Outline

Submerged Oil – Background

Project at USCG RDC

- **Detection Prototype Test Results**

- **Recovery System Development**
  - Design Phase
  - Prototype Build Phase
  - Prototype Tests

- **Next Steps**
  - Field Tests
  - Report

Detection and Recovery Issues

Highlights since National Academy of Science (USA) Report in 1999

- Third R&D Forum on High Density Oil Spill Response 11-13 March 2002, Brest, France
- Workshop at Coastal Response Research Center, New Hampshire, USA in 2007
- Michel Review paper in 2008.
- Assessment by UK Maritime and Coastguard Agency (MCA) in 2008
- Current guideline being developed under Technical Group of Marine and Environmental Protection Committee (MEPC) of IMO.

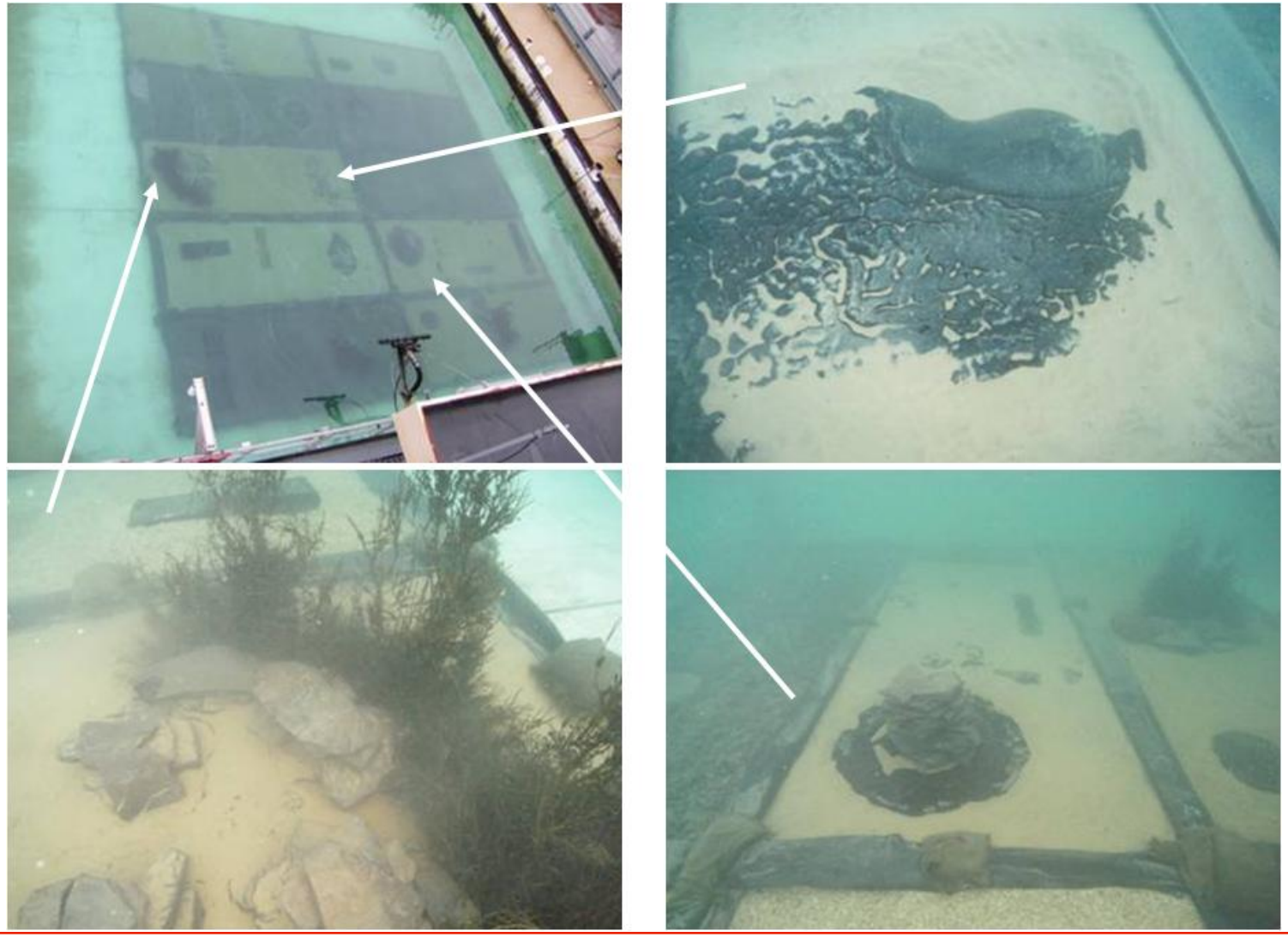
USCG R&D Center Efforts

First Addressed Detection (Hansen et. al. Interspill 2009)

