



and tending the boom should be able to safely transit seas which exceed the boom's operating limitation. Open water free-oil recovery systems are usually based on large vessels with high volume skimmers and large primary storage devices, such as barges (see Figure FO-1). 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 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 deploying, towing, and tending the boom should be able to safely transit seas which exceed the boom's operating limitation. 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.

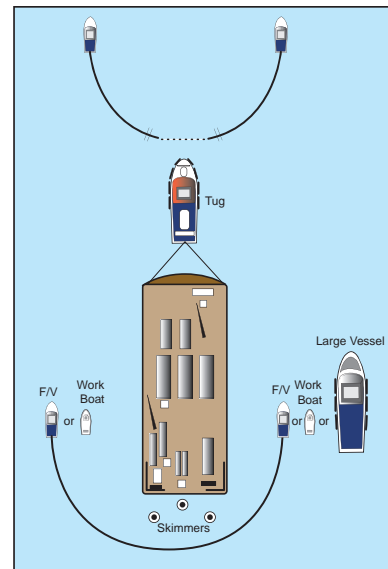


Figure FO-1. Open water barge-based free-oil recovery system.

FO-C FO-S 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 deploying, towing, and tending the boom should be able to safely transit seas which exceed the boom's operating limitation. Calm water 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 3 feet.

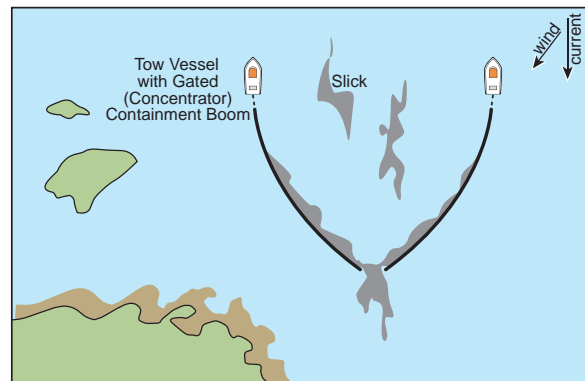


Figure FO-2. Gated U-boom concentrator boom, towed in front of free-oil recovery system.

FO-F FAST WATER

Fast water 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 foot and in 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 and in winds up to 15 knots. Vessels deploying, towing, and

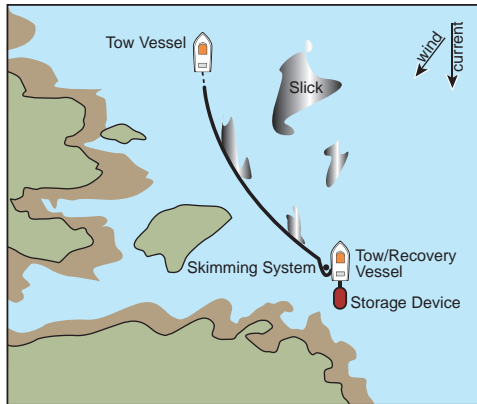


Figure FO-5. J-boom configuration.

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 FO-5). The rear towing vessel is outfitted with a recovery device (skimmer) for deployment along the vessel side 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, when maneuverability is not as critical, and when the oil is concentrated in windrows.

BOOM CONTROL AND ENHANCED RECOVERY DEVICES

Recent improvements in boom control devices, such as the Boom Vane™, allow a single vessel to deploy and control a U-Boom system (Figure FO-6). Enhanced recovery devices, such as the Current Buster™, allow for greater speed of advance for the boom system and concentrate oil to a deeper depth for more efficient collection (Figure FO-7). These configurations can improve system efficiency and reduce the costs of operation, however, they may limit the maneuverability of the recovery system.

