



## METHODS FOR SAMPLING SEAWATER INTAKES



### INTRODUCTION

Water intakes are a frequent concern when an oil spill occurs on water. Marine and fresh water are used in a variety of industrial and public works processes. In the fishing industry, seawater may be used directly to store or process fish, such as in live hold tanks on crab boats, which constantly intake and circulate seawater, or in fish processing plants which use seawater to rinse fish and in other phases of processing. Water quality sampling can be done anywhere that seawater is drawn from the impacted water body.

Water intakes provide an opportunity to screen water quality and assess whether oil contamination is present. Water intake sampling need not be limited to water that comes directly in contact with seafood; water intakes at other industrial sources or vessel seawater strainers may also be monitored for contamination.

Depending upon the type of oil spilled, water intake sampling may involve dissolved phase and/or whole oil sampling. To sample for dissolved phase oil, grab sampling may be used to collect discrete samples for laboratory analysis, or a method like fluorometry may be used to continuously monitor the water for threshold levels of hydrocarbon contamination. To sample for whole oil, oleophilic oil snares or mesh barriers may be used to filter the incoming water, either in total or in part, and regularly checked for signs of contamination. These methods may be utilized either at stationary facilities or onboard vessels or floating seafood processors. Sampling water intakes at stationary facilities provides information about the presence or absence of oil in a fixed location over time. Sampling water intakes on vessels may provide insight into the spatial distribution of oil as well.

#### **Detection Limits**

The sensitivity of seawater intake sampling methods is limited by several factors, including the relative volume of water sampled and the sensitivity of sampling devices.

As with all water quality 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. In areas with high vessel traffic, nearby oil and gas exploration, or adjacent to ports or marinas, background contamination levels may be relatively high. When conducting seawater intake sampling for dissolved phase oil, it is recommended that control samples be taken to identify background hydrocarbon contaminant levels, if feasible.



*(This page is intentionally blank)*



## VESSEL SEAWATER INTAKES

### OBJECTIVE & STRATEGY

The objective of Vessel Seawater Intake sampling is to collect data regarding the presence of oil as tar balls, mousse, or other forms of whole oil in the raw seawater entering a vessel's sea chest or seawater system. This strategy may be used on any vessel that intakes raw seawater. The strategy is to establish a representative flow of seawater and pass it through a sea strainer that has oleophilic snare in its collection basket. The snare is removed, inspected and replaced on a regular basis to check for the presence of oil. The sampling may be done on fishing vessels or test vessels that will establish the presence of oil in a specific area. The data collected may be extrapolated to draw conclusions regarding the relative abundance of whole oil in the water used in holding or processing seafood. This information may be used to make decisions regarding the operations of the fishing fleet.

The sampling scheme should be designed based on the real time questions posed for the incident by focusing on in-season fisheries operating in or transiting potentially affected areas. Different sampling schemes are required to determine the answer to the following types of questions:

- Is oil present in the water column at the depth of vessel seawater intakes?
- Is oil present in the water column in areas of fishing vessel transit or tank down?
- Could oil contaminate the seawater in fishing vessels that use seawater to hold or process fish?

### TACTIC DESCRIPTION

#### *Operating Environments*

Vessel Seawater Intake sampling may be implemented on any vessel that draws raw seawater from the body of water at risk for oil contamination. The depth of the seawater intake should be the same as a majority of fishing vessels that transit or fish in the area in question.



## Deployment Configurations

### SEA STRAINER

Raw seawater coming into a vessel is typically filtered with a sea strainer that is designed to remove larger debris from the water to protect pumps and other equipment. With additional filtering, these industrial strainers can be used to sample the water that may be used in holding or processing the catch. Additional filtering is achieved by packing oleophilic snare material into the debris collection basket to trap any oil.

### SAMPLE WATER FLOW

A measurable and continuous sample flow of seawater should be taken from the same source that is used in the processing area or holding tanks. The flow should be able to be turned on and off by the vessel crew or sampling technician to allow for removal and replacement of the snare material. If an outlet is not available from the water used in the holds, another intake may be used that approximates the intake.



Figure VSI-2. Typical sea strainer configuration on auxiliary outlet spigot.