Two phases:

- **Concepts (4 vendors)**
- **Prototype Design and build (2 vendors and 2 companies on own funding)**

Detection Prototype Test Layout
(At Ohmsett, USA)



Prototype Detection Test Results

Requirement	RESON	EIC	BioSonics	CodaOctopus
Identification of heavy oil on sea floor (80% certainty)	X	X	x	x
Ability to detect oil on the sea floor from at least 1 meter away	X	X	X	X
Geo-referenced to within 1 meter	x	x	x	x
Real time data	x	X	X	x
Able to provide data for all sea floor conditions	x	X	X	x
Search a one square mile area in a 12-hour shift	X	x	x	X
Water currents of up to 1.5 knots	X	X	X	X
Operate in up to 5 foot seas	X	X	X	X
Operable during the day and night	X	X	X	X
Able to be set up within 6 hours	X	X	X	X
Easily deployable and transportable	X	X	X	X
Capable of being deployed from a vessel of opportunity and a variety of other platforms	X	X	x	x

RESON Sonar and EIC Laser Fluorometer deployed during Deepwater

Recovery Development Approach

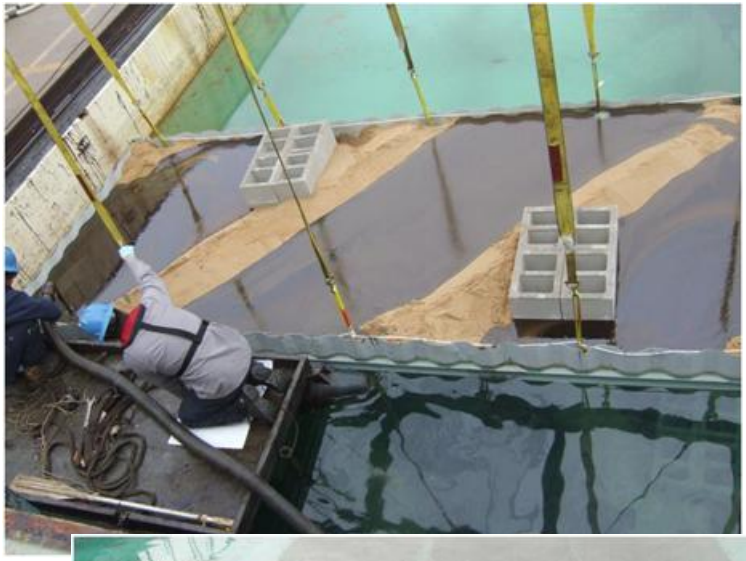
Developed Recovery Specifications – Three Phases

- **Design (Hansen et. al. IOSC 2011)**
- **Prototype Build and Test**
- **Field tests**

Three contracts:

- **Alion Science and Technology Corporation**
- **Marine Pollution Control**
- **Oil Stop Division of American Pollution Control**

Ohmsett Trays for Recovery Tests



Three Oil Types:

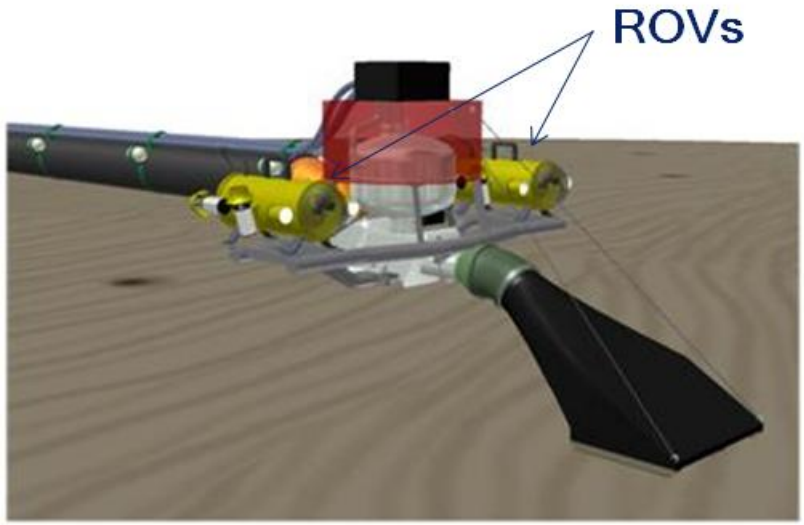
- **Viscoscity 50,000-180.000 cSt**

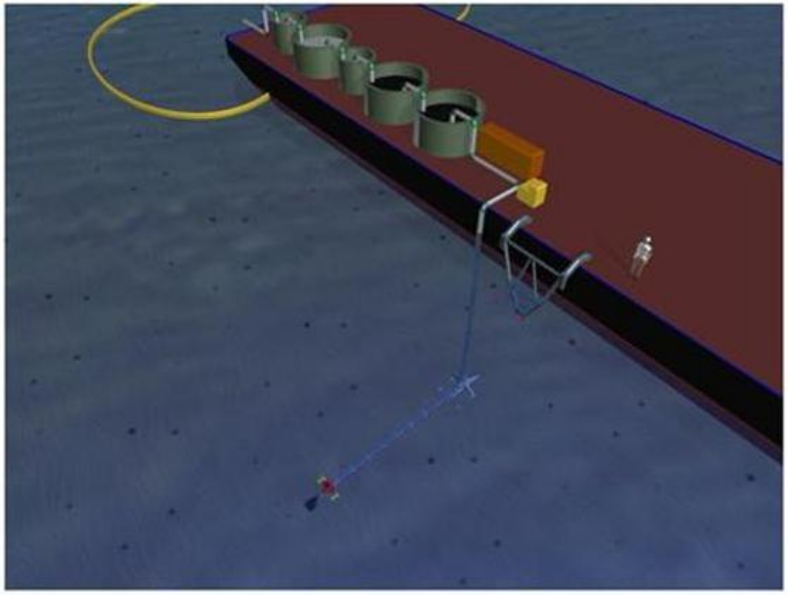
Two Sands:

- **Course and fine**
- **Not packed**

Alion Science & Technology Design

- **Lightweight system based on Remotely Operated Vehicles (ROV)**
- **Uses SONAR for detect**





