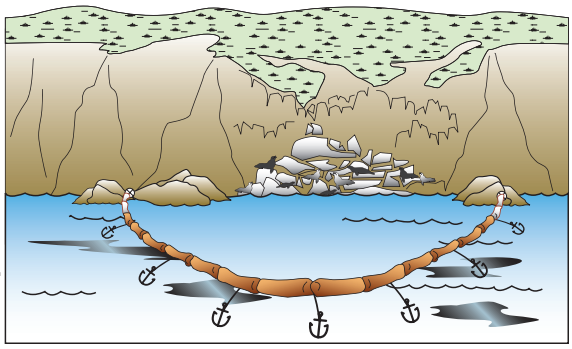
EXCLUSION BOOM

OBJECTIVE & STRATEGY

EX

Exclusion Booming is a fixed-boom strategy, with the objective of prohibiting oil slicks from entering a sensitive area.

TACTIC DESCRIPTION



This technique requires the area to be completely boomed off, forming a protective barrier. Conventional oil boom, tidal-seal boom, or a combination of each can be used to exclude spilled oil from a sensitive area. Typically, tidal-seal boom is deployed at the shoreline/water interface on both shores and is secured/anchored into position. Conventional oil boom is then connected to the tidal-seal boom and is secured with additional anchor systems to form a barrier and to maintain shape.

This technique is most efficient in low current areas. Freshwater outflow from a river or stream may assist in maintaining boom configuration and pushing oil away from the area inside the boom.

The general strategy is to:

1. Identify the location and trajectory of the spill or potential spill.
2. Identify, prioritize, and select sensitive areas to be protected from impact.
3. Select a deployment configuration that best supports the operating environment and available resources.
4. Mobilize to the location and deploy the equipment.
5. Secure boom with anchor systems and/or mooring points.
6. Monitor the boom on an appropriate basis.
7. If oil contacts the outside of the boom, utilize an appropriate recovery system to remove it.

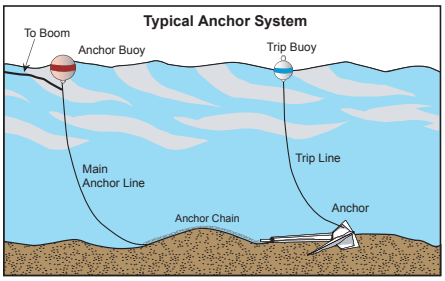


Figure EX-1. Typical anchor system.

Anchor Systems

Boom is secured in place using standard anchoring systems that are shown in Figure EX-1. Anchor sizes vary depending on the boom type and the operating environment.

Exclusion Boom

TIDAL-SEAL BOOM

A special type of boom, tidal-seal boom, is used on some boom arrays where the array contacts the shoreline to prevent oil from escaping. Tidal-seal boom typically contains three chambers as shown in Figure EX-2. Two of the chambers are filled with water, and contact the shoreline in shallow water and shoreline areas. The third chamber is usually filled with air, and provides flotation as the water level rises. Tidal-seal boom should be used in areas with a smooth bottom of gradual slope and avoided where there are large rocks and sharp breaks in the bottom.

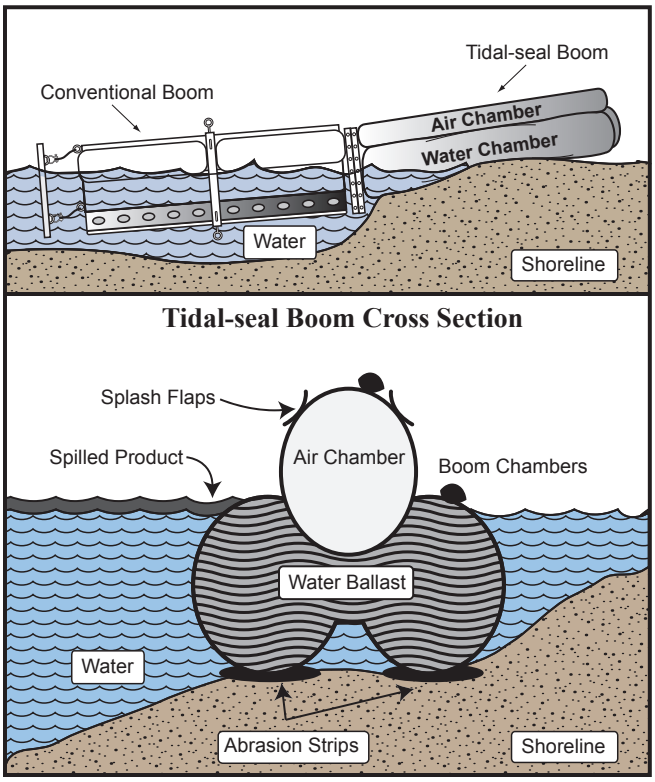


Figure EX-2. Tidal-seal boom configuration.

