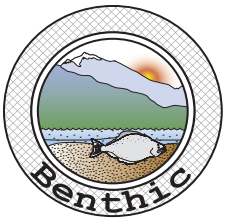

BENTHIC SAMPLING METHODS

INTRODUCTION

Whole oil that sinks to the sea floor requires a different sampling approach. Like water column sampling, methods may be either active or passive. Active benthic sampling involves dragging mesh nets or snare along the sea floor; however, this method may result in significant damage to the benthic environment and should be used cautiously. Passive sampling devices that are placed on the sea floor and checked at regular intervals will be far less disruptive to the environment.

Sediment sampling may also be used to assess the presence or distribution of oil on the sea floor. Sediment sampling usually involves removing small amounts of sediments from the bottom and analyzing them for signs of contamination. Sediment sampling can also be conducted using a dredge or trawl; however, this is generally more disruptive to the benthic environment. Various instruments exist to remove sediment samples from the sea floor. Once the samples have been collected, they may be examined either by sight/smell or through laboratory analysis.

Detection Limits of Benthic Sampling Methods

The sensitivity of benthic sampling methods is limited by several factors, including the relative volume of seawater or sediment sampled, the affinity of the oil for the sampling devices used, and the location of sampling stations relative to oil distribution. Passive sampling devices may be more or less sensitive depending upon the chemical composition and degree of weathering of the oil. Certain oils may adhere more readily to sorbent materials.

As with all oil sampling methods, it is possible that the oil detected may not necessarily be attributed to the spill source of concern. Background contamination levels vary in different water bodies, and sediment contamination may come from a variety of sources. In areas with high vessel traffic, nearby oil and gas exploration, or adjacent to ports or marinas, background contamination levels may be relatively high.

Benthic sampling should only be used for oil spills where oil properties and behavior are consistent with sinking behavior. Scientific support personnel and fate and effect models can be used to verify assumptions regarding whether oil may sink, and under what conditions.

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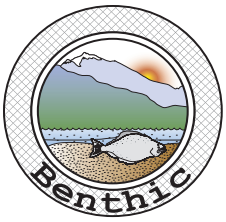

PASSIVE SAMPLING – BOTTOM

OBJECTIVE & STRATEGY

The objective of Passive Sampling-Bottom is to collect data regarding the distribution of whole oil as tar balls, tar patties, mousse, or other whole oil form, on the sea floor. Passive sampling devices should be deployed and held in place through a series of anchors or fishing gear that maintain the sampling device's contact with the seafloor. Data collected through passive sampling provides a gross measurement regarding the presence and absence of oil spatially and/or temporally. Since this method uses actual fishing gear, it may yield useful information regarding the potential oiling of gear and catch.

Passive sampling data may be used to monitor fishing grounds, assess the risk of oil to fishing gear, and map areas of oiling on the sea floor. The sampling scheme should be designed based on the real time question posed for the incident. Different sampling schemes are required to determine the answer to the following types of questions:

- Is there oil on the bottom?
- What is the relative distribution and abundance of oil on the bottom?
- Is this section of the seafloor oil-free?
- Is the amount of oil in this area increasing or decreasing?
- Is this area safe for ground fisheries?

Care must be taken to choose a sampling design that is appropriate to the questions being asked.

TACTIC DESCRIPTION

Operating Environments

Passive Sampling-Bottom may be deployed in any water body where vessels can operate or where access exists from docks, shoreline, or other marine structures. Applicable operating environments include: nearshore and offshore marine waters, harbors, bays, rivers, and lakes.

Passive sampling devices may be deployed from vessels, docks, marine structures, or installed by divers. Vessels must be sufficiently seaworthy to suit the worst conditions expected in the operating area.

Deployment Configurations

Passive sampling devices may be configured in a number of different ways, depending upon the information needs driving the sampling

program. Adapting commercial fishing equipment presents common and effective configurations that can submerge and maintain sampling devices on the bottom of the sea floor for an extended period. The basic components of a passive sampling device are:

- ***Sorbent material:*** A sorbent or oleophilic material will enhance the likelihood that submerged oil will adhere to the sampling device upon encounter. Sorbent snares or oleophilic netting, mesh, or line may be used. Polyethylene is the most common oleophilic material.
- ***Positioning system:*** A positioning device that will hold the sampling device in contact with the seafloor. A length of line or fishing gear is often used to position the sorbent material(s) at the desired location.
- ***Anchor:*** An anchor or anchoring device is usually needed to secure the positioning system in place. Traditional anchors may be used, or available structures such as docks or water intake pipes may be used to anchor the sampling device.