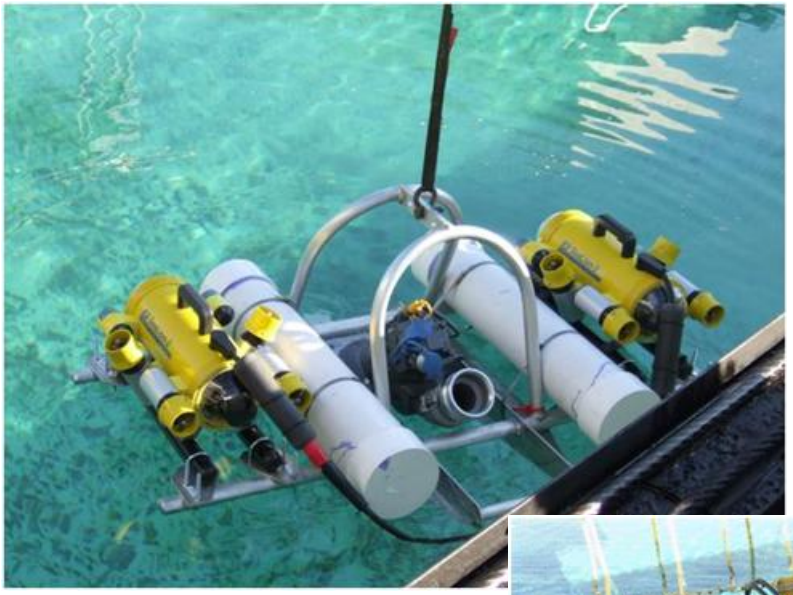
Recovery Configuration

Alion – Design Trade-Offs

ROVs

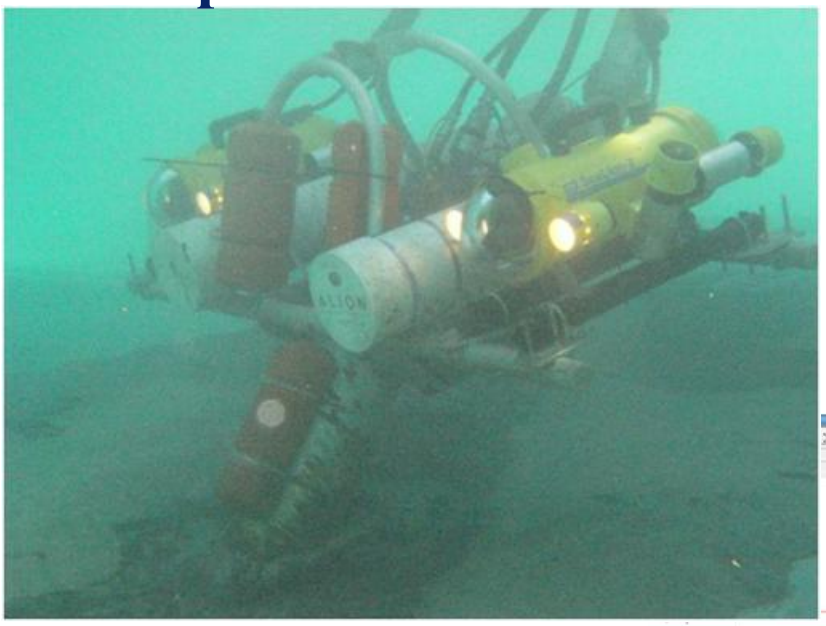
Pumps

Alion - Testing at Ohmsett

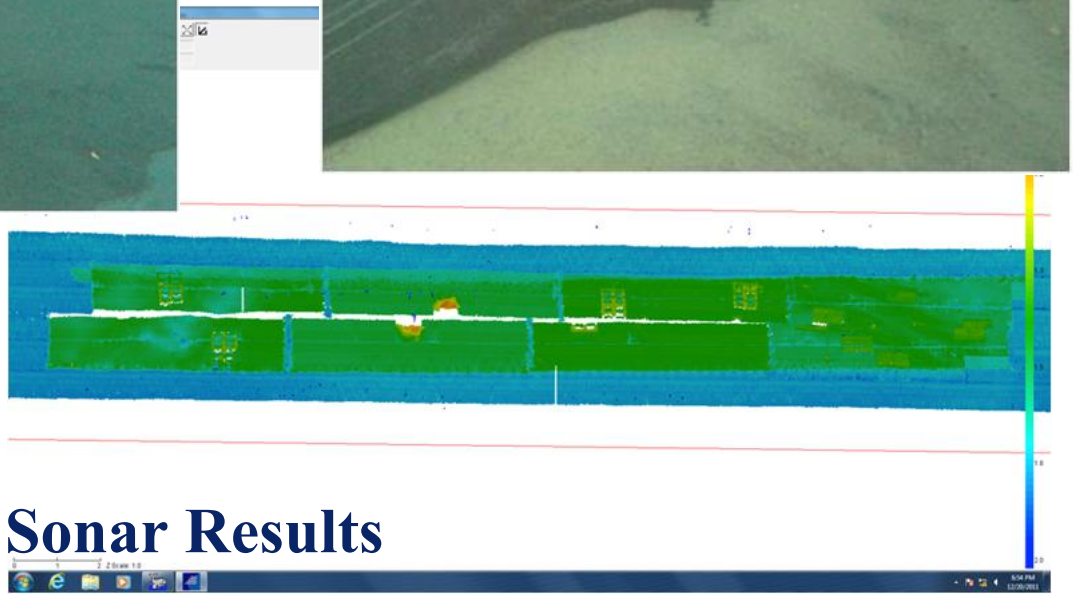


