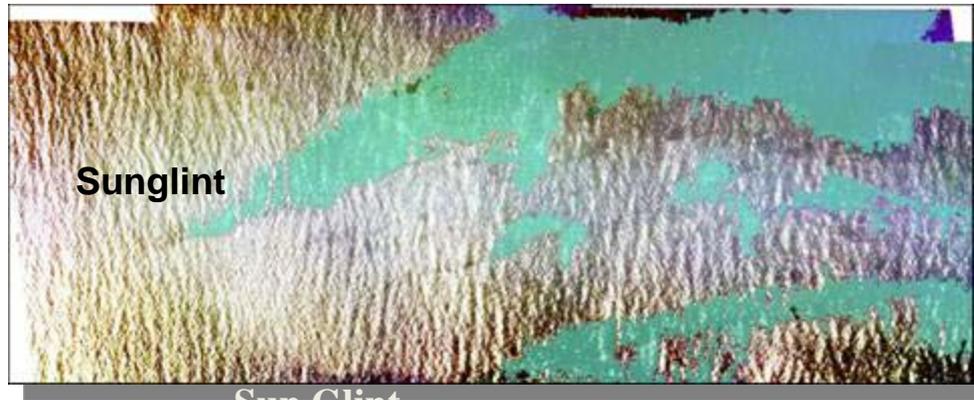
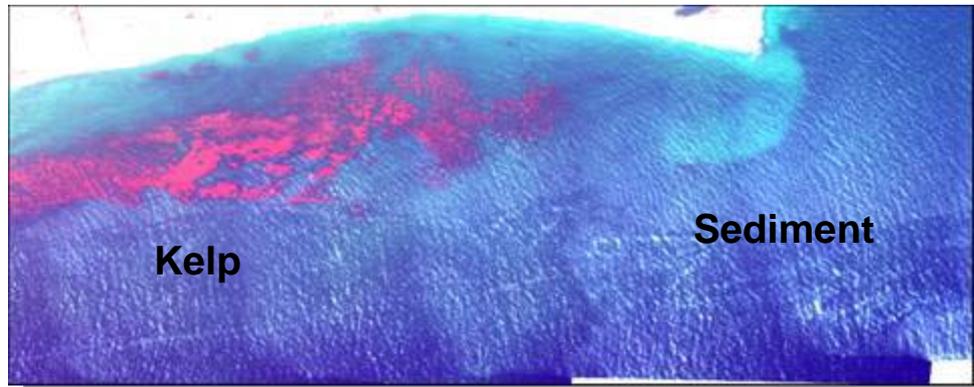




Oil Spill Thickness Mapping System Project Objective

Develop an operational aerial imaging technology that would enable real-time oil spill mapping in GIS format and eliminate false targets with an easily deployable and portable sensor

