# Acquisition Directorate

## Research & Development Center

# Oil-in-Ice Exercise planning

District 9 Cleveland, OH 10 October, 2011

RDC | Kurt Hansen (UNCLAS)

# Outline

- Background
  - Objectives
  - Results of last Teleconference
  - Arctic Conference
- Scenarios
  - Pipeline Spill Mackinac Straits
  - Cheboygan Facility Leak
- Vessels
  - CG
  - Tugs
  - Barges
- Test Plan
- Final Discussion

# Participants

- **US Coast Guard**
  - RDC (with SAIC)
  - District 9
  - Sector Sault Ste Marie
  - National Strike Force
  - District 17 DRAT
- **US EPA**
- **NOAA**
- **Enbridge Energy**
- **States**
  - Michigan
- **TBD**
  - Canadian Coast Guard
  - Environment Canada
  - States and Provinces
  - Local OSRO Responders
  - Local tug Operators (ice strengthened?)

# Potential OSROs

Marine Pollution Control

Applied Fabrics

Elastec/American Marine

Mackinac Environmental

T&T Marine

Observers

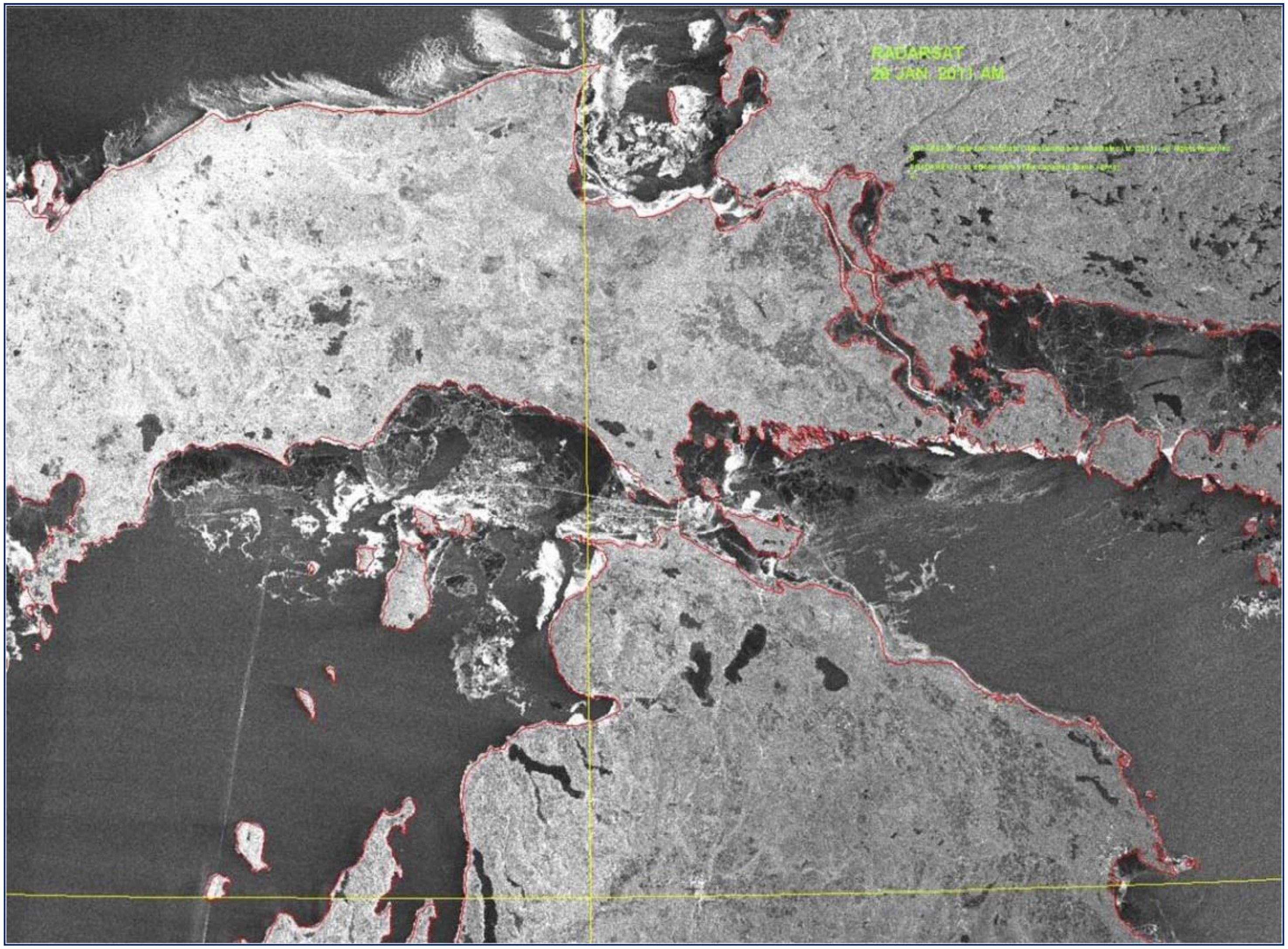
# Next Exercise: Winter 2012

**Objective: Demonstrate current capability for oil spill response in broken ice/ice edge/open water in the Great Lakes. Apply lessons for other areas (northern US and Alaska).**