Passive sampling devices can be designed and assembled ad hoc with locally available materials. Fishing gear for species-of-concern is often a good starting point for developing a passive sampling device. When commercial fishing gear is used for bottom sampling, other data may be collected concurrently using the same gear. Passive Water Column Sampling data may be acquired by following that protocol and attaching sorbent material at predetermined intervals along the buoy lines in the water column. In addition, if proper permitting is acquired, the gear may be baited and targeted species caught for inspection. Passive sampling devices for the sea floor may be oriented at a single geographic point or linearly along the seafloor. Anchor tackle (anchors, anchor chains, and cables) can also serve as passive sampling devices. Response vessels and fishing vessels should be instructed to inspect their anchor tackle whenever it is pulled out for signs of oil contamination. Following are two descriptions of fishing gear adapted for bottom sampling.

LONG LINE PASSIVE SAMPLING DEVICES-BOTTOM

To obtain sample data linearly, a long-line commercial fishing system with sorbent snare securely attached at predetermined spacing may be constructed. Using long line gear, a system may be configured with "detachable" sampling devices. An oleophilic snare or pom-pom can be attached using the ganion snaps to hold the snare. In addition to the long-line anchoring system fishing weights should be used to ensure that the snare remains in contact with the seafloor (Figure PSB-1).

An alternate configuration is to have the sampling device permanently "integrated" in the gear. This is achieved by the use of weighted ground line to deploy and hold the snare in position. A snare pom-pom is then cut into approximately 4 smaller portions and permanently attached to the line by using a fid to separate the strands temporarily.

Then the pom-pom material is inserted through the untwisted line. The line is then allowed to rewrap itself, therefore securing the sorbent material in the line. This allows for easier deployment and retrieval, but as portions of the line and sampling devices are oiled they must be physically removed by cutting and retying the line. Both these strategies are deployed and retrieved from a long lining vessel as a typical long lining set-up. Care should be taken during retrieval to ensure that the vessels and gear remain free of oil.

This method may also use baited gear to collect fish samples.

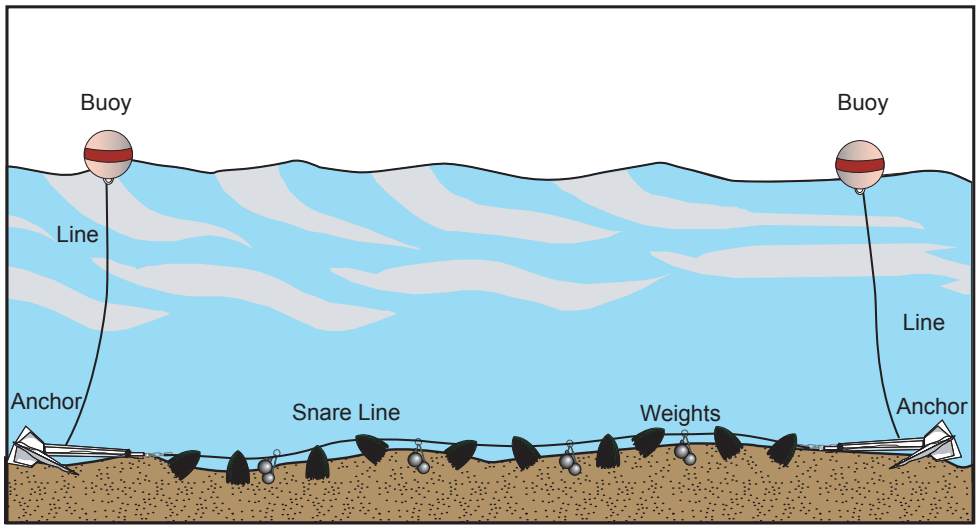

Figure PSB-1. Typical configuration for long-line passive sampling.

Figure PSB-2. Long-line Bottom Sampling System with detachable sampling devices being deployed.