Alion – Ohmsett Testing

In Operation



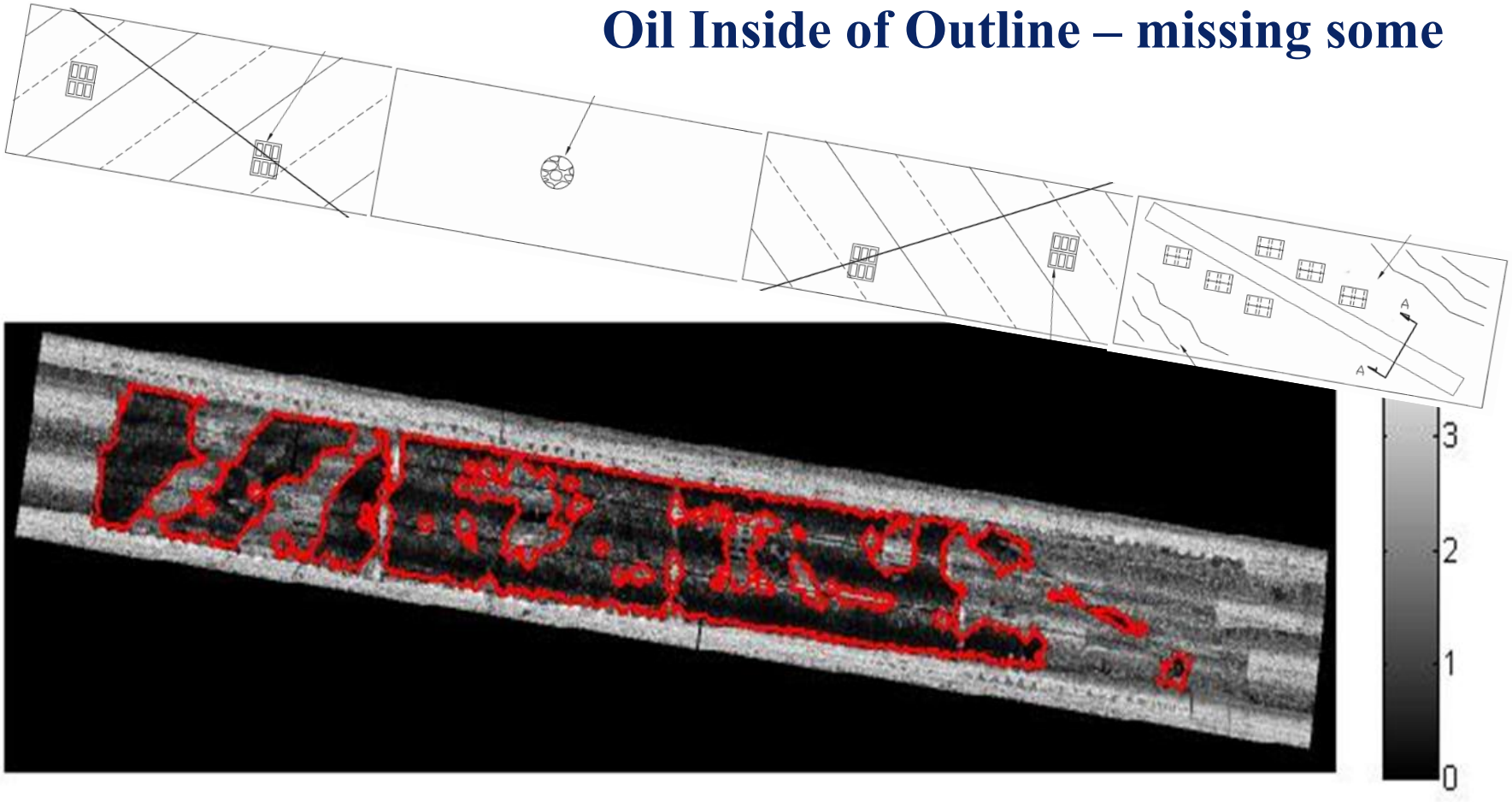
Close up of Nozzel



Sonar Results

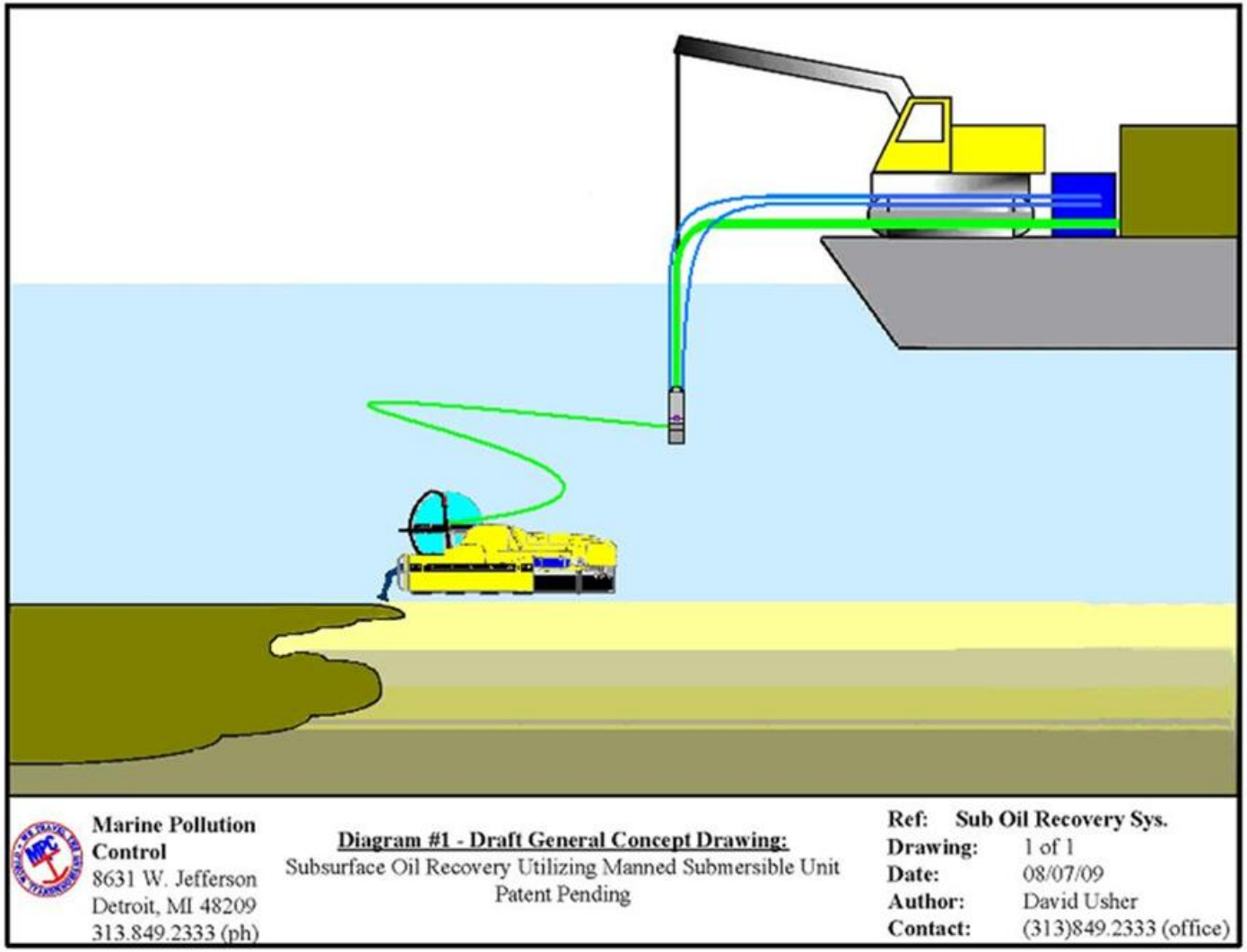
Alion - Initial Sonar Results