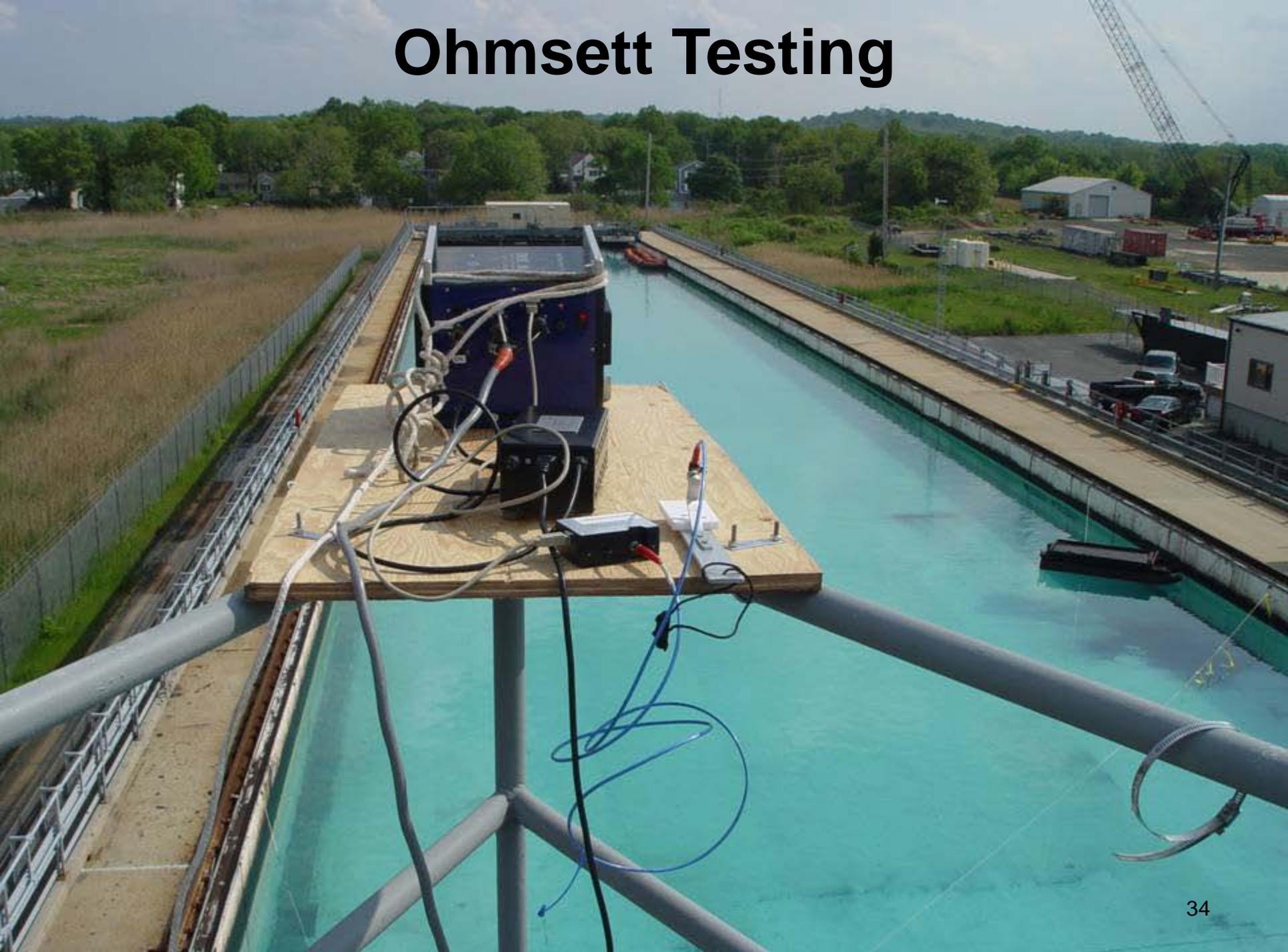




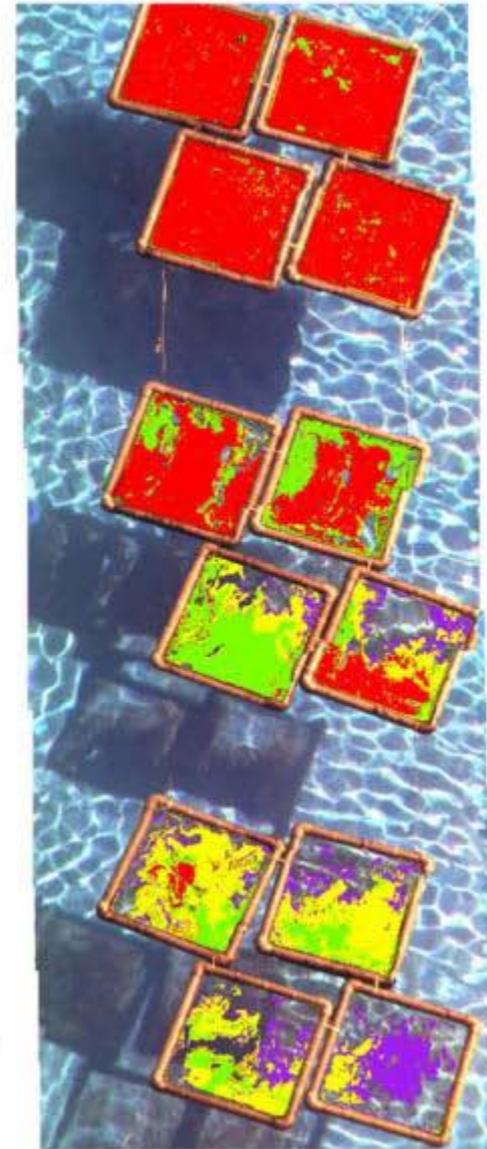
Sun Glint

Examples of multispectral differentiation between oil slicks and potential false targets caused by kelp, suspended sediment and sun glint

Ohmsett Testing







Ohmsett - 05/18/06

- Thinnest ~ 0.01 - 0.05 mm
- Thin ~ 0.05 - 0.20 mm
- Medium ~ 0.20 - 0.40 mm
- Thickness ~ > 0.40mm