Figure PSB-3. An oiled integrated sampling device on a long-line system. The sample and line were cut from the line, recorded and retained for evidence.

CRAB POT PASSIVE SAMPLING DEVICE

To obtain data regarding the presence of oil at geographic points, crab or cod pots may be used to hold sampling devices in place. Multiple pots may then be deployed in a pattern determined by the intended use of the information. The pots are configured by attaching oleophilic snare or pom-poms along the bottom of the pot - at a minimum, one snare on each of the four corners. These are then held on the bottom by the weight of the pot (Figure PSB-4).

This method may also use baited gear to collect fish samples.

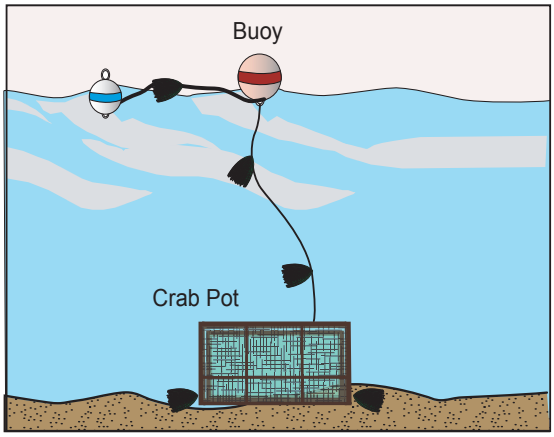

Figure PSB-4.Typical configuration of pot fishing gear used in Passive Sampling – Bottom.

Figure PSB-5. Snare sampling devices being removed from the corners of a baited crab pot used for bottom sampling and retrieval of seafood for inspection.

PROCEDURE

1. ***Prepare passive sampling device.***
   a. Affix sorbent snares to positioning system.
2. ***Set the passive sampling device at the desired location.***
   a. Mark the location using a buoy and a numbered tag.
   b. Record the date and time of deployment and latitude/longitude coordinates of device location.
   c. If long line gear is being used, record the beginning and end coordinates of the line.
3. ***Proceed to next location and repeat process until all passive sampling devices are positioned.***
4. ***After the desired interval of time, return to each passive sampling device to retrieve and inspect.***
   a. Recommended minimum "soak" time is 24 hours.
5. ***Remove device from the sea floor and inspect.***

   For Detachable Sampling Devices on Pots and Long-line Gear

   a. Retrieve the device from the bottom.
   b. Remove all the snares from the gear as they come on-board.
   c. Place each snare on sorting table, lined with sorbent pad, for inspection.
   d. Check each snare for signs of oil contamination using sight, smell, feel, and UV light if appropriate.
   e. Log all results-date, time, sampling device number, presence/absence of oil, location of the oiled sorbent on the long-line.

   For Integrated Sampling Devices on Long-line Gear

   a. Begin retrieval of the long-line.

b. Inspect the line and sampling devices visually and manually as they come aboard.

   i. Visually inspection- the crew and technicians should note any oil or suspicious colorization on the devices and gear which would prompt closer inspection by technicians.

   ii. Manual inspection- use oleophilic gloves to handle the line and sampling devices as they come on-board. After each sampling device passes through the technician's gloved hands, visually inspect the device and the gloves for signs of oiling. The very small amounts of oil will visually streak on the gloves.

c. Remove any oiled section from the line and retie the line.

d. Recoil the un-oiled portion of the long-line and prepare for redeployment if indicated.

e. Photograph any devices where oil is detected.

Figure PSB-6. Inspection of integrated sampling devices and long-line gear coming onboard using oleophilic gloves.

6. Place used sorbent in appropriate waste bag (refer to Waste Management Procedure).

a. Tag and label.

b. Oil-free snare or mesh may be re-used to reduce waste.

7. Inspect all equipment prior to redeployment for oil contamination and isolate any oiled equipment.

CONSIDERATIONS AND LIMITATIONS

+ Detection limits may be affected by location of sampling devices, length of sampling intervals, affinity of spilled oils for passive sampling materials, background tar ball levels, sea state and currents, sensitivity of laboratory analyses, and human error.

+ Daily 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.

  - Vessel crew should be experienced fishermen to ensure safe and effective deployment.

  - Technicians should be thoroughly briefed in fishing vessel deck procedures and safety by the deck boss.