Oil Inside of Outline – missing some



Marine Pollution Control (MPC) Design

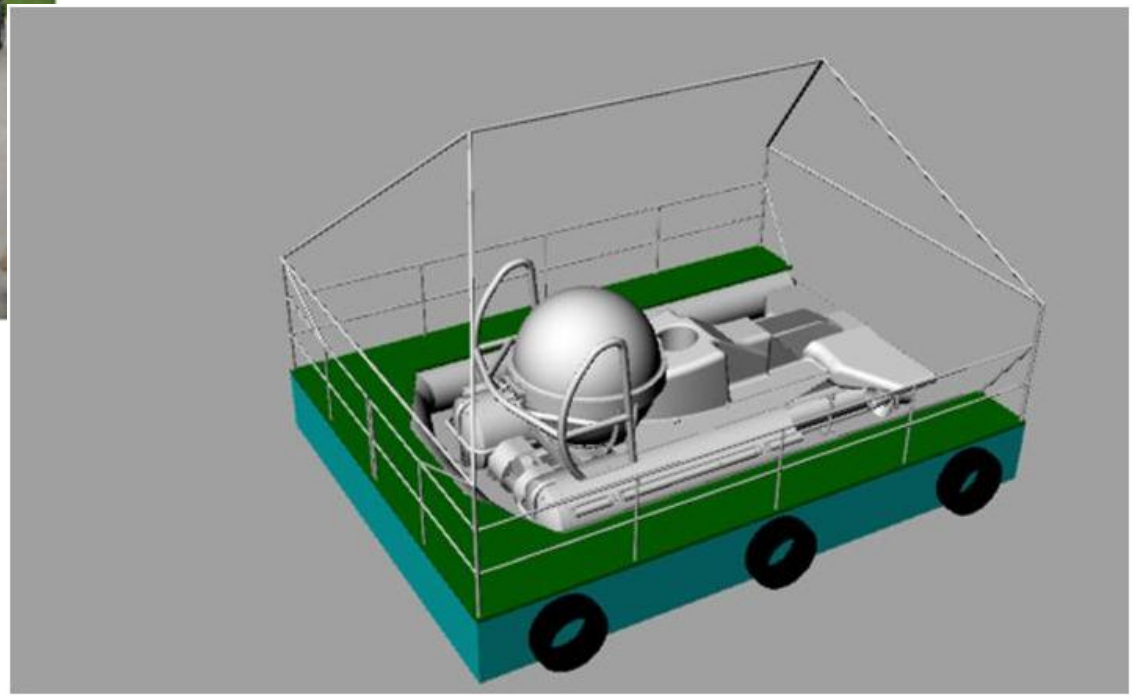
- Based on existing manned submersible
- Uses sonar, EIC and visual for detection