# Teleconference 19 September

1. **Vessel Still unidentified**
2. **Recommended contacts with Environment Canada and Canadian Coast Guard**
3. **Links to Response Manuals**
4. **Questions about Ice Conditions**
5. **Potential OSRO Participation**
6. **Potential Equipment**
7. **Other**
    1. Requested NOAA to investigate scenario
    2. Requested D9 plans for input about safety and communications plans
    3. All to look over tactics
    4. Need input for oil surrogate from states and EPA.

# Ice Coverage in January 2011



# Great Lakes Assets

## Can we leverage vessels and logistics in Great Lakes to help develop responses in Arctic ?

**225 Foot Buoytender (WLB)**

- 14 inches (5.5 cm) fresh water ice at 3 knots continuous speed,
- 36 inches(14 cm) packed fresh water ice by ramming

**140 Foot Tug (Bay Class, WTGB)**

- 18-20 inches (8 cm)
- 36 inches ramming (14 cm)

**CGC Mackinaw (WAGB)**

- 3 knots ahead in 32 inches (12.5 cm) solid level ice
- 10 knots ahead in 14 inches (5.5 cm) solid level ice
- 52 inches (20 cm) in ramming mode

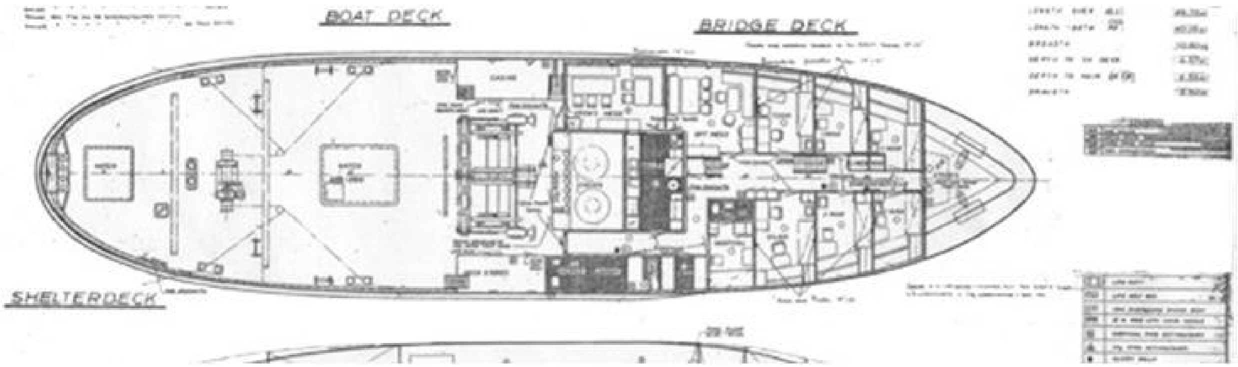
# Purvis Marine – Reliance (Sault Ste Marie, ON)

**DIMENSIONS**

- Length, overall: 45.20 m
- Breadth, moulded: 10.85 m
- Depth, moulded: 6.58 m
- Design draft: 5.30 m
- GRT: 708 L
- NRT: 212 L

**DECK EQUIPMENT:**

- Towing Winch Norwinch, double drum, Each with 914 in of 50.8 mm dia. Wire
- Deck Crane 8.4 in radius, 185 t SKB
- Type SRW 24
- Tugger Winch Norwinch 2 capstan heads
- PH4. Stem roller, tow pins & towing hook