+ Select passive sampling locations and water depths based on information needs as identified in sampling plan.

+ Use buoys, floats, or other obvious markers to identify passive sampling devices that may pose a navigational hazard.
+ Consider requesting that the U.S. Coast Guard issue a "Notice to Mariners" alerting them to the presence of passive sampling devices and floats.
+ Take into consideration the influence of tide and currents when deploying passive sampling devices.

REFERENCES TO OTHER TACTICS

Other methods associated with Passive Sampling – Bottom include:

- Passive Sample – Water Column
- Handling and Storing Samples
- Waste Management
- Safety
- Data Collection and Management
- Fish Collection

EQUIPMENT AND PERSONNEL RESOURCES

Resources for this tactic may include sorbent snare, commercial fishing gear, anchors, vessels, decontamination equipment, log books, and sampling technician(s). Configuration and specific resources 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.

Passive Sampling – Bottom

Equipment	Function	Quantity	Notes
Sorbent snare	Sampling device used to collect whole oil on the seafloor.	Dependent on spacing requirements and number of chain or weighted lines being used.	Un-oiled devices may be reused if inspected thoroughly.
Commercial fishing gear	Position and hold sampling devices on the seafloor.	If collecting point data-multiple fishing pots. If collecting linear data-adequate long-lining gear.	Gear configuration can be adapted to fit local conditions and data needs-use local knowledge.
Sorbent pads	Line sorting/sampling table to examine snare.	2 to 3 pads per inspection site. Ensure adequate amounts for frequent changes if heavy oiling is expected.	
Disposable Nitrile gloves	Inspection of integrated sampling devices in long-line gear.	Determined by amount of oil encountered.	After the gloves are oiled, they are no longer effective for inspecting the gear.
Oily waste storage	Store soiled sorbent materials.	Considerable amount of gear may become oiled and need disposal. Ensure adequate amounts if heavy oiling is expected.	
Detergent (e.g. degreaser)	Decontaminate/clean fishing gear.	1 bottle	Consult bottle regarding recommended dilution. Refer to MSDS for safety. Use only products registered on the National Contingency Plan product schedule.
Global Positioning System (GPS)	Note and record location and time of observation.	1 GPS and 1 backup, plus spare batteries	Recommend using combination of handheld GPS and vessel's GPS system.
Sampling materials	Collect and store samples of encountered oil for possible laboratory analysis.	Varies	Refer to Sample Handling Procedure.
Log books and data collection supplies	Record data regarding oil observations, conditions, etc.	2 (1 primary, 1 backup)	
Measuring tape or ruler/scale	Measure size of tarball or oil observation.	One per sampling technician	Photographs of tar balls or oil encounters should include ruler or scale to demonstrate size.
Digital camera	Record images of sampling process and observations.	One per sampling technician	Ensure sufficient batteries, charger, and memory stick storage for length of sampling survey.
Vessel	**Function**	**Quantity**	**Notes**
Vessel with appropriate capability to deploy passive sampling device (e.g. with pot launcher if using crab pots)	Deployment platform	Varies	Vessel should be inspected prior to use for safety equipment and communications capabilities.
Personnel	**Function**	**Quantity**	**Notes**
Sampling technician(s)	Deploy equipment, collect data.	2-3	Recommend at least 2 technicians per trip for safety. Technicians must have sufficient Hazmat certification and basic vessel safety training.

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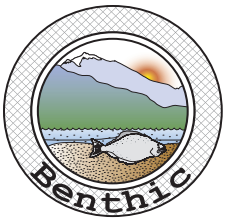

ACTIVE SAMPLING – BOTTOM

OBJECTIVE & STRATEGY

The objective of Active Sampling-Bottom is to collect data regarding the distribution of whole oil as tar balls, tar patties, mousse, or other whole oil form, on the sea floor. The strategy is to deploy sampling devices on the sea floor and move them in a predetermined track while maintaining the sampling device's contact with the bottom. Data collected through this strategy provides a gross measurement regarding the presence of oil spatially and/or temporally.