MPC Submersible Design Components

Existing Submersible

Proposed Docking Station



MPC Components Available

Multi-degree of Freedom Robot Arm

Pump and debris control

MPC Test Rig Assembling at Ohmsett

MPC – Ohmsett Testing

Test Rig

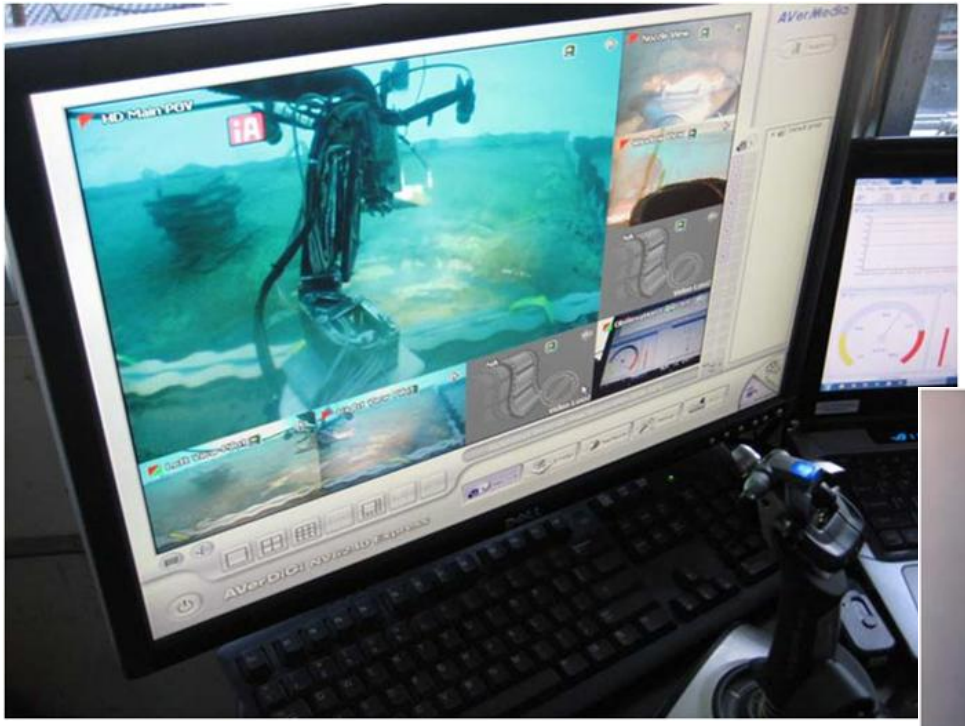
Underwater View

MPC – Ohmsett Testing

Filter System Between Tanks

Heating elements

MPC Ohmsett testing



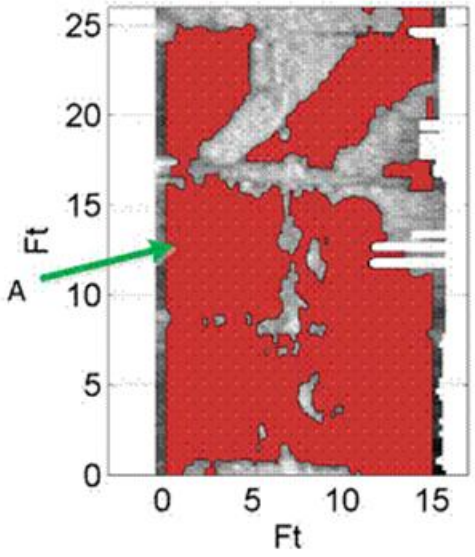
View From Camera

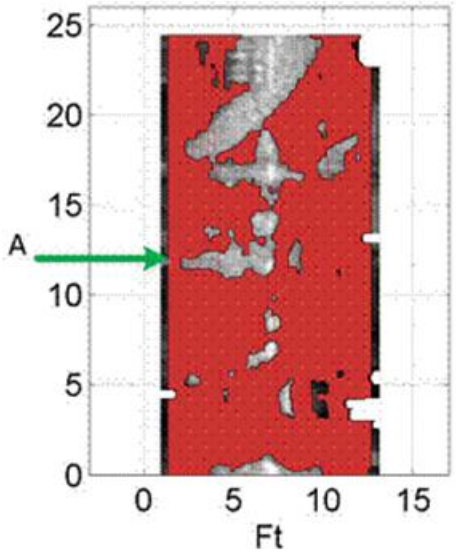
View from Above

MPC Ohmsett Results (oil and sonar)

View of Tray

Sonar Data (Oil removed in right figure)





Oil Stop Design

- Based on submersible dredge
- Uses visual for detection
- Weight reduction and increased depth capability needed

