



ON-WATER FREE-OIL RECOVERY

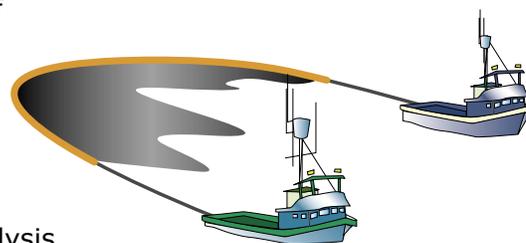
OBJECTIVE & STRATEGY



The objective of the free-oil recovery tactic is to contain and recover spilled oil on the water, thus minimizing impact to the environment. In some situations, the Unified Command may task the free-oil recovery team with maximizing oil recovery, while in other situations the objective may be to maximize protection of a sensitive area by encountering oil that is on a trajectory to impact that area.

The general strategy is to:

1. Identify the trajectory and location of the spilled oil by performing over-flight surveillance and trajectory analysis,
2. Select a deployment configuration that best supports the operating environment and available resources,
3. Mobilize to a location down stream and up wind of the slick and deploy free-oil recovery teams,
4. Encounter the oil and concentrate it in oil boom,
5. Recover the oil with available skimming systems, and
6. Store the recovered fluid in a primary storage device, until it can be transferred to secondary storage.



TACTIC DESCRIPTION

Free-oil recovery systems are comprised of vessels with oil boom for containment and concentration, skimming systems for recovery, and primary storage devices for temporary storage. There is a great variation in the way these systems are configured depending on the operation environment, type of oil and state of weathering, and the available deployment platforms. Examples of skimming systems and primary storage devices may be found in the Marine Recovery tactics sheet.

Operating Environments

Free-oil recovery can be used in four operation environments.

OPEN WATER

Free-oil recovery system components (vessels, boom and skimmers) for open water operations should be able to deploy and operate in seas up to 6 feet and in winds up to 30 knots. For safety, vessels should be

On-water Free-Oil Recovery



able to transit seas up to 12 feet with winds up to 45 knots. Open water free-oil recovery systems are usually based on large vessels with high volume skimmers and large primary storage devices, such as barges. In many cases, the components of these systems are dedicated to oil spill response. Open water systems are usually deep draft, operating at depths of greater than 6 feet.

FO-P **FO-S** **PROTECTED WATER**

Vessels, boom and skimmers for protected water free-oil recovery systems should be able to deploy and operate in seas up to 3 feet and in winds up to 25 knots. Vessels should be able to transit seas up to 6 feet with winds up to 30 knots for safety. Protected water free-oil recovery systems are often based on vessels of opportunity, such as fishing vessels, fitted with portable skimmers and primary storage devices. Protected water systems may be deep draft or shallow draft, depending on the water body.

FO-C **CALM WATER**

Calm water free-oil recovery systems are composed of vessels, booms and skimmers that should be able to deploy and operate in seas of 1 foot and in winds up to 15 knots. Vessels should be able to transit seas up to 3 feet in winds up to 20 knots for safety. Calm water

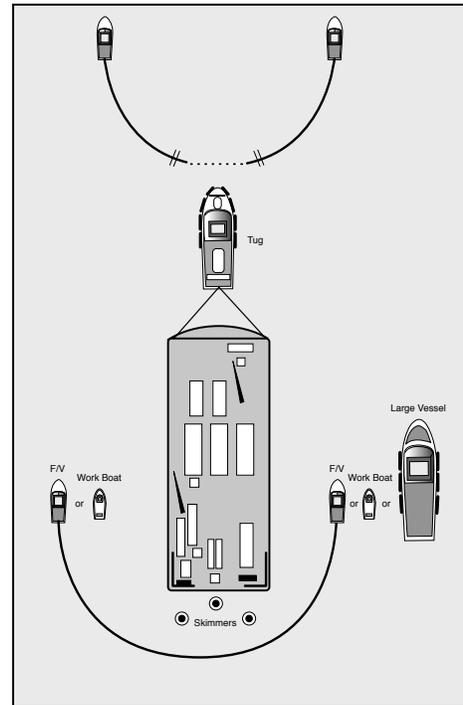


Figure 1. Open water barge-based free-oil recovery system.