# Great Lakes Towing – Missouri (Sault Ste Marie, MI)

**TUG MISSOURI**

**Official Number: 226560**

**Length Overall: 88.4'**

**Breadth: 24.6'**

**Depth: 12.3'**

**GRT: 149**

**NRT: 101**

**Propulsion**

**Main: Alco 12-251**

**Bollard Pull: 53,000 Lbs.**

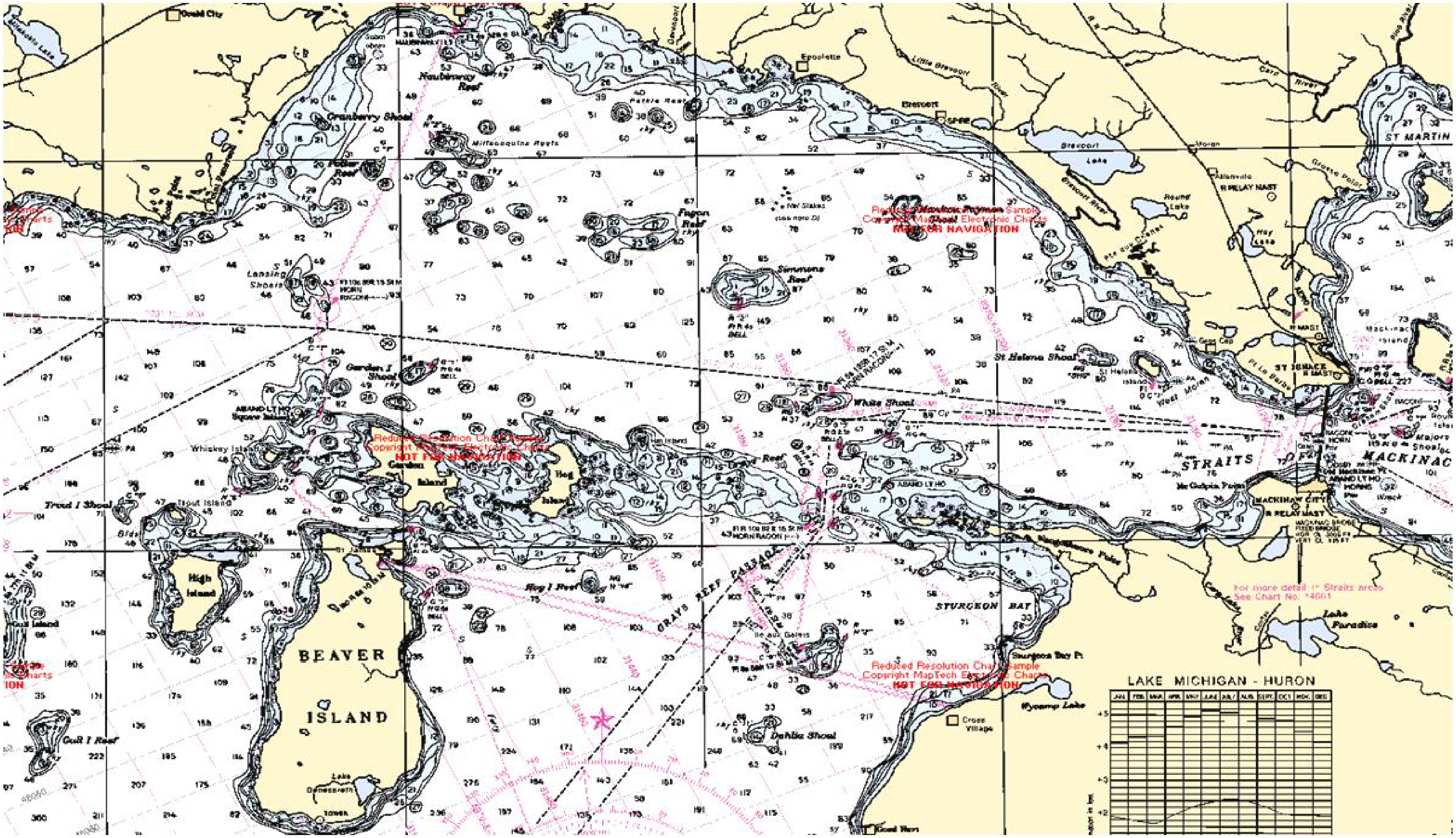
# Basic Towing – Erika Kobasic, Nickelena and Barge (Escanaba, MI)

Erika – ex CG-110’