Active sampling data may be used to monitor fishing grounds, assess the risk of oil to fishing gear, and map areas of oiling on the sea floor. The sampling scheme should be designed based on the real time question posed for the incident. Different sampling schemes are required to determine the answer to the following types of questions:

- Is there sub-surface oil?
- Are certain sections of seafloor oil-free?
- Is the amount of oil in this area increasing or decreasing?
- Is the oil stable or moving?
- Is there oil present in the fishing grounds?
- Will oil impact fishing gear?

Care must be taken to choose a sampling design that is appropriate to the questions being asked.

TACTIC DESCRIPTION

Operating Environments

Active Sampling-Bottom may be deployed in any water body where vessels can operate and bottom structures will not impede the movement of the sampling device. Critical and sensitive bottom habitats should not be sampled using this sampling method. Applicable operating environments include: nearshore and offshore marine waters, harbors, bays, rivers, and lakes.

Active sampling devices may be deployed from vessels with sufficient capabilities to maintain forward movement while towing the sampling device. Vessels must be sufficiently seaworthy to suit the worst conditions expected in the operating area.

Deployment Configurations

Active sampling devices may be configured in a number of different ways, depending upon the information needs driving the sampling

program. Adapting commercial fishing equipment presents common and effective methods that can submerge and maintain sampling devices on the bottom of the sea floor while being towed for an extended period. The basic components of an active sampling device are:

- ***Sorbent material:*** A sorbent or oleophilic material will enhance the likelihood that submerged oil will adhere to the sampling device upon encounter. Sorbent snares or oleophilic netting, mesh, or line may be used.
- ***Towing bridle system:*** A towing system that will hold the sampling device in contact with the seafloor. The "sweep" assembly of bottom trawling fishing gear may be modified to accept the sampling devices. Generally these assemblies are fairly large and a similar but smaller system may be constructed to achieve the same effect.
- ***Weights:*** multiple weights are needed to maintain the sampling devices contact with the sea floor as it is moved along the bottom. Heavy chains cut to length provide a durable and adequate weight that can also accommodate the sampling device.

Active sampling devices can be designed and assembled ad hoc with locally available materials. Fishing gear for species-of-concern is often a good starting point for developing an active sampling device.

Active Sampling Devices – Bottom

To obtain sample data, a bottom trawling commercial fishing system may be modified to accept the addition of the weighted sampling devices. The tow bridle and the sweep or foot of the trawl gear can be used with sorbent snare in place of nets.

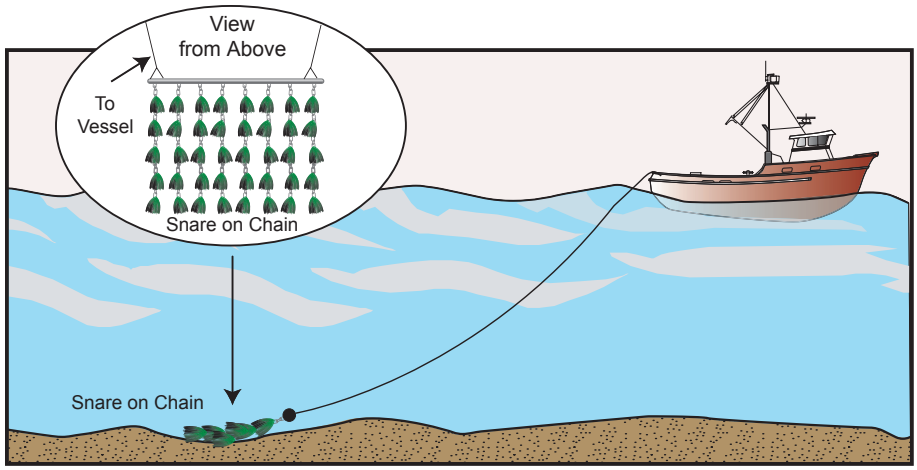

Figure ASB-1. Typical configuration for active bottom sampling.

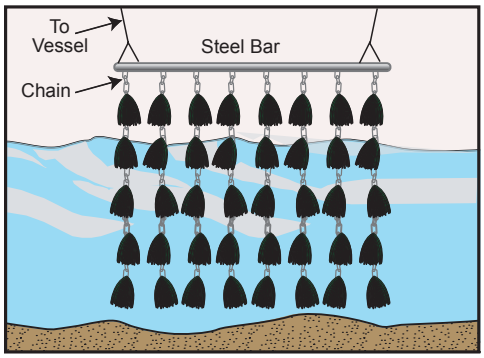

Figure ASB-2. Modified bottom trawl for active bottom sampling.