Typically, auxiliary outlet spigots are plumbed on the vessel's deck for wash down and cleaning. This presents the most obvious area for the sampling activity, allowing ease of access and adequate workspace. A sea strainer designated for sampling can be plumbed into this pipe and sampling completed on deck. The water may be allowed to return via the vessel's scuppers or directed overboard with hoses. Care must be taken to ensure that the seawater will not

adversely affect the safety of other operations. Alternative sampling sites may be available on the vessel where sampling activities will not interfere with deck operations.

### OLEOPHILIC SAMPLING DEVICE

The seawater is sampled for whole oil content using an oleophilic snare or oleophilic pad that is positioned inside the porous strainer or basket. The snare should be of sufficient quantity in the container that the water pressure does not displace the material and allow the water to flow directly through the strainer without contacting the snare.

Figure VSI-3. Snare being placed on a sorbent pad and inspected for contamination.



Figure VSI-1. Typical industrial marine grade sea strainer.





## PROCEDURE

Vessel Seawater Intake Sampling.

**1. Install sea strainer.**

- a. Identify raw seawater outlet location.
- b. Have vessel crew/engineer plumb the sea strainer.
- c. Establish the flow rate through the sea strainer in gallons per hour.

**2. Remove the collection basket from the strainer.**

- a. Pack pom-pom snare material in the collection basket and reinstall it in the strainer.
- b. Establish sample water flow through strainer.
- c. Maintain constant water pressure and volume.
- d. Note the date, time, and location of test period.

**3. Inspect snare and replace at regular intervals.**

- a. Frequency of sampling should be determined by presence of oil in the immediate area.
- b. Stop water flow.
- c. Remove the collection basket and place snare on a sorbent pad.
- d. Inspect snare for contamination.

**4. Record sampling data and findings.**

- a. Note the time and location of sample check.
- b. Note vessel's track during sampling period.
- c. Note presence or absence of oil, type/quantity of oil observed.
- d. Take representative photographs.

**5. Obtain sample of collected oil if sufficient amount is present.**

- a. Use proper handling and storage procedures
- b. Maintain proper documentation.

**6. Decontaminate oiled strainer**

- a. Dispose of used snare and replace with new material.
- b. If collection basket and snare are not contaminated, proceed directly to step #7.
- c. Set basket on sorbent pad on sampling table.
  - i. Do not allow contaminated equipment to come into contact with the vessel.
- d. Use proper Personal Protective Equipment.
  - i. Review Material Safety Data Sheet for cleaning solution.



- ii. Use eye protection.
- iii. Use rubber gloves.
- iv. Use splash suit/rain gear.
- v. Have available first aid kit and eye flush kit.
- e. Place appropriate cleaning solution in cleaning tub.
  - i. Soak basket in cleaning solution for 5 Minutes.
  - ii. Scrub with brush if needed.
  - iii. Rinse with clean water.
  - iv. Repeat cleaning process until basket is clean.
  - v. Observe proper disposal methods for dirty cleaning solution and water.
- f. To spot clean small areas (<1 mm), use the scrub brush and cleaning solution.
- g. Visually inspect sea strainer body for contamination and use scrub brush and cleaning solution to clean.

**7. Redeploy snare in collection basket.**

- a. Repeat steps #1 through #6.

**CONSIDERATIONS AND LIMITATIONS**

- + Detection limits may be affected by depth of seawater intake, vessel track through area of concern, background hydrocarbon or tar ball levels, sea state and currents, and human error.
- + If results are to be compared from two or more vessels, the flow rate must be consistent.
- + Technicians should be oriented and briefed in the vessel safety plans.
- + Coordination with the vessel crew and engineer regarding vessel operations are critical for successful operations.
- + Be aware that oil may be introduced into the vessel's seawater system through leaky pump seals.

**REFERENCES TO OTHER TACTICS**

Other methods associated with Vessel Seawater Intakes include:

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

This tactic can be executed in a simpler, more cost-effective manner by allowing a deck hose to discharge seawater through a sampling basket filled with snare. See tactic for Processor Seawater Intakes.



## EQUIPMENT AND PERSONNEL RESOURCES

Resources for this tactic include sea strainer and associated plumbing, pom-pom snares, decontamination equipment, log books, GPS and sampling technician(s). Configuration and specific resources required will be determined by site conditions, spilled oil type and volume, as well as resource availability. Resource sets may need to be refined as site-specific requirements dictate.