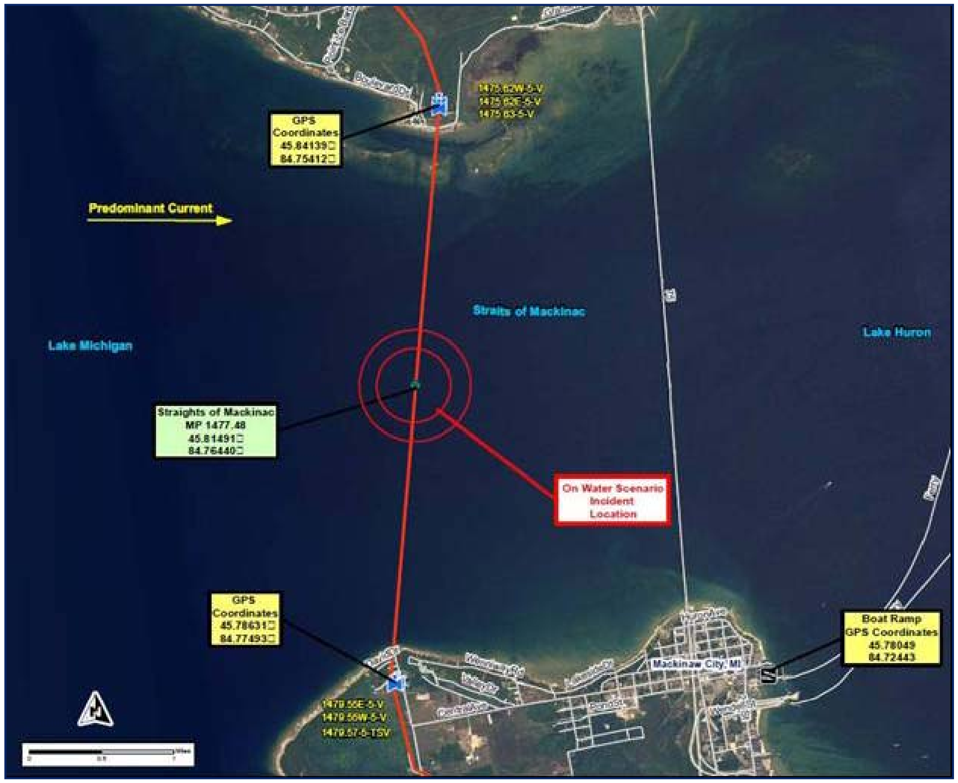
Nickelena - 103′ x 29′ x16′, 199 GT, 2000 HP.