Cosco Busan November 7, 2007



San Francisco Bay - Cosco Busan Spill
DMSC Imagery - 11/09/07



Scale 1:22,000



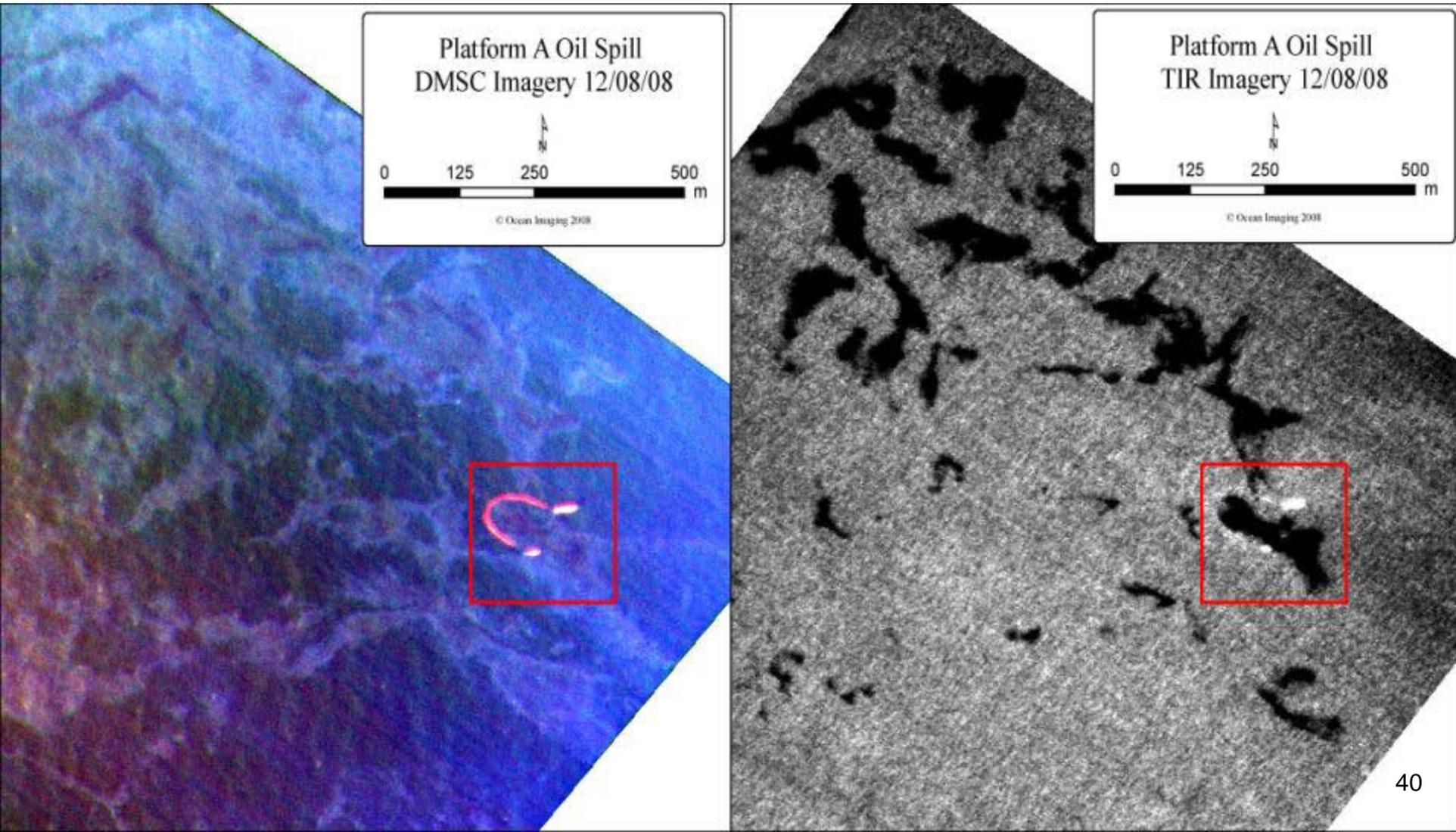
© Ocean Imaging 2008

- Thick Oil (>0.2mm)
- Thin Oil (<0.2mm)
- Emulsified

Angel Island

Thermal Infrared Camera

Santa Barbara Channel Platform Spill



Web-Based GIS

OSPR Spatial Viewer - Windows Internet Explorer

http://64.183.10.155/website/OSPR/viewer.htm

File Edit View Favorites Tools Help

OSPR Spatial Viewer MSN.com

OSPR Interactive Map Viewer

The screenshot displays a web-based GIS application. The main map area shows a coastal region with a dashed purple boundary enclosing a specific area. A satellite image of a structure is visible within this boundary. The map is overlaid with a vector field of arrows, indicating flow or direction. The interface includes a toolbar on the left with navigation and analysis tools, a layers panel on the right, and a help section at the bottom right. The map is created by Ocean Imaging 2008.

Map created by Ocean Imaging 2008

Zoom In

Lat: 34.28 Long: -119.43

Internet 100%

start Microsoft PowerPoint ... C:\addphs\pfe\... OSPR Spatial Viewer ... 3:31 PM

Mississippi Canyon 252

Image Classification 9-May-2010 0852-0904 HRS CDT

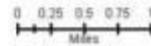
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Platform: DeHavilland Twin Otter (DHC-6)

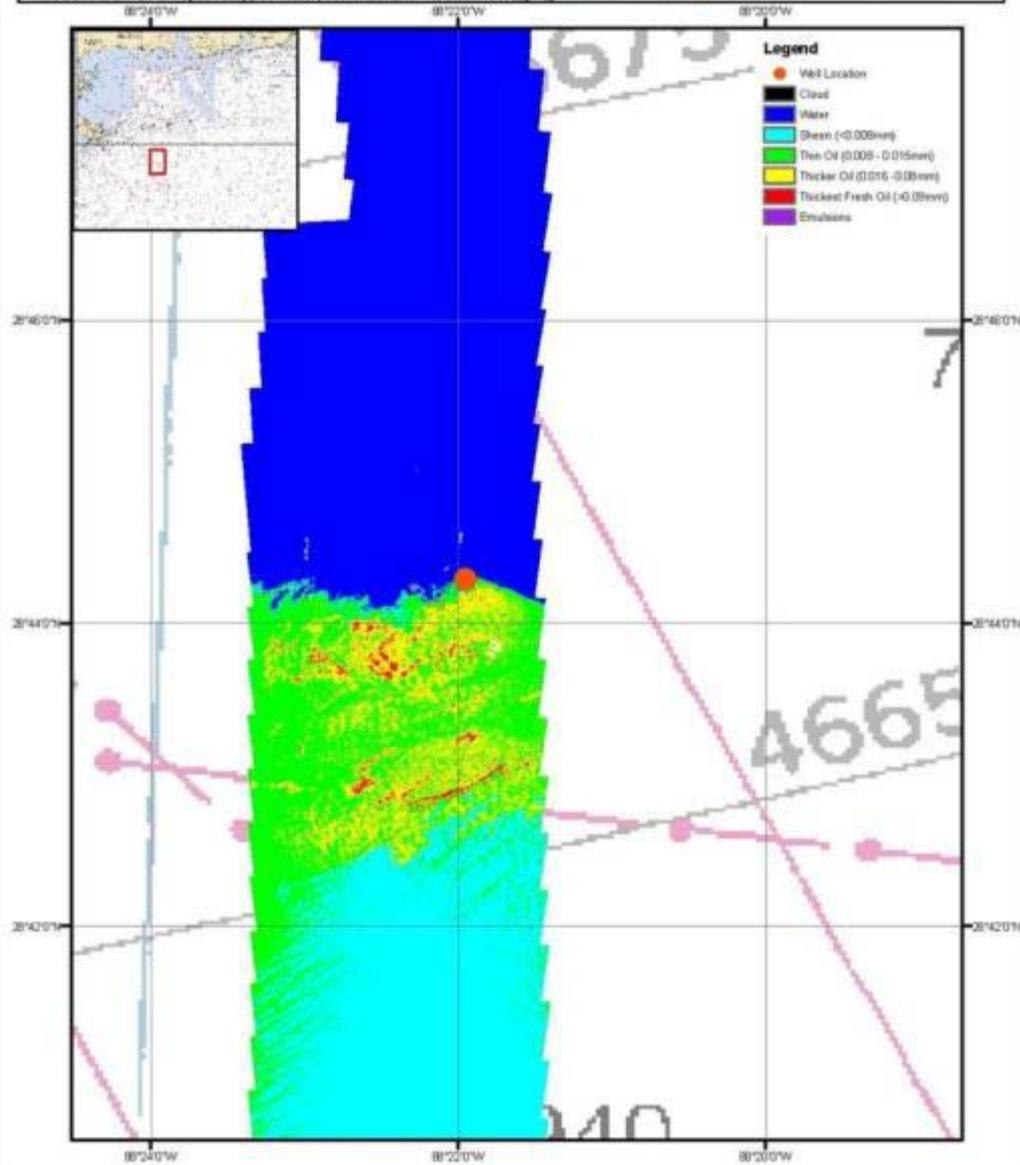
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Ocean Imaging