### *Vessel Seawater Intake Sampling*

Equipment	Function	Quantity	Notes
Sea Strainer Recommended specifications: 2" diameter intake and outlet	Contain the sampling snare and collect whole oil in sample water flow.	1 ea.- sea strainer design is generally robust enough to negate need for back up	The strainer should be configured for easy removal of the cap with wingnuts or other quick release device.
Oil Snare	Collect oil sample.	Sufficient amount to fill the basket during each sample period, and adequate numbers to allow for replacement.	Snare material should be cut from larger pom-pom and used in the appropriate volume to fill the strainer collection basket.
Sorbent pads	Line sorting/sampling table to examine sample snare.	2-3 pads per test site	For long term deployment allow adequate numbers for replacement.
Detergent (e.g. degreaser)	Decontaminate/clean sample basket.	1 bottle	Consult bottle regarding recommended dilution. Refer to MSDS for safety. Use only products registered on the National Contingency Plan product schedule.
Wash basins	Soak basket for decontamination.	At least 2 basins - one to wash and one to rinse	
Oily waste storage	Store contaminated water from washing buckets and soiled sorbent pads.		
Sampling materials	Collect and store samples of encountered oil for possible laboratory analysis.	Varies	Refer to Sample Handling Procedure.
Global Positioning System	Note and record location and time of observation.	1 GPS and 1 backup, plus spare batteries	
Log books and data collection supplies	Record data regarding oil observations, conditions, etc.	Varies	Refer to Data Keeping Procedure.
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.
Personnel	Function	Quantity	Notes
Sampling technician(s)	Sample, replace snare in strainer collection basket.	1	Technicians must have sufficient Hazmat certification, basic vessel safety training, and orientation to the facility.



*(This page is intentionally blank)*



## PROCESSOR SEAWATER INTAKES

### OBJECTIVE & STRATEGY

The objective of Seafood Processor Seawater Intake sampling is to collect data regarding the presence of whole oil as tar balls, mousse, or other forms of whole oil in the raw seawater entering a seafood processing plant. The sampling strategy is to use a passive sampling device to monitor a representative flow of seawater being used in the processing of seafood to check for the presence of oil. The data collected by the sampling may be extrapolated to draw conclusions regarding the relative abundance of whole oil in the water used to process seafood.

### TACTIC DESCRIPTION

#### Operating Environments

Seafood Processor Seawater Intake sampling may be implemented at any facility that draws raw seawater from the body of water at risk for oil contamination. Processing facilities may be fixed or may be floating (vessels).

#### Deployment Configurations

##### SAMPLE WATER FLOW

A continuous sample flow of seawater should be taken directly from the pipes leading from the intakes to the processing plant. Typically this is achievable in the pump house where auxiliary outlet spigots are present and the sampled water can be allowed to return via floor drains. Alternative sampling sites may be available in the facility where outlet spigots have been established to aid in wash downs and cleaning.

The flow of seawater should be of sufficient volume for sampling but not overly pressurized as to weather and wash away any oil that may be collected. The flow should be measured and consistent to establish the overall percentage of water being sampled.

##### PASSIVE SAMPLING DEVICE

The seawater is sampled for whole oil content using a passive sampling device that is positioned at the bottom of a porous container or mesh

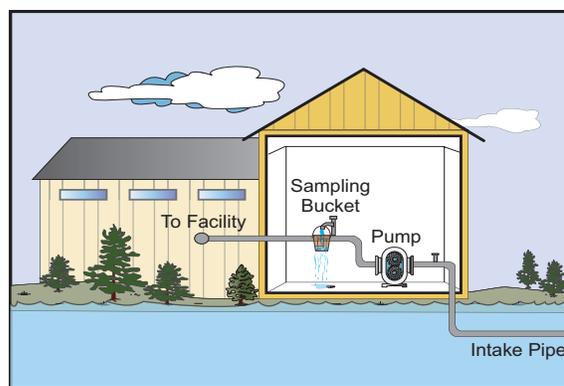


Figure PSI-1. A typical configuration of a sampling bucket in a processor pump house.



basket, underneath a constant flow of water. The passive sampling device is typically oleophilic snare (for persistent oils) or sorbent pads (for non-persistent oils). The snare should be of sufficient quantity in the container that the water pressure does not displace the material thus allowing the water to flow directly through the container without contacting the snare.