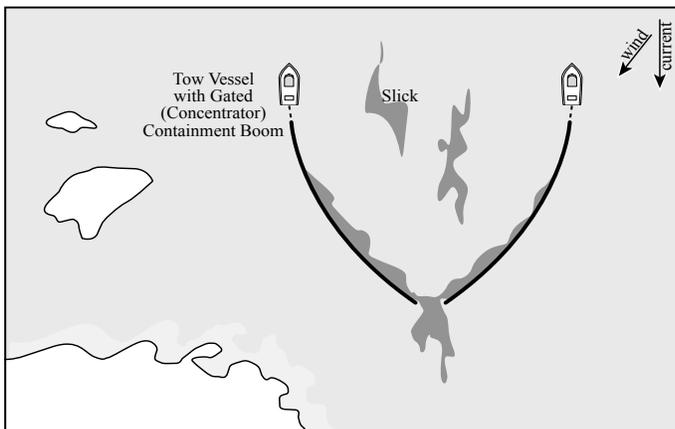


Figure 2. Gated U-boom concentrator boom, towed in front of free-oil recovery.

free-oil recovery systems are usually based on small fishing vessels, work-boats or skiffs fitted with portable skimmers and primary storage devices. Calm water free-oil recovery systems typically work in depths as shallow as three feet.

CALM WATER - CURRENT **FO-R**

Calm water-current free-oil recovery systems are designed to operate in moving water where

the current exceeds 0.8 knots. This includes rivers and areas with significant tidal current. Vessels, boom and skimmers used in tidal waters should be able to deploy and operate in seas up to 1 feet in

B. MECH.

On-water Free-Oil Recovery

winds up to 15 knots. Vessels, boom and skimmers used in river waters should be able to deploy and operate in waves up to 2 feet in winds up to 15 knots. For safety, vessels operating in tidal waters or large rivers should be able to transit seas to 4 feet in winds up to 20 knots. Calm water-current free-oil recovery systems are equipped with high-current boom and skimmers. These systems are usually deployed from small vessels or skiffs.

Deployment Configurations

There are typically three primary deployment configurations for Nearshore Free-Oil strike teams.

U - BOOM CONFIGURATION

The U-Boom System consists of vessels towing boom in a "U" configuration concentrating spilled oil into the back of the pocket formed by the boom (see Figure 3). This technique can also be used solely for oil concentration by leaving an opening secured by chain in the apex of the boom

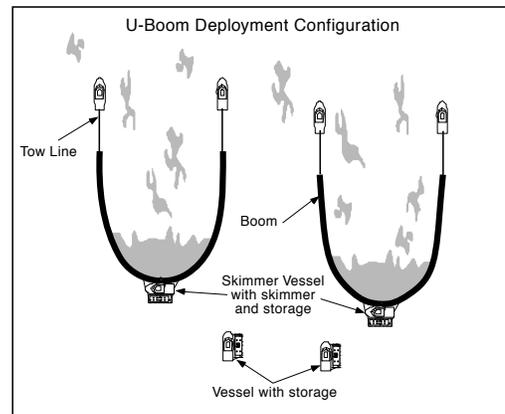


Figure 3. U-boom configuration.

or a "gated U - Boom". Typically, combinations of these configurations are used to enhance concentration and containment effectiveness. The spilled oil is then collected with a recovery device (skimmer), typically deployed by an additional vessel, and stored in a primary storage device.

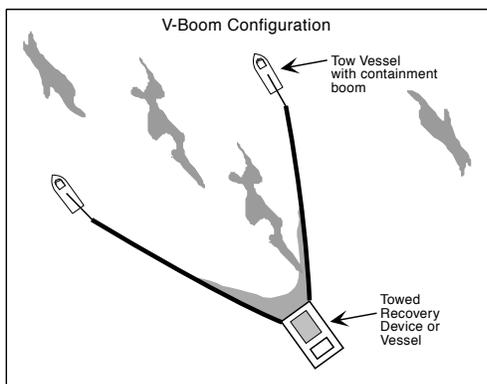


Figure 4. V-boom Configuration.

V-BOOM CONFIGURATION

The V-Boom Configuration consists of vessels towing boom and a recovery device (skimmer) in a "V" configuration (see Figure 4). The spilled oil is concentrated with the boom toward the back apex where a skimmer is located for oil recovery.

Typically, these recovery systems are designed with a limited amount of storage built in and are either offloaded frequently or are augmented with additional storage devices and transfer systems.