Geographic WGS 84



Mississippi Canyon 252

Image Classification 12-May-2010 0828-0906 HRS CDT

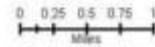
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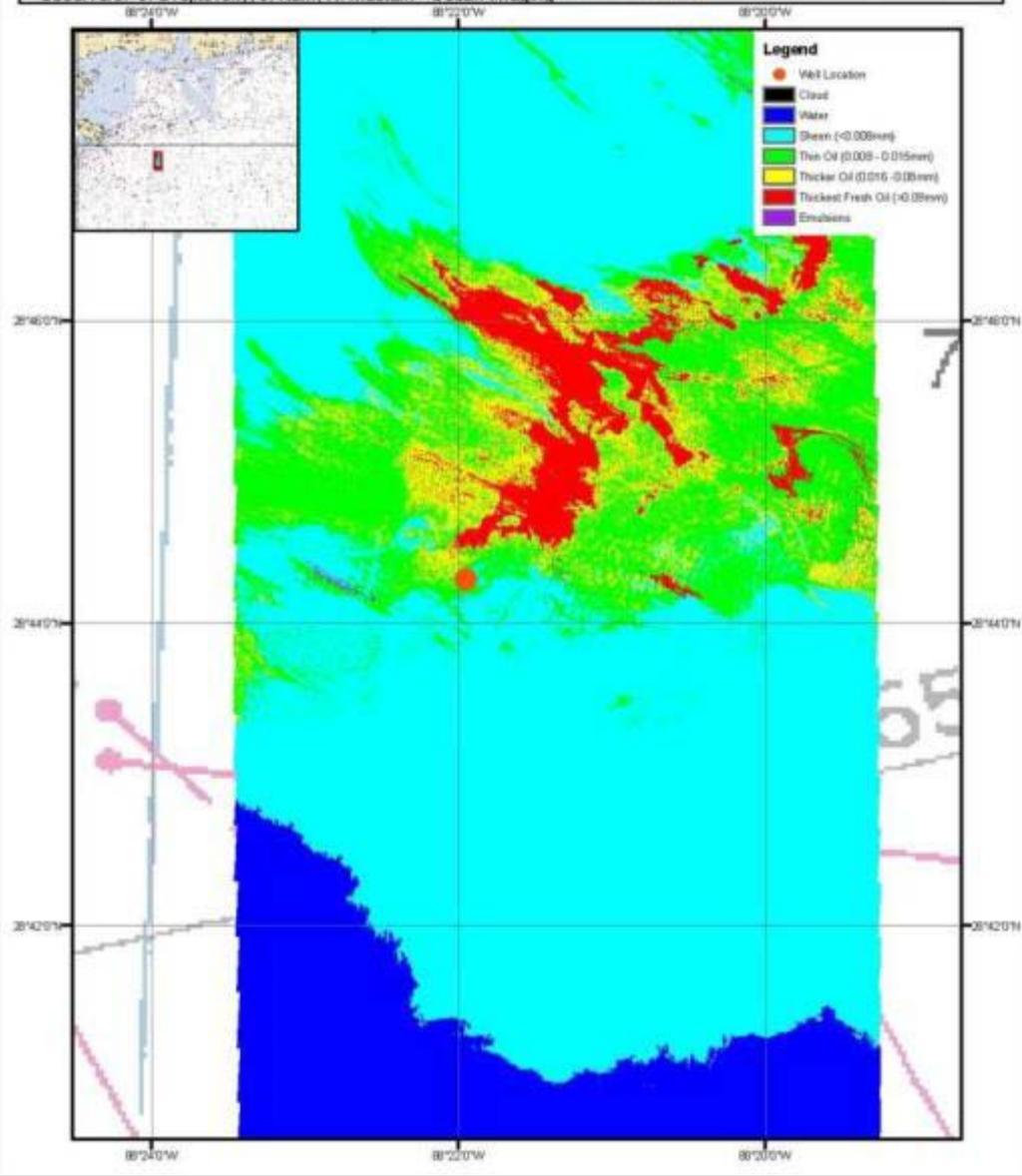
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Ocean Imaging



