Booming

Objective:
1. To prevent oil from contacting resources at risk
2. To facilitate oil removal.

Description:
A boom is a floating, physical barrier, placed on the water to:

1. Contain
2. Exclude
3. Deflect
4. Divert
Before spilled oil can be recovered, the spreading of the oil must be controlled and contained in an area accessible to oil recovery devices. Generally accomplished using oil containment boom as a...
1. A Containment Tool (Keep In)

2. A Protective Tool
   a.) Exclusionary Configurations (Keep Out)
   b.) Deflection Configurations (Re-Direct Away)
   c.) Diversioneer Configurations (Re-Direct To)
Limitations
There are limitations on the effectiveness of any boom:

Splash-Over from wind & breaking waves.
Changing tides & shifting currents.
In *all cases* of boom deployment…

consideration must be given to conditions on-scene AND protecting the *safety* of personnel.
Open Water Containment

- Oil spilled on open water is normally contained using boom.
- Boom deployed using vessels to tow the boom around the perimeter of the oil spill.
- Type of boom to be deployed will depend on local conditions:
  - Sea State
  - Tides
  - Currents
  - Wind
- To be most effective:
  - Booming on open water should be done as soon as possible after a spill.
Protective Booming
((Exclusionary or Deflection Configurations))

Goal of most containment and recovery strategies is to collect the spilled oil from the water and prevent it from reaching sensitive resources.

This is not always possible & the goal will shift to:

Minimizing environmental injury using a variety of booming techniques to keep the oil out or direct the oil away from sensitive natural resources or cultural artifacts.

What are some of those areas to be protected???
Exclusionary & Deflection Booming

- Performed prior to the advance of the oil - Used to prevent or exclude oil from entering:
  - Harbor Inlets
  - Sloughs
  - Marshes
  - Estuaries
  - Water Intakes

- Hard boom alone, or in combo with sorbent boom, can be used for these configuration. Factors for consideration:
  - Type
  - Size of Boom
  - Natural Forces of Water Body
  - Wind
  - Tide
  - Currents

- These factors can be pre-determined by:
  - A Priority System (GRP)
  - Regularly Training, and
  - Local Knowledge of the Waters
Diversionary Booming

- **Purpose:** To divert the direction of the oil to a recover site.

- **Oil velocity** for this booming strategy should be reduced to under 0.7 knots.

- **Accomplished by:**
  - Angling the boom in relation to the current's direction, reducing the velocity of the floating oil in relation to the boom.

- Diversionary booms can be set up in series along a waterway to increase their effectiveness.

- **Reminder:** The boom needs to be tended and monitored as weather and tidal conditions change.
Boom Types
TYPES

- Fence
  - No chain for ballast tension
  - Rigid
  - Poor response to waves
  - Flexi usually used in sheltered areas
  - Foam floatation chamber w/ ballast skirt
TYPES

- Fence
- Curtain
  - Flexible material
  - Ballast skirt
  - Good response to waves
  - Air or foam in top chamber
TYPES

- Fence
- Curtain
  - Fast water
  - Holes in skirt reduce force on boom
  - Reduces entrainment
TYPES

- Fence
- Curtain
- Inflatable
  - Chained tension member
  - Heavy duty fabric
  - Good for cascade booming
TYPES

- Fence
- Curtain
- Inflatable
- Fire
- Tidal Seal
  - 3 cells, 2 bottom filled w/ water, 1 top filled w/ air
BOOM
CONSTRUCTION

5 Parts of a Boom
1. ASTM Connector
2. Main Tension Member
3. Ballast
4. Floatation
5. Skirt
Deployment
Boom Deployment

Boom is sometimes wound onto reels and stored for easy access and maneuverability. In lieu of reels, boom may be stowed methodically on response trailers for rapid deployment.
Overstressed due to high volume of oil. Gross oil loss or entrainment will follow.
CONTAINMENT BOOM CONFIGURATIONS

COMPLETE ENCIRCLEMENT (NEGligible CURRENT)

PARTIAL ENCIRCLEMENT (NEGligible CURRENT)

Catenary (U-shape)

Current = Approximately 2.5 KT.

Double Containment Booming (Swift Current)

Angled Containment Boom (Moderate Current)

Current = Approximately 1.5 KT.

Excavation Along Shore Line

Angled Containment Boom with Recovery Pit

Current = Approximately 1.2 KT.
“Sacrificial” boom used to collect debris and trash. Will probably be discarded after use due to damage. Easy to deploy, labor intensive to decon & repack.
Water-flushing to prevent residual oil from affecting shoreline’s sensitive areas
Natural collection areas for debris and trash are signs of where spilled oil will end up. These natural collection spots can be part of an ACP for this area.
Product was diverted to this area for removal by Vac Truck.
Protection - Exclusionary
Long lengths of boom require anchoring every 400 ft or less
Booming just far enough away from bulkheads, etc. can save clean up costs
Hatchery being protected using boom and anchor points . . .

Lots of them!
Directions, precautions . . . All on the surface of the boom
Towing section with a float attached
Use of bridle and amount of boom should not exceed 500 ft
Damage

Boom selection and tow speed are some of many critical factors in mechanical recovery. The wrong choice can lead to compounding problems during a response event.
Selection Factors

- Type of water body
- Environment
- Structures
- Available resources
- Accessibility
- Safety
- Debris
Selection Factors

- Type of water body
  - Offshore
  - Rivers
  - Canals
  - Harbors
  - Inlets
  - Bays
  - Channels
  - Natural collection areas
Selection Factors

- Type of water body
- Environment
Selection Factors

- Type of water body
- Environment
- Structures
Selection Factors

- Type of water body
- Environment
- Structures
- Resources
Selection Factors

- Type of water body
- Environment
- Structures
- Resources available
Selection Factors

- Type of water body
- Environment
- Structures
- Resources available
- Accessibility
Cascade booming in fast moving currents. Staggered sections stepwise along the shoreline
Estimating Current & Deflection Angles
Forces on the boom
Estimating Current & Deflection Angles

- Forces on the boom and rigging
- Drag forces
Figure 7. Plot of the maximum angle for boom deployment at increasing current velocities.
Boom

Anchoring
CONVENTIONAL BOOM ANCHORING

WATER SURFACE

FLOAT

TETHER LINE

ANCHOR LINE
5-10 x WATER DEPTH

ANCHOR
6-10 FEET OF ANCHOR CHAIN

BOOM