J-BOOM CONFIGURATION

The J-Boom Configuration consists of vessels towing boom in a "J" configuration, concentrating the spilled oil for recovery into the back of the pocket formed by the boom (see Figure 5). The rear towing vessel is outfitted with a recovery device (skimmer) for deployment along the vessel side

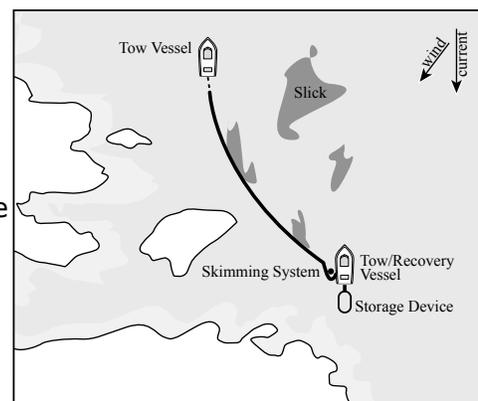


Figure 5. J-boom configuration.

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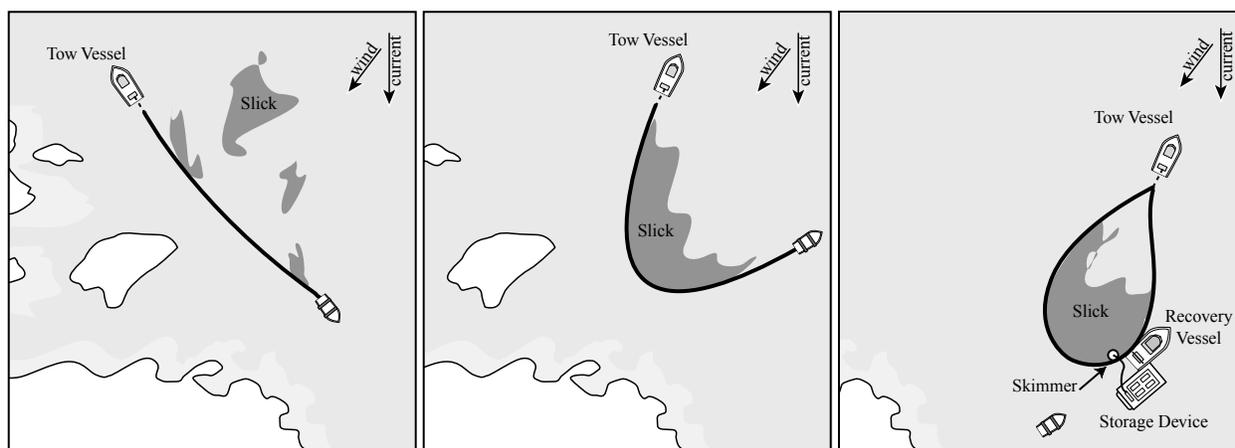


Figure 5. Nearshore trapping, boom towing boats collect oil then tow the trapped oil to deeper water for recovery.

where the apex of the boom is formed. The oil is then collected with the skimmer and stored in a primary storage device, such as a mini barge. This system is often utilized in place of the U-Boom system, when the response is limited by the amount of vessels available and when maneuverability is not as critical.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- + Daily fair and foul weather evaluations are 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 local knowledge is preferred.
- Site conditions may influence deployment configuration options.
- Combinations of free-oil recovery and diversion tactics are often used together.
- Combinations of configurations may optimize recovery.
- Procedures and permits for decanting recovered water should be considered.
- Open water systems, typically operate two 12 hr. shift per day. Other systems typically operate one 12 hr. shift per day.
- Logistics for oil transport and disposal should be considered.

REFERENCES TO OTHER TACTICS

Other tactics associated with free-oil recovery include:

- Marine Recovery
- Diversion Boom and Recover
- Marine Based Storage and Transfer



On-water Free-Oil Recovery

EQUIPMENT AND PERSONNEL RESOURCES

Resources for this tactic include vessels, boom, skimmers, primary storage devices, and personnel. Configuration type and quantity of strike teams required will be determined by site conditions, spilled oil type and volume, area of coverage, as well as resource availability. Resource sets may need to be refined as site-specific requirements dictate.