Geographic WGS 84



Mississippi Canyon 252

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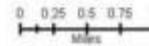
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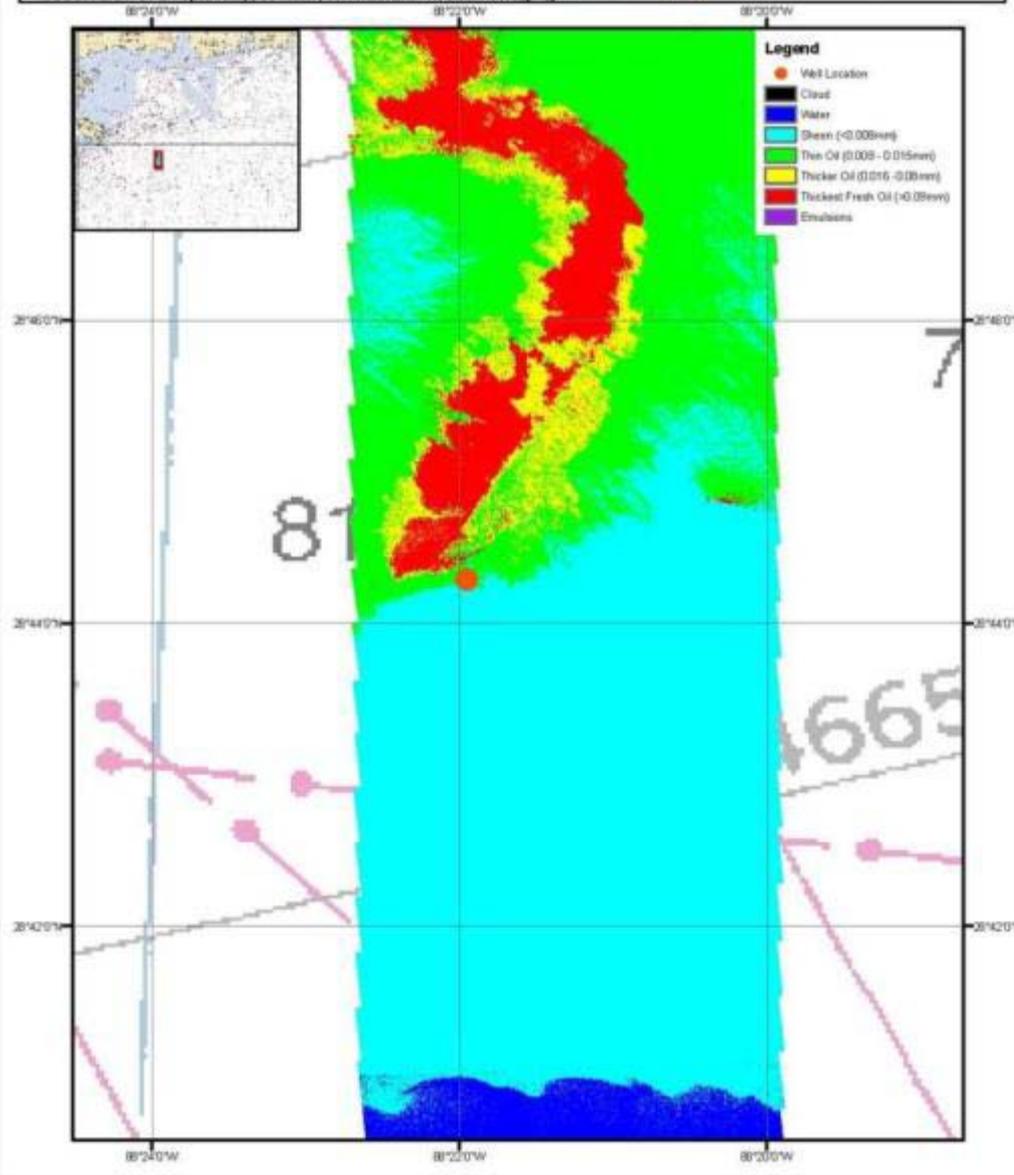
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Ocean Imaging