Figure ASB-3. An oiled sampling device on an Active Bottom Sampling system. (Photo credit: NOAA Hazmat)

PROCEDURE

1. Prepare active sampling device.

a. Affix sorbent snares to weighted bottom sampling system.

2. Set the active bottom sampling device at the desired beginning location.

a. Release device with adequate scope in the cables and bridle to ensure that the sampling devices remain in contact with the sea floor.

b. Record the initial date and time of deployment and latitude/ longitude coordinates.

3. Tow sampling device at a slow enough speed to ensure sea floor contact (1 to 3 kts).

4. After the desired interval of time and distance of active sampling, retrieve and inspect sampling device.

a. Retrieve the device from the bottom.

b. Place sorbent pads on large sturdy sorting table or on the vessel deck.

c. Place the device on the sorbent pads.

d. Check each snare for signs of oil contamination using sight, smell, feel, and UV light if appropriate.

e. Log all results-date, time, sampling device number, presence/ absence of oil, location of the oiled sorbent on the chain.

f. Photograph sampling devices where oil is detected.

g. Remove any oiled sorbents from the chains.

h. Re-attach snare sorbent to the chains and prepare for redeployment if warranted.

5. Place used sorbent in appropriate waste bag (refer to Waste Management Procedure).

a. Tag and label.

b. Oil-free snare or mesh may be re-used to reduce waste.

6. ***Inspect all equipment prior to redeployment for oil contamination and clean any oiled equipment.***

CONSIDERATIONS AND LIMITATIONS

+ Detection limits may be affected by vessel speed, sampling sites, duration and location of sampling deployments, affinity of spilled oils for sorbent materials, background benthic oil levels, sea state, currents, sensitivity of laboratory analyses, and human error.
+ Daily 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.
+ The vessel must have adequate stability and horsepower to safely and effectively tow the equipment.
+ Vessel crew should be experienced fishermen to ensure safe and effective deployment.
+ Technicians should be thoroughly briefed on fishing vessel deck procedures and safety by the deck boss.
+ Select active sampling locations and water depths based on information needs as identified in sampling plan.
+ Take into consideration the influence of tide and currents when deploying active sampling devices.

REFERENCES TO OTHER TACTICS

Other methods associated with Active Sampling – Bottom include:

- Active Sample – Water Column
- Handling and Storing Samples
- Waste Management
- Safety
- Data Collection and Management

EQUIPMENT AND PERSONNEL RESOURCES

Resources for this tactic may include sorbent snare, commercial fishing gear, vessels, decontamination equipment, log books, and sampling technician(s). Configuration and specific resources 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.

Active Sampling – Bottom

Equipment	Function	Quantity	Notes
Sorbent snare	Sampling device used to collect whole oil on the seafloor.	Dependent on spacing requirements and number of chain or weighted lines being used.	Un-oiled devices may be reused if inspected thoroughly.
Commercial fishing gear	Position and hold sampling devices on the seafloor.	Adequate trawling gear.	Gear configuration can be adapted to fit local conditions and data needs-use local knowledge.
Sorbent pads	Line sorting/sampling table to examine snare.	2 to 3 pads per inspection site. Ensure adequate amounts for frequent changes if heavy oiling is expected.	
Disposable oleophilic gloves	Inspection of sampling devices.	Determined by amount of oil encountered.	After the gloves are oiled they are no longer effective for inspecting the gear.
Oily waste storage	Store soiled sorbent materials.	Considerable amount of gear may become oiled and need disposal. Ensure adequate amounts if heavy oiling is expected.	
Detergent (e.g. degreaser)	Decontaminate/clean fishing gear.	1 bottle	Consult bottle regarding recommended dilution. Refer to MSDS for safety. Use only products registered on the National Contingency Plan product schedule.
Global Positioning System (GPS)	Note and record location and time of observation.	1 GPS and 1 backup, plus spare batteries	Recommend using combination of handheld GPS and vessel's GPS system.
Sampling materials	Collect and store samples of encountered oil for possible laboratory analysis.	Varies	Refer to Sample Handling Procedure.
Log books and data collection supplies	Record data regarding oil observations, conditions, etc.	2 (1 primary, 1 backup)	
Digital camera	Record images of sampling process and observations.	One per sampling technician	Ensure sufficient batteries, charger, and memory stick storage for length of sampling survey.
Measuring tape or ruler/scale	Measure size of tarball or oil observation.	One per sampling technician	Photographs of tar balls or oil encounters should include ruler or scale to demonstrate size.
Vessel	**Function**	**Quantity**	**Notes**
Vessel with appropriate capability to deploy active sampling device	Deployment platform	Varies	Vessel should be inspected prior to use for safety equipment and communications capabilities.
Personnel	**Function**	**Quantity**	**Notes**
Sampling technician(s)	Deploy equipment, collect data.	2-3	Recommend at least 2 technicians per trip for safety. Technicians must have sufficient Hazmat certification and basic vessel safety training.