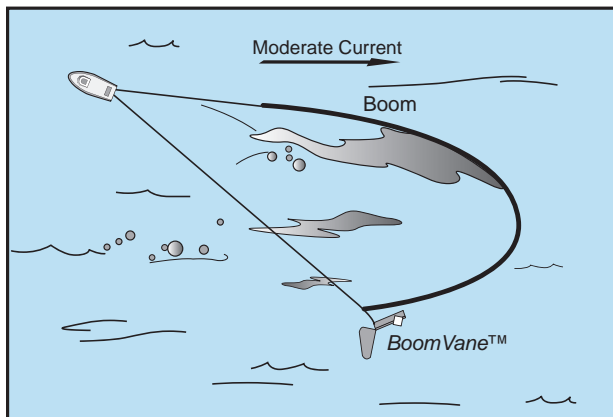


Figure FO-6. Free-oil recovery using a BoomVane™ to control one end of a U-boom.

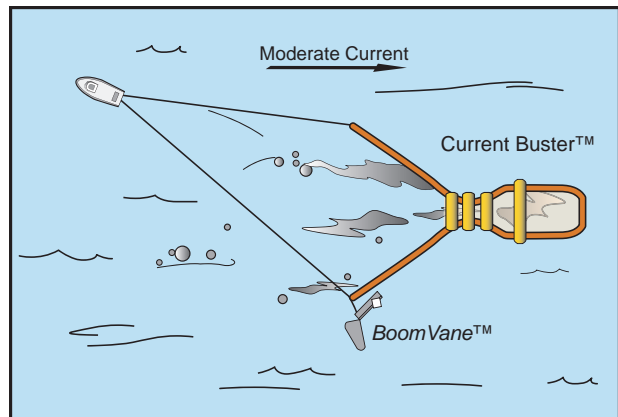


Figure FO-7. Free-oil recovery using a BoomVane™ to control one end of a Current Buster™.





Protected Water Free-oil Recovery System

Typical 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 optional	Examples are: Current Buster™ or River Lagoon™
Boom control device	Control one end of boom array	1 optional	May be used in place of one vessel, however, a larger vessel may be required
Skimming system(s), protected water	Remove 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 small bladders are used for protected water systems
Decanting system	Removing recovered water	1 optional	Permit is required to decant
Typical Vessel	Function	Quantity	Notes
Class 1, 2, or 3	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
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
General Technicians	Work under the direction of skilled technicians	1 to 4	Depending on number of vessels

Part III
MECH.



Calm Water Free-oil Recovery System

Typical 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™
Boom control device	Control one end of boom array	1 optional	May be used in place of one vessel, however, a larger vessel may be required
Skimming system(s), calm water	Remove 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
Typical 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.
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 2	Depending on number of vessels
General Technicians	Work under the direction of skilled technicians	0 to 4	Depending on number of vessels



On-water Free-Oil Recovery



Fast Water Free-oil Recovery System

Typical 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™
Boom control device	Control one end of boom array	1 optional	May be used in place of one vessel, however, a larger vessel may be required
Skimming system(s), calm water current	Remove 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	Typically mini-barges or small bladders are used for fast water systems
Decanting system	Removing recovered water	1 optional	Permit is required to decant
Typical 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.
Typical Personnel	Function	Quantity	Notes
Field Team Leader	Supervises operations	1	
Vessel Operators, protected/calm water	Masters of response vessels	2 to 3	Depending on number of vessels
Skilled Technicians	Crew vessels and operate 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

Part III
MECH.



Broken Ice Free-oil Recovery System

Typical 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 or protected water	Remove concentrated oil	1 minimum	Type and capacity of skimmer depends on oil type, oil weathering state, and operating environment - oleophilic rope/brush skimmer preferred
Primary storage device	Store recovered fluid	1 or 2	Typically mini-barges with sufficient hull strength for ice
Decanting system	Removing recovered water	1 optional	Permit is required to decant
Typical Vessel	Function	Quantity	Notes
Classes 2, 3, or 4	Platform for skimming and handling recovery device	1	Depending on configuration. Steel hull required.
Classes 2, 3, or 4	Boom towing	1 to 2	Depending on configuration. 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 3	Depending on number of vessels
Skilled Technicians	Crew vessels and operate 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