Geographic WGS 84



Mississippi Canyon 252

Image Classification 19-May-2010 0832-0841 HRS CDT

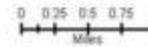
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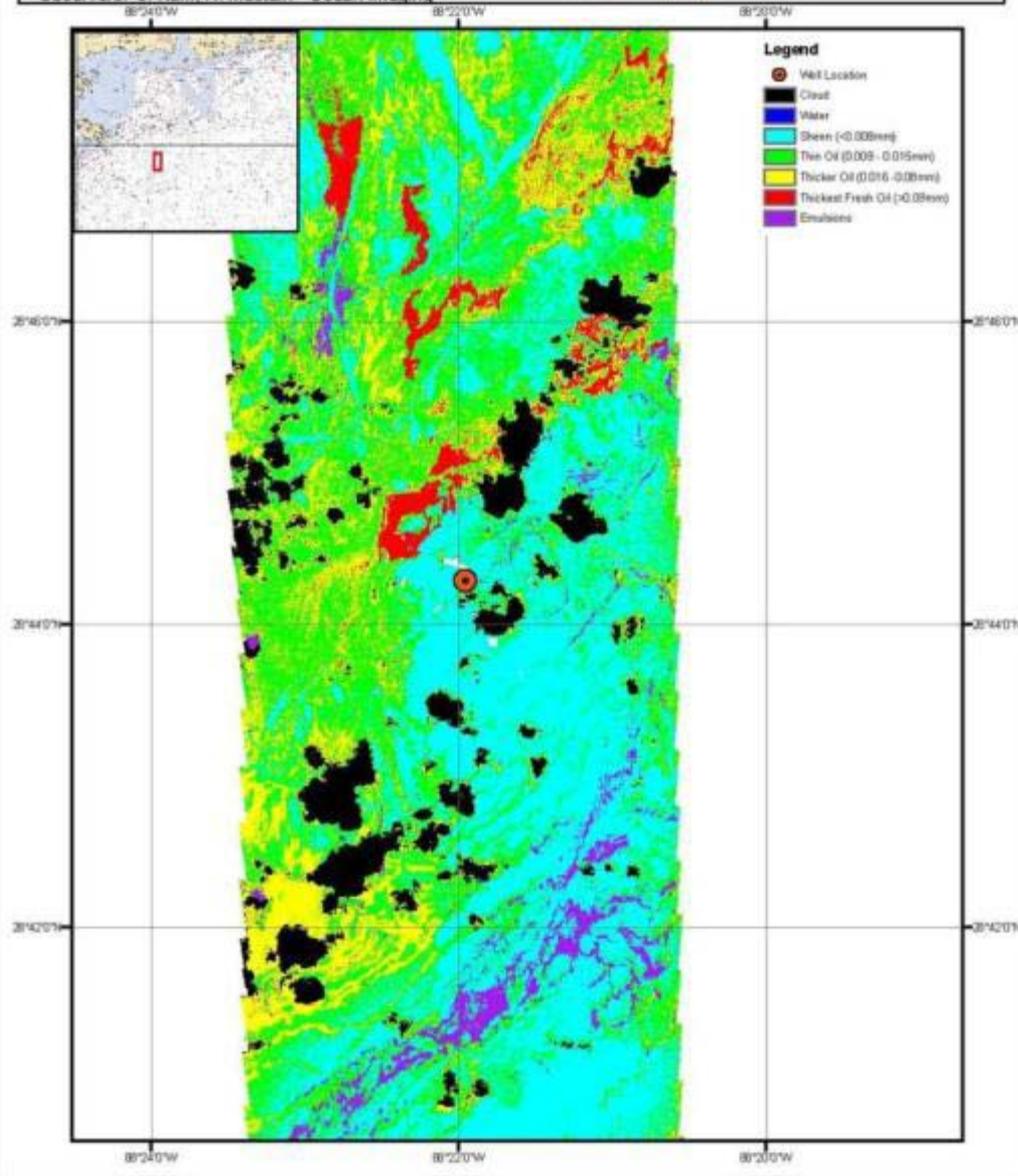
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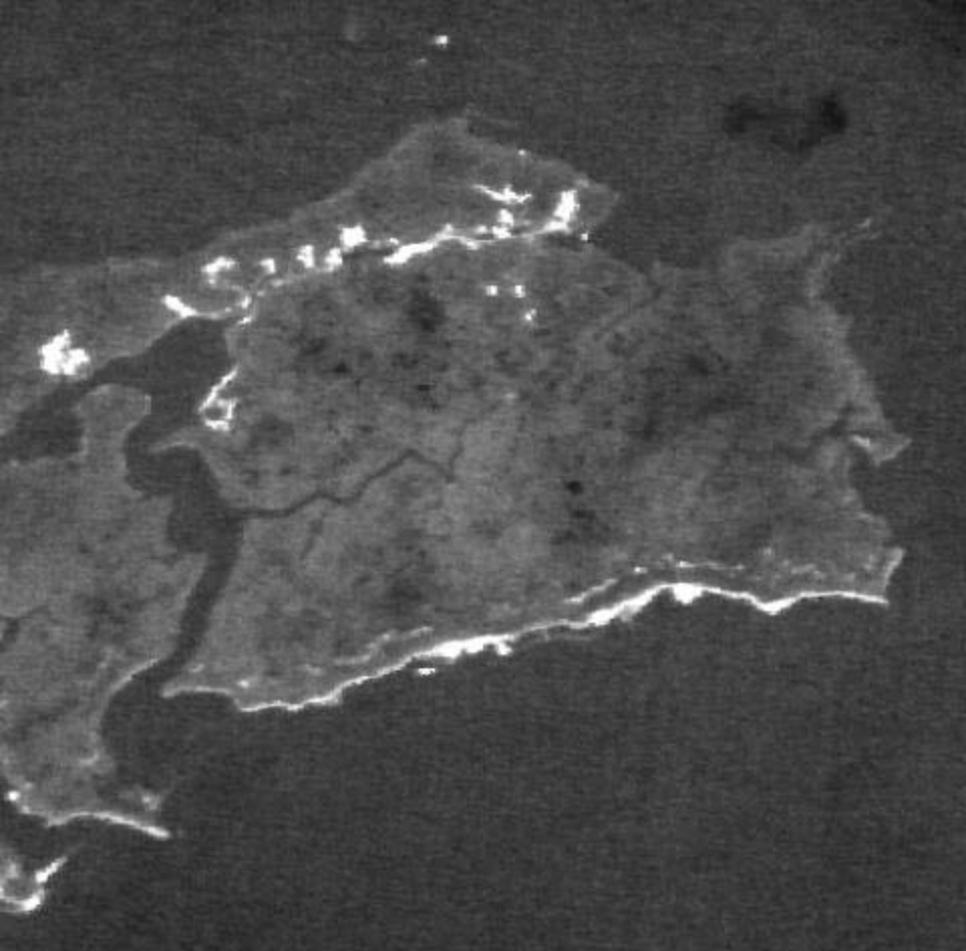


Ocean Imaging



Geographic WGS 84





DMSC Multispectral Imagery

(4-band UV-Vis wavelength combo customized for oil detection)