Open Water Free-oil Recovery System

Equipment	Function	Quantity	Notes
Oil boom, > 36" height	Contain and concentrate oil	1,000 to 3,000 ft.	Depending on configuration and oil concentration
Skimming system(s), open water	Recover concentrated oil	1 minimum	Type and capacity of skimmer depends on oil type, oil weathering state and operating environment.
Primary storage device	Store recovered fluid	2 times the effective daily recovery capacity of the skimming system(s)	Typically large barges are used for open water systems.
Decanting system	Removing recovered water	1 minimum	Permit is required to decant.
Vessel	Function	Quantity	Notes
Class 1 or 2	Platform for skimming and handling recovery device	1 or 2	Depending on configuration
Class 3 or 4	Boom towing	1 to 4	Depending on configuration
Personnel	Function	Quantity	Notes
Field Team Leader	Supervise operations	1	
Vessel Operators, Open water	Masters of response vessels	2 to 5	Depending on number of vessels
Skilled Technicians	Crews vessels and operates response equipment	4 to 7	Depending on number of vessels
General Technicians	Work under the direction of skilled technicians	2 to 5	Depending on number of vessels



Protected Water Free-oil Recovery System

Equipment	Function	Quantity	Notes
Oil boom, 18" to 42" height	Contain and concentrate oil	500 to 1,000 ft.	Depending on configuration and oil concentration.
Enhanced recovery device	Concentrate oil	1 minimum	Type and capacity of skimmer depends on oil type, oil weathering state and operating environment.
Primary storage device	Store recovered fluid	2 times the effective daily recovery capacity of the skimming system(s)	Typically mini-barges are used for protected water systems.
Decanting system	Removing recovered water	1 optional	Permit is required to decant.
Vessel	Function	Quantity	Notes
Class 2 or 2	Platform for skimming and handling recovery device	1	Depending on configuration
Classes 3, 4, 5, or 6	Boom towing	1 to 3	Depending on configuration
Personnel	Function	Quantity	Notes
Field Team Leader	Supervise operations	1	
Vessel Operators, Protected/Calm water	Masters of response vessels	2 to 4	Depending on number of vessels
Skilled Technicians	Crews vessels and operates response equipment	1 to 4	Depending on number of vessels
General Technicians	Work under the direction of skilled technicians	1 to 4	Depending on number of vessels

B.
MECH.

On-water Free-Oil Recovery



Calm Water Free-oil Recovery System

Equipment	Function	Quantity	Notes
Oil boom, 6" to 24" height	Contain and concentrate oil	200 to 1,000 ft.	Depending on configuration and oil concentration
Enhanced recovery device	Concentrate oil	1 optional	Examples are: Current Buster or River Lagoon.
Skimming system(s), open water	Recover concentrated oil	1 minimum	Type and capacity of skimmer depends on oil type, oil weathering state and operating environment.
Primary storage device	Store recovered fluid	2 times the effective daily recovery capacity of the skimming system(s)	Typically mini-barges or portable tanks are used for calm water systems.
Decanting system	Removing recovered water	1 optional	Permit is required to decant.
Vessel	Function	Quantity	Notes
Classes 4, 5, or 6	Platform for skimming and handling recovery device	1	Depending on configuration
Classes 4, 5, or 6	Boom towing	1 to 3	Depending on configuration. Use of a boom control device, such as a Boom-vane, may necessitate less vessels.
Personnel	Function	Quantity	Notes
Field Team Leader	Supervise operations	1	
Vessel Operators, Protected/ Calm water	Masters of response vessels	2 to 4	Depending on number of vessels
Skilled Technicians	Crews vessels and operates response equipment	1 to 2	Depending on number of vessels
General Technicians	Work under the direction of skilled technicians	0 to 4	Depending on number of vessels



Calm Water-current Free-oil Recovery System

Equipment	Function	Quantity	Notes
Oil boom, 8" to 24" height	Contain and concentrate oil	200 to 500 ft.	Depending on configuration and oil concentration
Enhanced recovery device	Concentrate oil	1 optional	Examples are: Current Buster or River Lagoon.
Skimming system(s), calm water-current	Recover concentrated oil	1 minimum	Type and capacity of skimmer depends on oil type, oil weathering state and operating environment.
Primary storage device	Store recovered fluid	1	
Decanting system	Removing recovered water	1 optional	Permit is required to decant.
Vessel	Function	Quantity	Notes
Classes 5 or 6	Platform for skimming and handling recovery device	1	Depending on configuration
Classes 5 or 6	Boom towing	1 to 2	Depending on configuration. Use of a boom control device, such as a Boom-vane, may necessitate less vessels.
Personnel	Function	Quantity	Notes
Field Team Leader	Supervise operations	1	
Vessel Operators, Protected/ Calm water	Masters of response vessels	2 to 3	Depending on number of vessels
Skilled Technicians	Crews vessels and operates response equipment	1 to 3	Depending on number of vessels
General Technicians	Work under the direction of skilled technicians	0 to 3	Depending on number of vessels

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