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SEDIMENT SAMPLING

OBJECTIVE & STRATEGY

The objective of Sediment Sampling is to collect data regarding the presence of hydrocarbons in sediments and the distribution and concentration of sediment contamination. Sediment sampling involves the collection and analysis of samples to assess the presence, concentration, and distribution of contaminants that may impact fish, shellfish, and benthic species.

Sediment sampling data may be used to assess the risk of oil to certain types of fishing gear or to target species for ground fisheries. The sampling scheme should be designed based on the real time question posed for the incident. Different sampling schemes are required to determine the answer to the following types of questions:

- Is there oil on the bottom?
- What is the relative distribution and abundance of oil on the bottom?
- Is this section of the seafloor oil-free?
- Is the amount of oil in this area increasing or decreasing?
- Is this area safe for ground fisheries?

Care must be taken to choose a sampling design that is appropriate to the questions being asked.

TACTIC DESCRIPTION

Operating Environments

Sediment sampling devices may be deployed in any water body where vessels can operate. Applicable operating environments include: nearshore and offshore marine waters, harbors, bays, and lakes. Sediment sampling is difficult in waters where significant currents exist.

Sediment sampling devices are most commonly deployed from vessels. Vessels must be sufficiently seaworthy to suit the worst conditions expected in the operating area.

Deployment Configurations

Sediment sampling requires that a bottom grab sampler be deployed to collect sediment samples from the seafloor. There are a variety of bottom grab samplers commercially available, such as the Van Veen grab sampler, the Ekman Bottom grab samplers, or the Wildco® Ponar

Type grab sampler (Figure SS-1). Different models of grab samplers may be better suited for certain bottom characteristics (soft, hard, etc.).

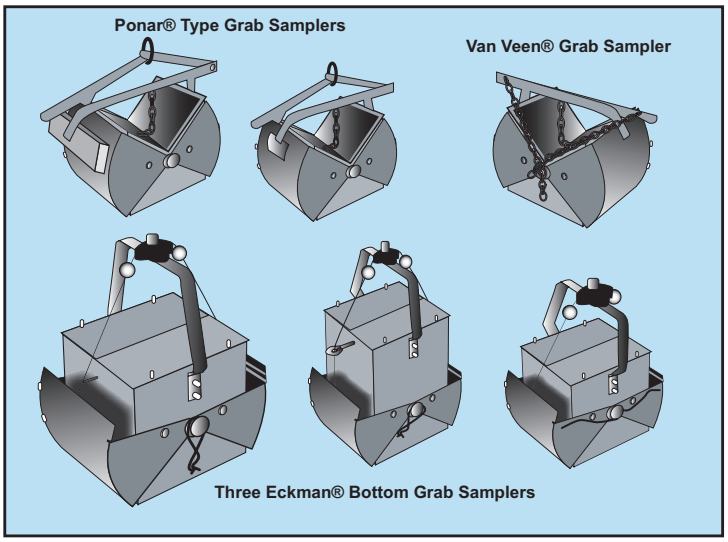

Figure SS-1. Examples of common grab sample equipment.

Grab samplers are designed to collect an accurate representative sample of the sediment bottom. They rely on their own weight and gravity to penetrate the sediment as well as the leverage from the closing of the jaws. They normally take a discreet "bite" of sediment to a fairly consistent and measurable depth. The closing mechanism is required to completely close and hold the sample as well as prevent wash-out during retrieval. Likewise, during descent the sampler should be designed to minimize disturbance of the topmost sediment by the pressure wave as it is lowered to the bottom. Grabs often cause a shock wave upon descent which may disturb very fine sediment at the sediment-water interface.