192’ Barge

# Western Straits of Mackinac



# Proposed Scenarios



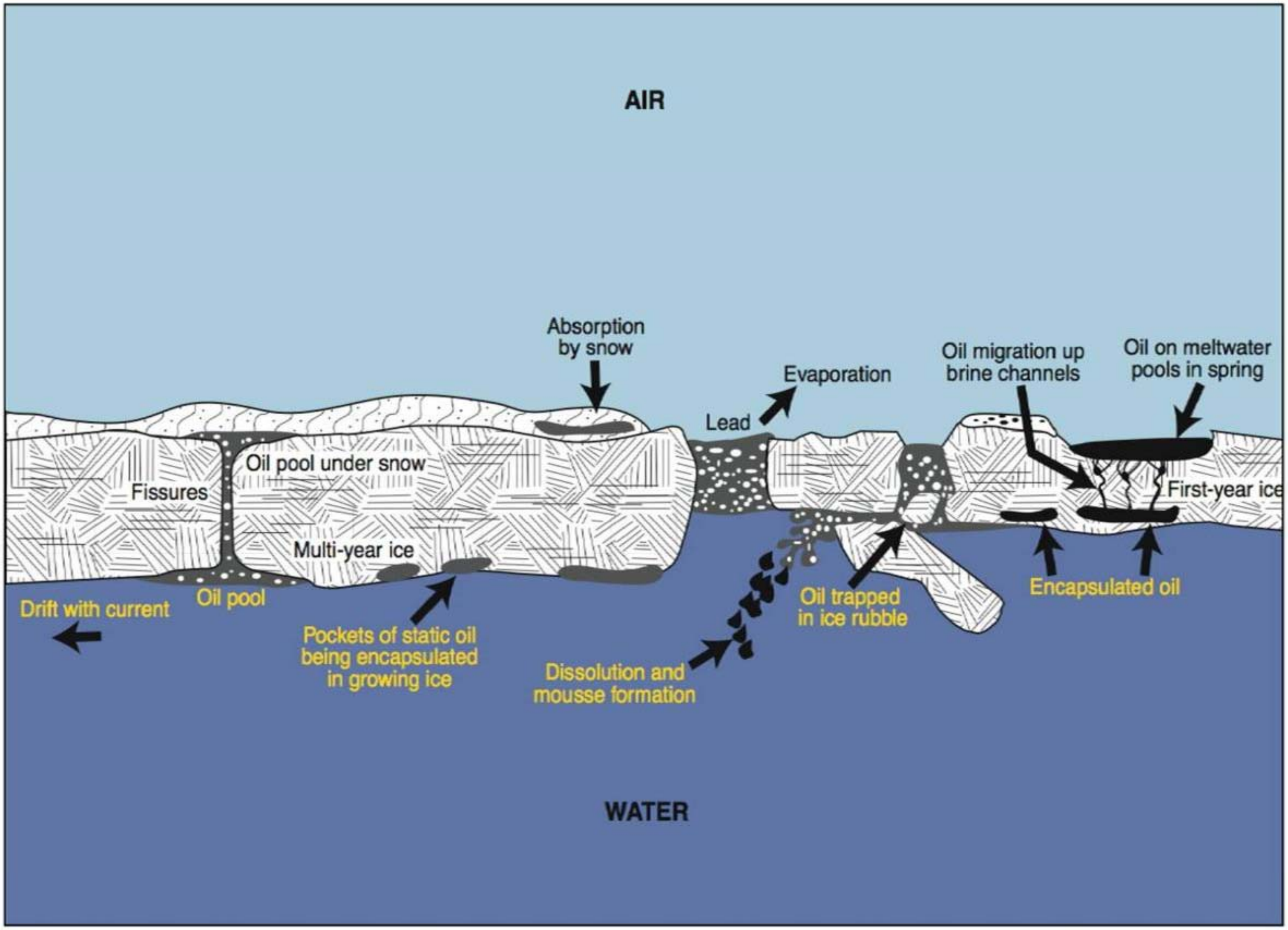

Pipeline Spill


Barge Accident

# Exercise Implementation

1) Develop scenario to identify oil locations (open water, broken ice, under ice)
2) Determine training/loadout locations
3) Determine method(s) to mark or deploy surrogate
4) Use air boat? to deploy targets
5) Have FOSCR direct two-three task forces
6) Daily operations or stay out?
7) Measure and evaluate each evolution
    - Vessel tracks
    - Equipment Performance?
8) Hot Washup

# Ice Differences



# COMPARISONS BETWEEN THE GREAT LAKES AND THE ARCTIC (From G Comfort, 2010 )

## Overall Statement: There are Many Similarities

- Basic Oil-Ice Interaction Processes Would be the Same
- However, There are Significant Variations in Conditions Which Affect the Relative Significance of the Various Mechanisms

## Basic Oil-Ice Process Cycle Seen for Static Ice (Encapsulation, Migration, Release) Not Expected to be so Predominant for Great Lakes

- “Winter” Period Not as Predominant in the Great Lakes
- Oil More Likely to be Released by Other Mechanisms (e.g., Thaws, Ice Cover Dynamics and Cracking) in Great Lakes
- Net Result: Encapsulation Couldn’t be Relied Upon to Stabilize an Oil Spill to the Same Degree as the Arctic

# Great Lakes are More Temperate

- Winters are Not Sustained in Many Locations - Don’t Get “Mid-Winter” Period at Them – Only a Cycle of Freeze-up, Thaws, Refreezing

## More “New” Ice or “Developing” Ice in Great Lakes

- Nilas, Grease Ice, etc
- More Likely to Have Thaws in the Great Lakes

## More Likely to be Affected by Rivers, Shorelines, etc in Great Lakes

- Oil Drift Due to Both Winds and Currents in Great Lakes – Predominantly Wind-Driven in Arctic

# Great Lakes vs. Arctic

More Shipping in Great Lakes:

- Greater Potential for Oil Releases Into a Broken Ship Channel
- Greater Potential For Oil Interaction With Brash Ice
- Greater Potential for Oil Releases in Harbors or at Navigation Structures

Freshwater vs. Saline:

- No Brine Channels in Ice in Great Lakes – May Affect Nature and Timing of Oil Released From Within an Ice Sheet
- Affects Performance of Dispersants of Course

# Arctic Conference 2011

Latest Effort from Joint Industry Project , Steve Potter with S.L. Ross, Canada, 2009

Mechanical Recovery –

- Preferred strategy but limitations for large spills
- Recommended primarily near ice edge and shoulder seasons for <10% ice or "trace" ice
- Some ice processing systems developed but low encounter rates

In-Situ Burning -

- Primary countermeasure in open water and in some ice concentrations
- Relatively high effectiveness but residue issue
- Relatively low equipment and manpower requirements