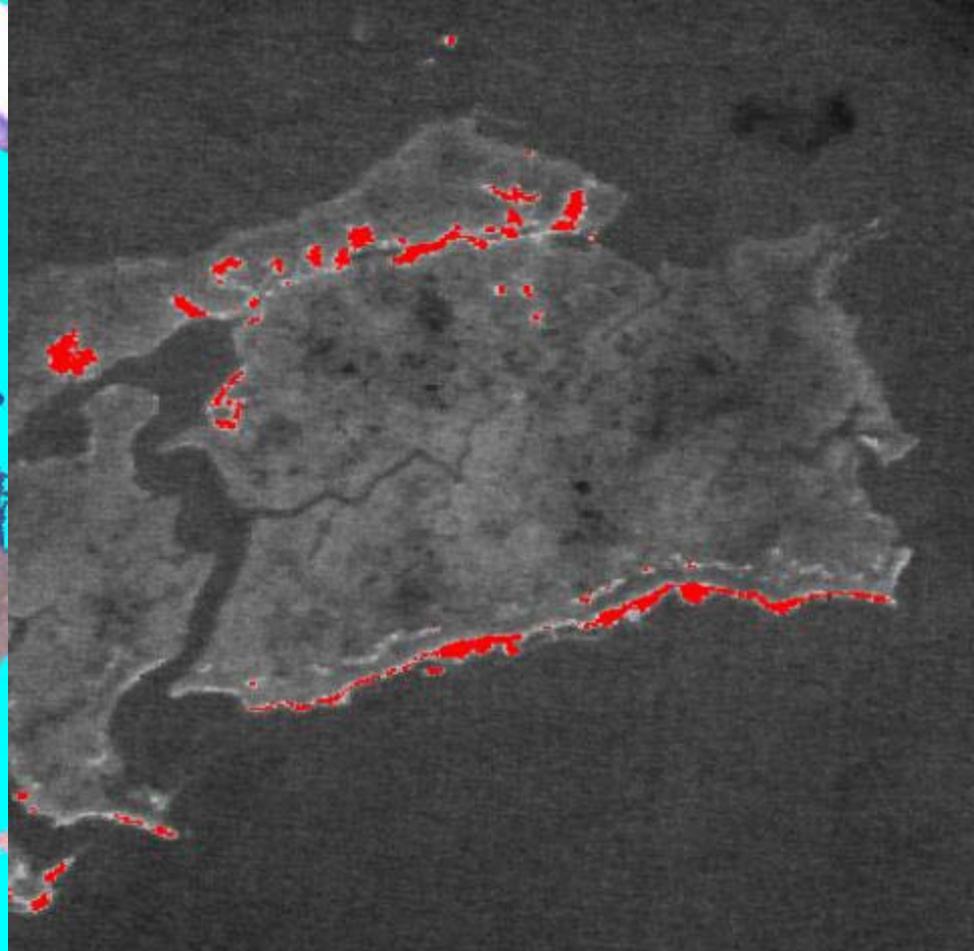
Thermal IR Imagery

(thick oil areas re-emit high heat (white areas))

Barateria Bay – UV-Vis-IR
Copyright 2010 Ocean Imaging Corp.



Final Classification



Thermal Classification

Barateria Bay
Copyright 2010 Ocean Imaging Corp.

Field SCAT vs. Remote Sensing



Field SCAT vs. Remote Sensing



Field SCAT vs. Remote Sensing



Field SCAT vs. Remote Sensing



MC252 SCAT Photos



MC252 SCAT Photos



MC252 SCAT Photos





In Situ Burning of Oil

A proven response technology developed through more than 30 years of research incorporating laboratory and tank testing, large scale field trails and actual incidents



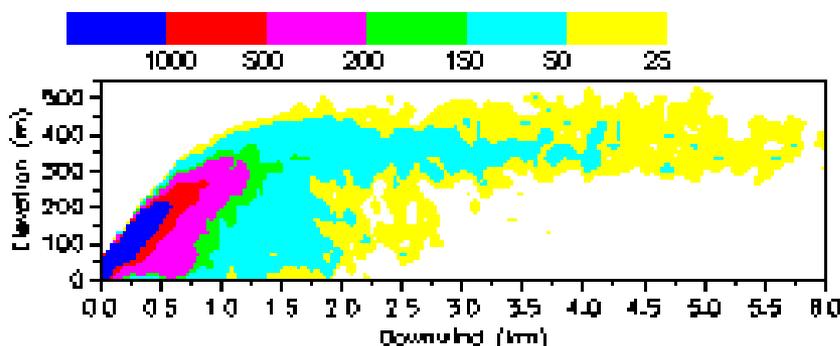
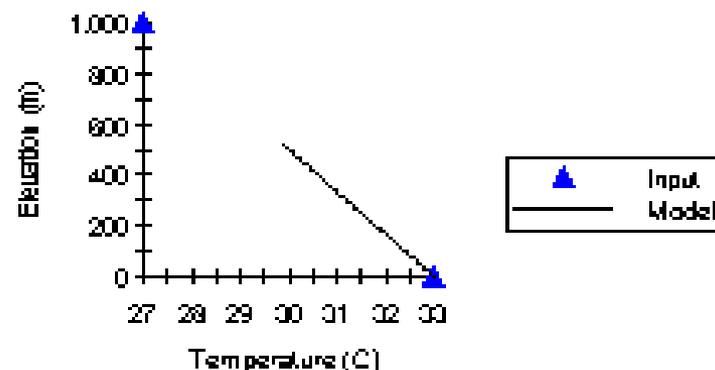