Eddy Pump

Oil Stop Existing Components

Typical frac tank

Conveyor Belt Skimmers

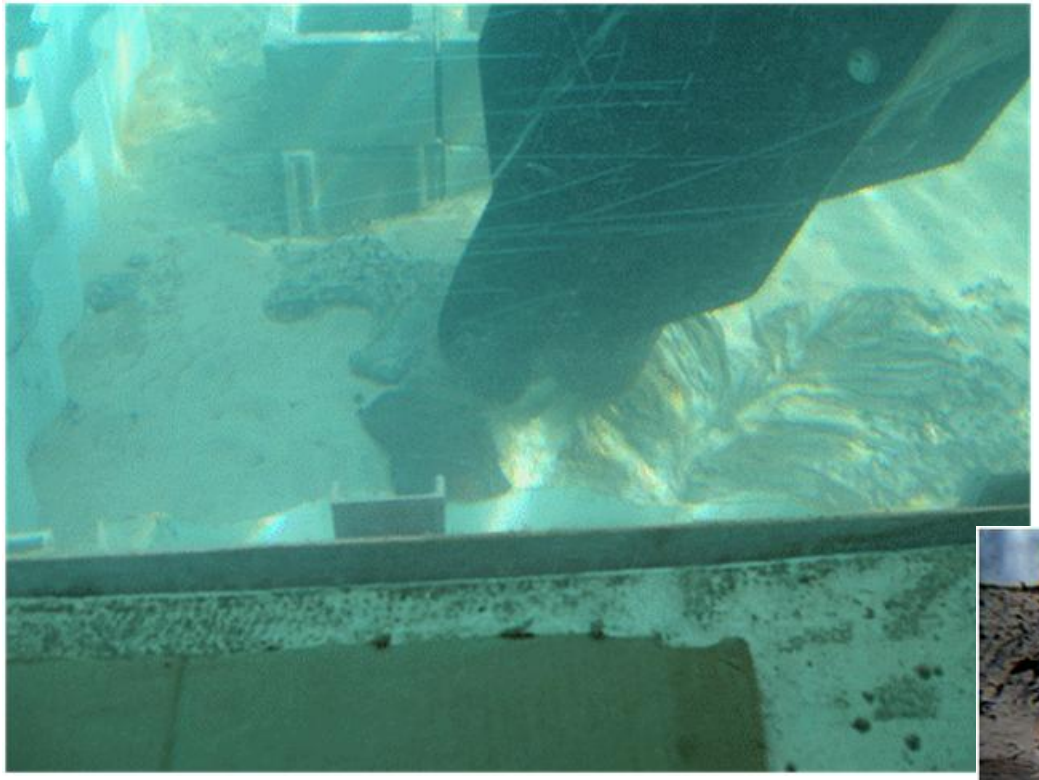
Voraxial Separator

Oil stop Testing at Ohmsett
(Excavator and tanks)

Initial Configuration

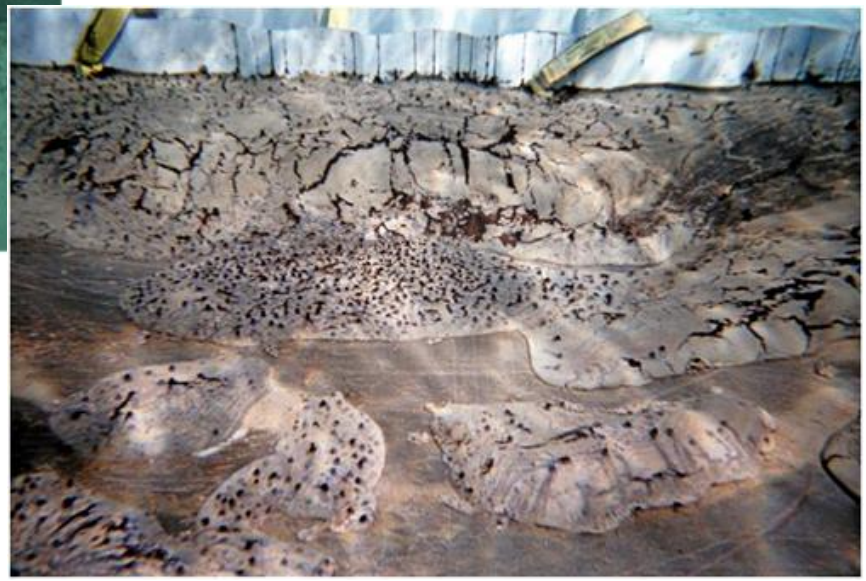
Views of Operations

Oil stop Testing at Ohmsett



View from Above

View of Tray



Submerged Oil Results

Systems selected as having unique capabilities but need more work to decrease amount of water/silt collected:

- **One is lightweight; ROV may need more power and intake nozzle may need to be smaller.**
- **One can get deeper and stay longer; (manned submersible) but may have high operational requirements**
- **One could handle harsh wind/wave conditions but large operation requirements and environmental impact**

Configuration of system can vary with spill

Next Steps

- **Field tests in FY2012 without oil for Alion and Oil Stop**
  - Components not tested at Ohmsett
  - MPC previously evaluated in field trial by company (Usher, 2008)
- **Monitoring results from Deepwater Horizon and Enbridge Pipeline (Michigan, USA, heavy oil in river system) with mixed sand and oil**
- **Comparison of operations with divers for specific spill scenarios**
- **Final Report later this year**

Questions?

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