# Technologies

**Coast Guard**

- **SORS for ice mode**

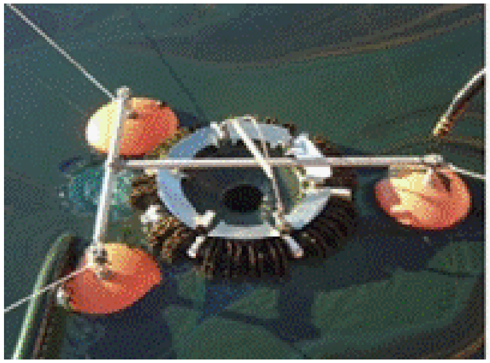
**Vendors**

- **Skimmers**
  - Steam drum skimmer
  - Polar Bear
- **Fire Boom**

**Sensors**

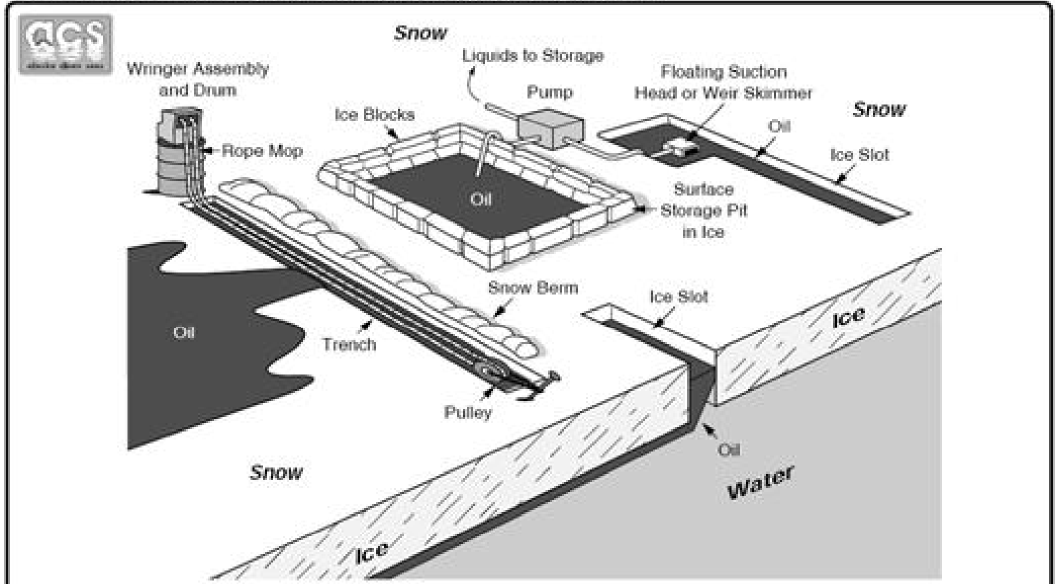
- **Ice radar?**
- **TBD**

# Potential Technologies




# Potential Tactics

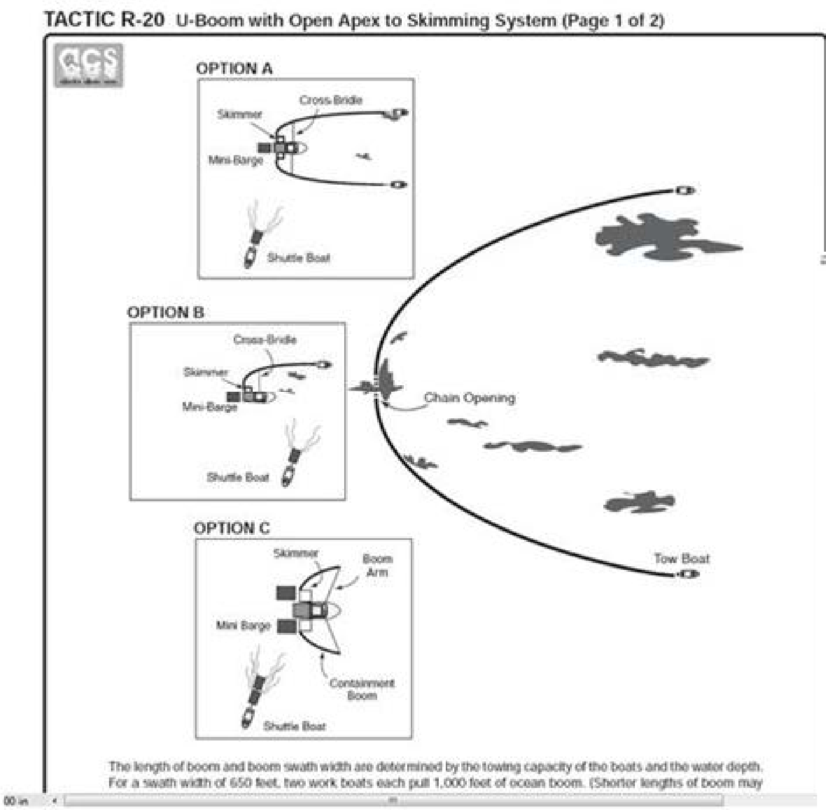
TACTIC R-13 Cutting Ice Slots for Recovery (Page 1 of 2)