Operating Environments

EX-O

OPEN WATER

Exclusion Boom is not recommended for use in the open water environment, because of the high probability of boom and anchor failure; consider On-water Free-oil Recovery, Diversion Booming, or Deflection Booming instead.

EX-P

PROTECTED WATER

Vessels, boom and anchors for protected-water exclusion boom systems should be able to deploy and operate in seas up to 3 feet and winds up to 25 knots. Vessels setting and tending the boom should be able to safely transit seas which exceed the boom's operating limitation. Protected water exclusion boom systems are often based on vessels of opportunity, such as fishing vessels. Protected water systems may be deep draft or shallow draft, depending on the water body.

EX-C

CALM WATER

Calm water exclusion boom systems are composed of vessels, booms and skimmers that should be able to deploy and operate in seas of 1 foot and winds up to 15 knots. Vessels setting and tending the boom should be able to safely transit seas which exceed the boom's operating limitation. Calm water exclusion boom systems are usually based on small fishing vessels, work-boats or skiffs fitted with portable skimmers and primary storage devices. Calm water exclusion boom systems typically work in depths as shallow as 3 feet.

EX-F FAST WATER

Exclusion Boom is not recommended for fast water operating environments; consider Diversion Boom or Deflection Boom tactics instead.

EX-B BROKEN ICE

Exclusion Boom may be difficult for broken ice operating environments; consider Marine Recovery instead.

Deployment Configurations

Two configurations are described below, but responders should consider the actual conditions and modify their deployment accordingly.

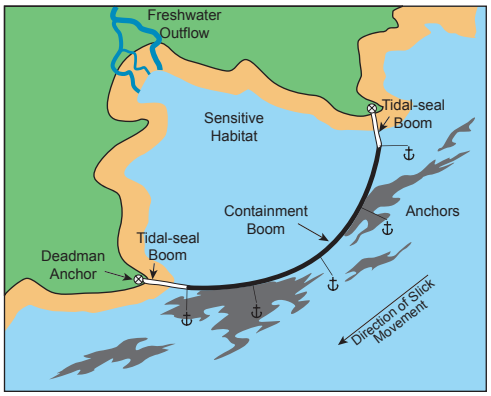


Figure EX-3. Exclusion booming configuration.

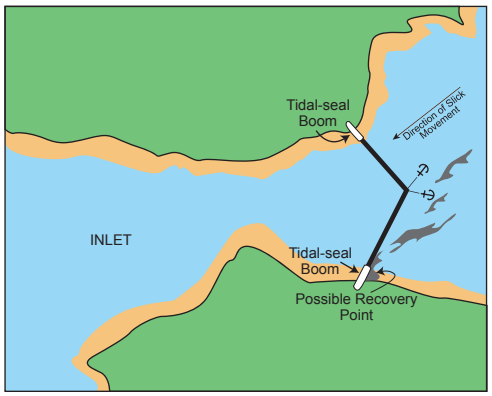


Figure EX-4. Exclusion booming with apex for exposed shores or currents.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

SAFETY

- Daily weather evaluation is recommended, and should include distance to safe harbor, transit times and exposure of vessels.
- Vessel masters should have experience in the appropriate operating environment and tactic. Local knowledge is preferred.
- Vessels setting and tending the boom should be able to safely transit seas which exceed the boom's operating limitation.
- Vessels, including skiffs, must have a minimum of two crew aboard.
- If possible, vessels in transit to/from an operation or staging area should transit in pairs.
- A communications schedule should be established and followed, between vessels in transit and the Operations Section or Radio Dispatcher.

- Anchor trip lines should be made of material strong enough to handle a moderate strain during boom reconfigurations. Responders normally used the trip line to reposition and reset the anchors.
- Response personnel should wear PPE as required by the incident-specific Site Safety Plan.
- Buoy lights should be considered for night operations.

DEPLOYMENT

- Do not try to exclude oil from too large of an area; a single failure will result in contamination of the entire area. It is better to deploy more booms arrays covering smaller areas.
- Do not assume 100% efficiency with one boom system.
- Readjust anchors to maintain boom shape through tide cycles.
- Constant monitoring of system is required.
- Deployment planning should be based on average high tidal conditions.
- Expect boom failure where currents over 0.75 knots encounter the boom.
- A gate may be installed to allow vessels to pass.
- If tidal-seal boom is not available, sorbent materials such as pom-poms or snare on rope can be placed next to or attached to conventional boom to hinder oil entrainment under the boom at the beach water interface. Plans should be made to change out oiled sorbent on each low water tide cycle.
- Anchor systems must be selected based on the maximum stress that might be expected to occur on the boom array, considering stronger currents and winds than when the anchor is set.
- The scope of the anchor line should be at least 3 times the depth of the water. If the anchor fails to hold try increasing the line scope to five times the depth of the water and/or double the length of the anchor chain. Finally, if additional anchor holding is required, anchors can be ganged or set in series.
- If wildlife or historic properties are encountered, see Wildlife Checklist on page A-19 or Historic Properties Checklist on page A-20.