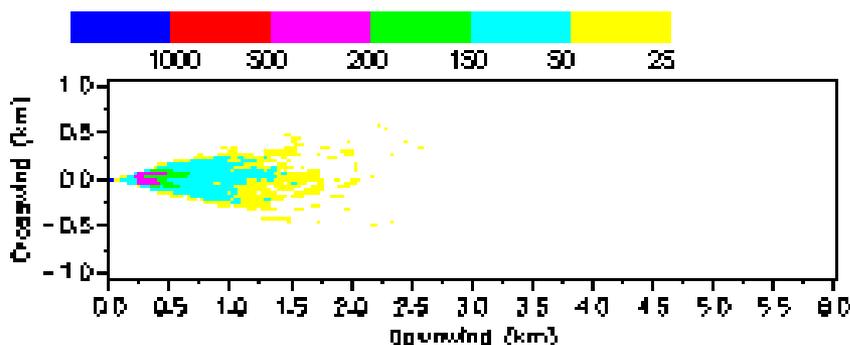




ALOFT-FT 3.04
 test case 1
 Alaska North Slope Crude
 HRR - 1.750 (MW/m²) BR - 0.05100(kg/s-m²)
 Wind - 5.0 (m/s) S Theta - 20.0 (deg) S Phi - 20.0 (deg)
 Fire Area (m²)
 1 33.0



Smoke Particulate PM10 Concentration (micrograms/cubic meter - one hr avg) Vertical Plane, 0 km Crosswind



Smoke Particulate PM10 Concentration (micrograms/cubic meter - one hr avg) Horizontal Plane, 0 m Elevation

Position

Downwind km

Crosswind km

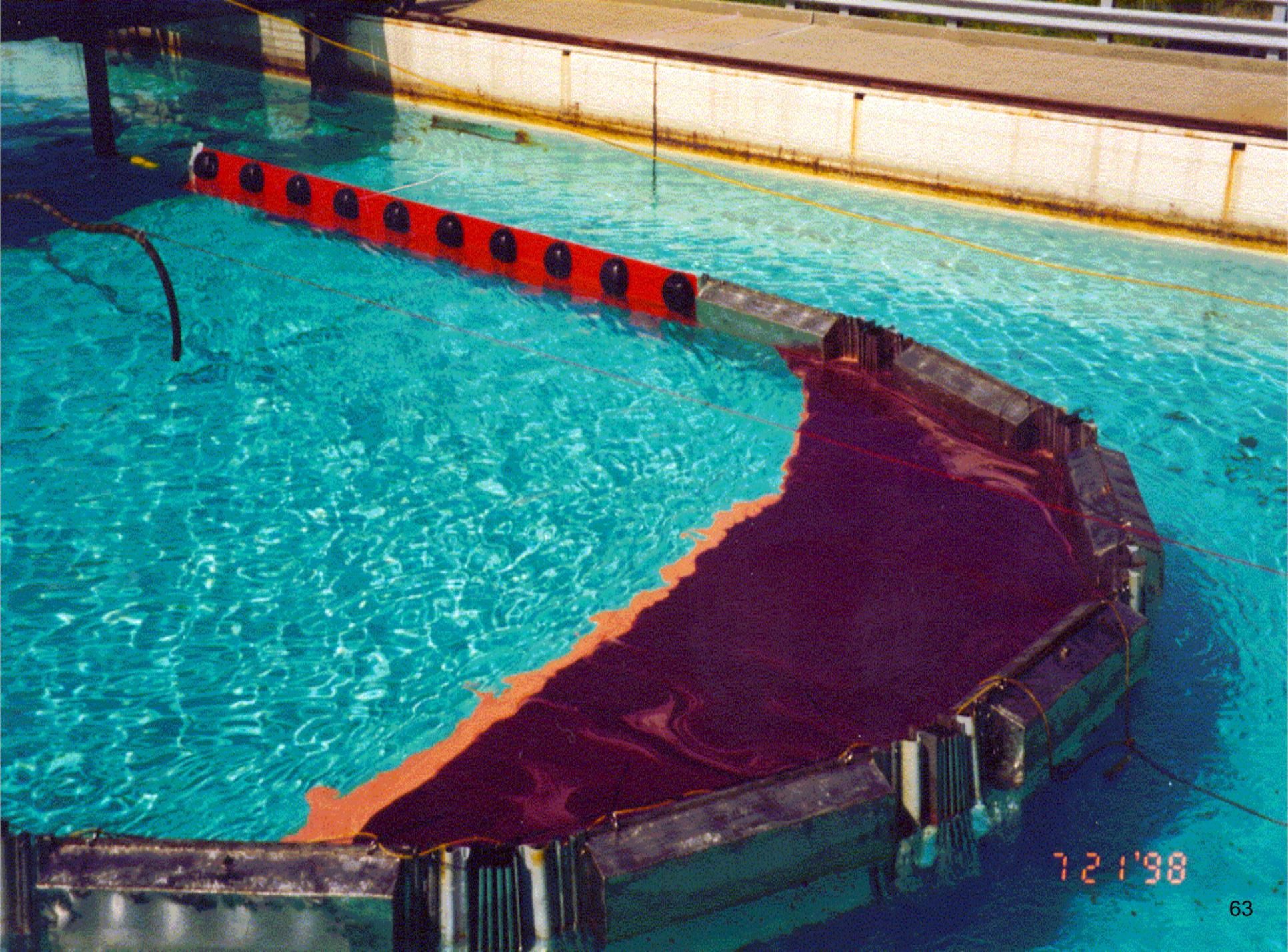
Vertical m

Product Concentration
 one hour average

Smoke Particulate PM10

 micrograms/cubic meter





721'98



Fire Boom Testing with Propane



















***In Situ* Burning of Oil Spills**

2-CD Set

- Comprehensive collection of scientific information on *in situ* burning as a response tool
- Contains 350 technical documents and one hour of video
- All operational aspects of burning are covered in detail
- Human health, safety and potential environmental impacts are addressed
- BOEMRE distributes this 2-CD set without charge (3,000 to date)



Questions?

For more information on BOEMRE's Oil Spill Response Research Program and the Ohmsett Facility visit our websites:

- WWW.BOEM.GOV/TARPHOME

- WWW.OHMSETT.COM