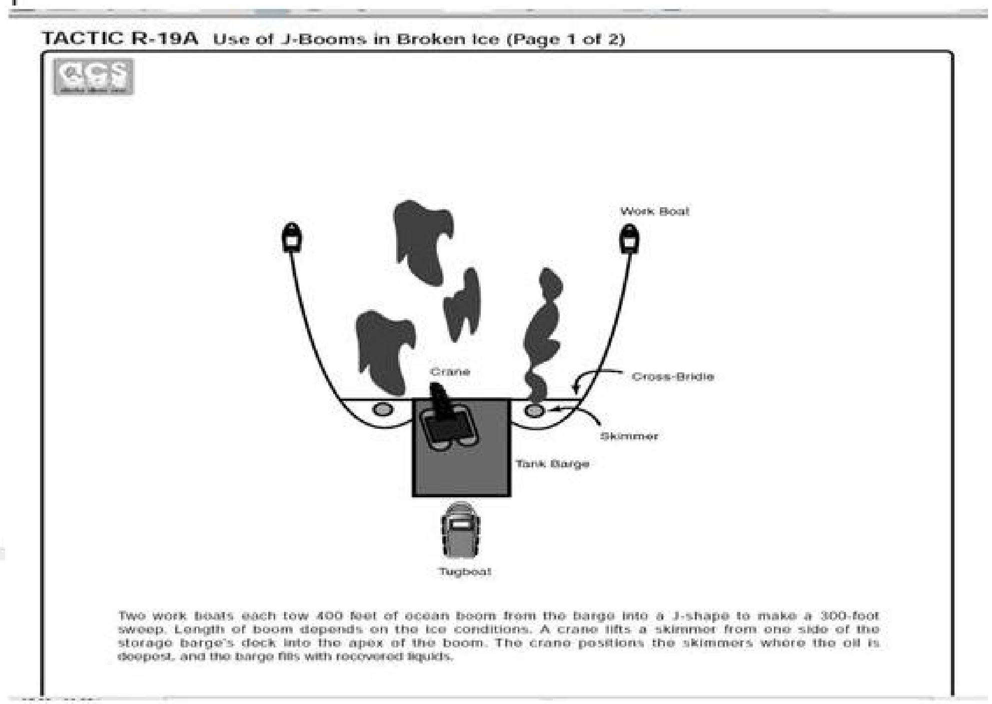



Oil moving both on the surface of ice and underneath it can be concentrated in slots cut in the ice and recovered by skimming with rope mops or other types of skimmers. If the oil in the slot is thick enough, it can be removed using weir skimmers or direct suction.

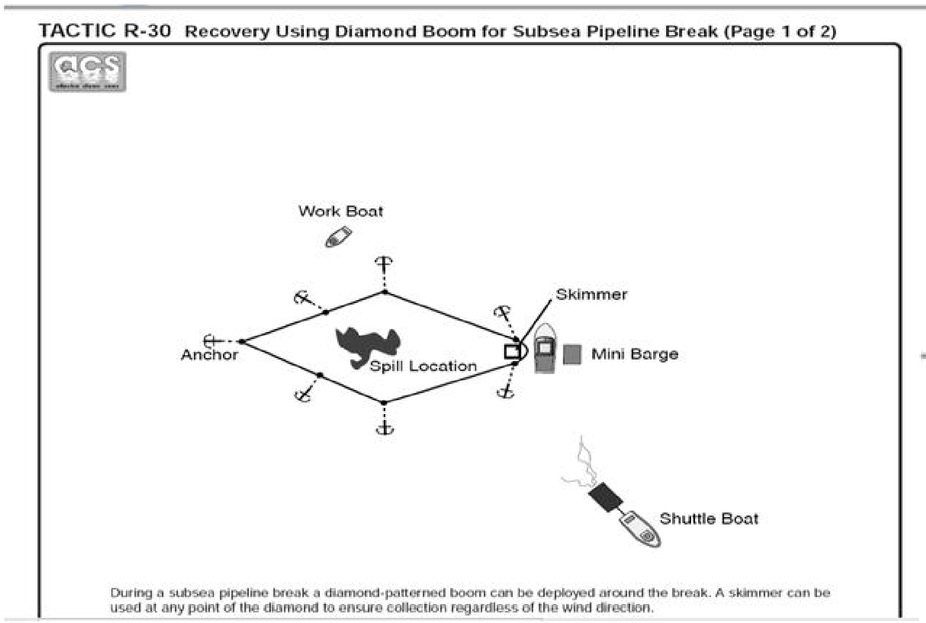
Oil entrained in subsurface pockets can be reached by drilling holes with ice augers and pumping the oil directly to storage containers such as drums or bladders. Temporary storage can also be provided by excavating shallow pits in the ice surface using chain saws and chipper bars. These oil concentrations can be pumped off or burned.