REFERENCES TO OTHER TACTICS

Other tactics associated with Exclusion Boom include:

- BB Beach Berms and Exclusion Dams
- DV Diversion Boom
- DF Deflection Boom

EQUIPMENT AND PERSONNEL RESOURCES

Commonly used resources for this tactic include vessels, boom, anchoring systems, and response personnel. Configuration and specific resources required will be determined by site conditions, spilled oil type and volume, area of coverage, and resource availability. Resource sets may need to be refined as site-specific requirements dictate.

Protected Water Exclusion Boom System EX-P

Typical Equipment	Function	Quantity	Notes
Oil boom, 18" to 42" height	Exclude oil from sensitive area	Site-specific	Depending on configuration, currents, sea states, and oil concentration
Tidal-seal boom	Seal containment across the inter-tidal zone	Site-specific, optional	Best for sand and gravel beaches with gradual slopes
Small anchor systems or shore-based anchors	Secure boom in selected configuration	Rule of Thumb – 1 anchor per 200 ft. of boom	Depending on configuration, currents, and sea states
Typical Vessel	**Function**	**Quantity**	**Notes**
Class 3, 4, 5 or 6 At least one vessel with a crane is recommended	Deploying/tending anchors and boom	2 to 4	Depending on configuration, currents, and sea states
Typical Personnel	**Function**	**Quantity**	**Notes**
Field Team Leader	Supervises operations	1	
Vessel Operators, protected/calm water	Masters of response vessels	2 to 4	Depending on number of vessels
Skilled Technicians	Crew vessels and operate response equipment	1 to 4	Depending on number of vessels, configuration, recovery system
General Technicians	Work under the direction of skilled technicians or vessel operators	1 to 4	Depending on number of vessels, configuration, recovery system

Calm Water Exclusion Boom System EX-C

Typical Equipment	Function	Quantity	Notes
Oil boom, 6" to 24" height	Exclude oil from sensitive area	Site-specific	Depending on configuration, currents, sea states, and oil concentration
Tidal-seal boom	Seal containment across the inter-tidal zone	Site-specific, optional	Best for sand and gravel beaches with gradual slopes
Small anchor systems or shore-based anchors	Secure boom in selected configuration	Rule of Thumb 1 anchor per 200 ft. of boom	Depending on configuration, currents, and sea states
Typical Vessel	**Function**	**Quantity**	**Notes**
Class 3, 4, 5, or 6	Deploying/tending anchors and boom	1 to 3	Depending on configuration, currents, and sea states
Typical Personnel	**Function**	**Quantity**	**Notes**
Field Team Leader	Supervises operations	1	
Vessel Operators, protected/calm water	Masters of response vessels	2 to 4	Depending on number of vessels
Skilled Technicians	Crew vessels and operate response equipment	1 to 4	Depending on number of vessels, configuration, recovery system
General Technicians	Work under the direction of skilled technicians or vessel operators	1 to 4	Depending on number of vessels, configuration, recovery system

Exclusion Boom

Broken Ice Exclusion Boom System

EX-B

Typical Equipment	Function	Quantity	Notes
Oil boom, 6” to 42” height	Exclude oil from sensitive area	Site-specific	Depending on configuration, currents, sea states, and oil concentration
Tidal-seal boom	Seal containment across the inter-tidal zone	Site-specific, optional	Best for sand and gravel beaches with gradual slopes
Anchor systems or shore-based anchors	Secure boom in selected configuration	Rule of Thumb 1 anchor per 200 ft. of boom	Depending on configuration, currents, and sea states
Typical Vessel	**Function**	**Quantity**	**Notes**
Class 1, 2, or 3	Deploying/tending anchors and boom	1 to 3	Depending on configuration, currents, and sea states. Steel hull required.
Typical Personnel	**Function**	**Quantity**	**Notes**
Field Team Leader	Supervises operations	1	
Vessel Operators, open/ protected/calm water	Masters of response vessels	2 to 4	Depending on number of vessels
Skilled Technicians	Crew vessels and operate response equipment	1 to 4	Depending on number of vessels, configuration, recovery system
General Technicians	Work under the direction of skilled technicians or vessel operators	1 to 4	Depending on number of vessels, configuration, recovery system