Grab samplers are attached to a line and lowered over the side of the vessel by hand, using a block if available. The grabs are usually triggered to close by sending a messenger down the line or by sharply pulling the line. When a sample is retrieved, it should be placed into a sample tub and then stored in the appropriate container for the planned analysis. Some analytic techniques may be performed in the field if the appropriate equipment is available.

PROCEDURE

1. Thoroughly clean and decontaminate grab sampler.

2. Proceed to sampling station.

a. Use anchors or other devices to maintain vessel position.

b. Avoid disturbing sediments prior to collecting sample.

3. Set closing mechanism and lower grab slowly to substrate, being careful to avoid a shock wave caused by too rapid of a descent near the sediment.

4. Initiate closure mechanism of grab. This is usually a messenger sent down the rope or a sharp pull on the rope.

5. When it feels like the grab has closed and contains sediment, raise grab at a steady rate and immediately position over large bucket. If jaws are not completely closed due to obstructions, discard entire grab contents away from sampling area and try again. Make sure to move the sampling site at least several feet away from the previous attempt(s) to avoid sampling a disturbed area.

6. Place appropriate volume of sediment into sample container.

a. Record position, date and time, depth, sample ID and any other comments associated with sample.

b. Photograph samples where oil is detected.

7. Repeat steps 1-6.

CONSIDERATIONS AND LIMITATIONS

+ Detection limits may be affected by location and depth of sampling sites, size and composition of samples, background contamination levels, sensitivity of laboratory analyses, and human error.
+ Laboratory analysis may be required to determine source of sediment contamination.
+ Daily 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.
+ Technicians should be thoroughly briefed in fishing vessel deck procedures and safety by the deck boss.
+ Select sampling locations based on information needs as identified in sampling plan.
+ Sediment samples should be collected from the reference or control sites first whenever possible to reduce the chances of cross-contamination from other sites.

REFERENCES TO OTHER TACTICS

Other methods associated with Sediment Sampling include:

- Handling and Storing Samples
- Waste Management
- Data Collection and Management
- Safety

EQUIPMENT AND PERSONNEL RESOURCES

Resources for this tactic may include a grab sampler, line, anchors, vessels, decontamination equipment, log books, and sampling technician(s). Configuration and specific resources 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.

Sediment Sampling

Equipment	Function	Quantity	Notes
Grab sampler	Collect bottom sediment samplers.	1 per survey	Samplers may be available through ADEC or through local University or research programs/ organizations.
Line	Deploy grab sampler.	Sufficient length for anticipated water depth	
Weight or messenger	Trip the grab sampler.		Some samplers may be activated by simply pulling on the line.
Block	Deploy and retrieve sampler.		
Anchor (s)	Hold vessel position while deploying grab sampler.		
Sorbent pads	Line sorting/sampling table to examine grab sampler.		
Sediment storage containers with associated documentation	Store sediment samples for further analysis.		Coordinate handling/storage of samples with laboratory. Follow chain-of-custody protocol.
Oceanographic winch or similar device	Deploy grab sampler.	One or more	
GPS	Locate sampling devices and record position/location data (latitude/longitude).	2 (1 primary, 1 backup), with spare batteries	Recommend using combination of handheld GPS and vessel's GPS system.
Measuring tape or ruler/scale	Measure size of tarball or oil observation.	One per sampling technician	Photographs of tar balls or oil encounters should include ruler or scale to demonstrate size.
Digital camera	Record images of sampling process and observations.	One per sampling technician	Ensure sufficient batteries, charger, and memory stick storage for length of sampling survey.
Vessel	**Function**	**Quantity**	**Notes**
Vessel with appropriate capability to deploy grab sampling device	Deployment platform	1 per sampling trip	Vessel should be inspected prior to use for safety equipment and communications capabilities.
Personnel	**Function**	**Quantity**	**Notes**
Sampling technician(s)	Deploy equipment, collect data.	2-3	Recommend at least 2 technicians per trip for safety. Technicians must have sufficient Hazmat certification and basic vessel safety training.