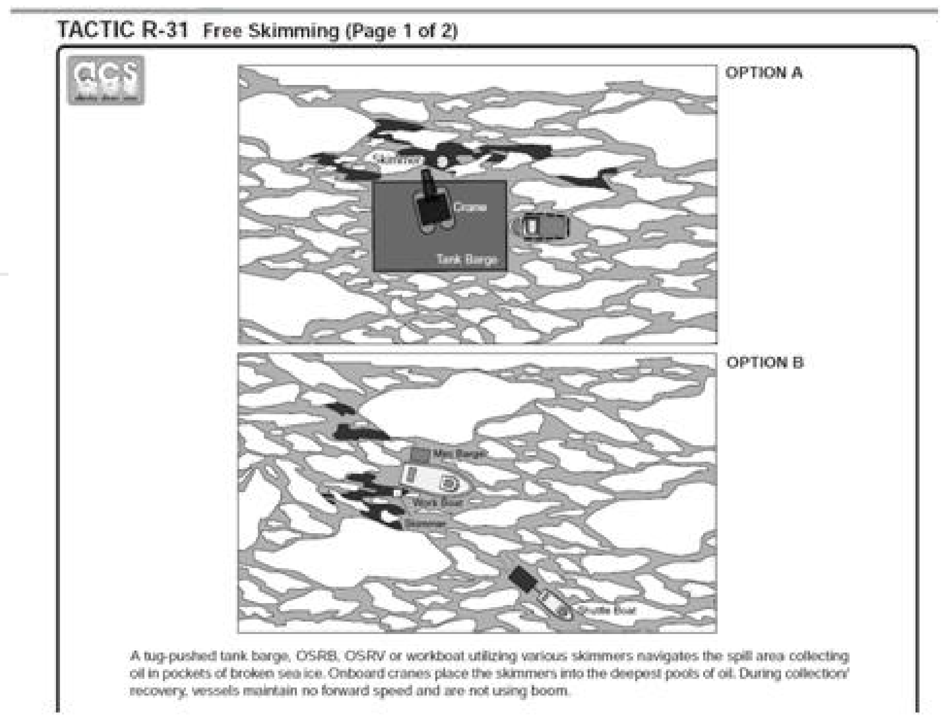
# In relatively open water



# Other Tactics



# Options (from A Allen, 2007)

| | Low Ice Concentration (1-2/10) | Medium Ice Concentration (3-6/10) | High Ice Concentration (7-9/10) |
|---|---|---|---|
| Mechanical | • Minor ice management to avoid & work between ice floes.<br>• Good containment & recovery efficiency. | • Ice deflection/management and chemical "herders" to enhance containment.<br>• Use of narrow swath and pocket recovery techniques. | • Recovery in natural & man-made openings/leads.<br>• Ice deflection & "herders" to help contain oil & reduce spreading. |
| Burning | • Minor ice management to avoid & work between ice floes.<br>• Good containment with fire boom & rapid elimination of oil with high efficiencies. | • Ice deflection/management and chemical "herders" to enhance containment.<br>• Rapid elimination of oil with moderate-to-high efficiency. | • Ice management and "herders" to enhance containment.<br>• Reduced burn rates (with smaller areas), but efficient. |
| Dispersants | • Aerial & surface application.<br>• High oil encounter rates.<br>• Ice of little-to-no concern.<br>• Promising new chemical formulations. | • Potential aerial/surface use.<br>• Ice deflection/management to enhance oil targeting.<br>• Ice micro-turbulence to enhance efficiency | • Surface application likely.<br>• Ice management & induced agitation to enhance use.<br>• New formulation test results look promising. |

Alan A. Allen

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# Test Plan (from April 11)

# Execution Section

# Appendicies

# Next Steps

**Funding**

- RDC can fund TONOs for planning and executions
- RDC/Enbridge funds OSROs
- RDC can fund fuel
- CG  provide vessel time
- RDC may be able to fund State and Provinces TONOs

**Schedule**

- OCT 15 Draft plan
- Nov 15 next Version
- Exercise:??

# Action Items

# Questions

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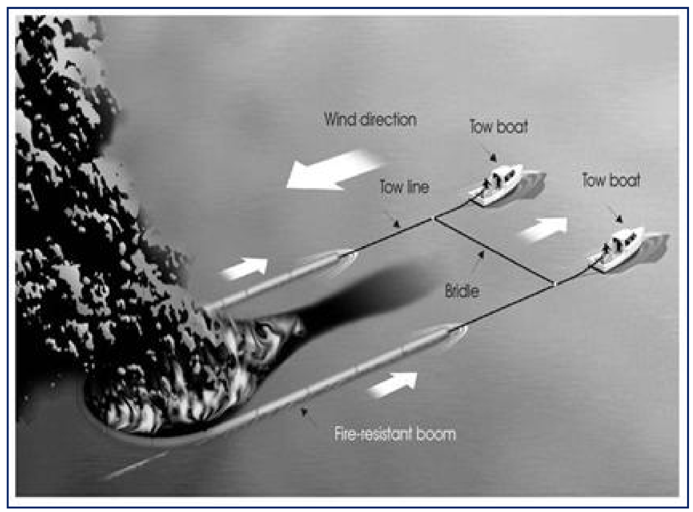
# Current Project for Arctic

## 1999-2002: Project based on in-situ burn efforts near Galveston

- Series of increasingly complex exercises
- Using local responders
- Resulted in operations manual, training videos and sample plans



# Simulating the In-Situ burning



Actual In-Situ burning in icy water conditions