A sampling basket or similar device is used to position the snare within the flow of seawater. Any porous rigid or semi-rigid container with the volume to contain the snare and allow adequate water flow would suffice for the sampling basket. A cost-effective option is to use a mesh basket made from an oleophilic mesh. This construction will allow for sample collection by the basket as well as by the snare. The mesh size and basket volume should contain the snare material and allow sufficient water to flow through the snare material. The water flow should be adjusted to ensure that the sampled water does not flow over the top of the basket but is strained through the snare. The baskets may be constructed immediately prior to deployment using locally available material, or may be constructed and tested ahead of time. Materials should be sufficiently strong to stand up to the flow pressure and frequent cleaning.

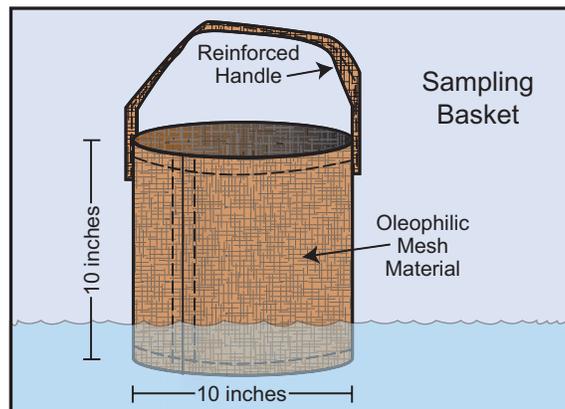


Figure PSI-2. Sample basket constructed of mesh material.

## PROCEDURE

Seafood Processor Seawater Intake sampling may utilize one or more sampling sites at a processor depending on the number of intakes.

### **1. Deploy basket.**

- a. Establish sample water flow.
- b. Maintain constant water pressure and volume that will not over flow the basket.
- c. Position the basket to contain the flow and place the oil snare or sorbent pads directly under the flow.



**2. Inspect basket and sample snare or sorbents at regular intervals.**

- a. Frequency of sampling should be determined by presence of oil in the immediate area.
- b. Remove the snare from the basket and place on a sorbent pad.
- c. Inspect snare and the basket for contamination.

**3. Record sampling data and findings.**

- a. Date and time of sample check.
- b. Note findings, type/quantity of oil observed.
- c. Take representative photographs.

**4. Obtain sample of collected oil if sufficient amount is present.**

- a. Use proper handling and storage procedures.
- b. Maintain proper documentation.

**5. Decontaminate sampling basket.**

- a. If basket and snare/sorbent are not contaminated, proceed directly to step #6.
- b. Set basket on sorbent pad on sampling table.
  - i. Do not allow contaminated equipment to come into contact with the facility.
- c. Use proper Personal Protective Equipment.
  - i. Review Material Safety Data Sheet for cleaning solution.
  - ii. Use eye protection.
  - iii. Use rubber gloves.
  - iv. Use splash suit/rain gear.
  - v. Have available first aid kit and eye flush kit.
- d. Place appropriate cleaning solution in cleaning tub.
  - i. Soak basket in cleaning solution for 5 Minutes.
  - ii. Scrub with brush if needed.
  - iii. Rinse with clean water.
  - iv. Repeat cleaning process until basket is clean.
  - v. Observe proper disposal methods for dirty cleaning solution and water.
- e. To spot clean small areas (<1 mm), use the scrub brush and cleaning solution.

**6. Redeploy sampling basket.**

- a. Repeat steps #1 through #5.

**7. When sampling is complete, store basket.**



- a. Clean basket of all contamination prior to storage (see #5).
- b. Store in a manner that prevents contamination from other sources. Heavy polyethylene bags (e.g. oily waste bags) are a good storage option.

## **CONSIDERATIONS AND LIMITATIONS**

---

- + Detection limits may be affected by depth and location of seawater intake, background hydrocarbon or tar ball levels, water circulation patterns and currents in waterbody, and human error.
- + Technicians should be oriented and briefed in the facility safety plans.
- + Coordination with the facility managers regarding the facility operations are critical for successful operations.
- + Consider that contamination from leaky seals in the facility sea water pumps is possible.

## **REFERENCES TO OTHER TACTICS**

---

Other methods associated with Processor Seawater Intakes include:

- Handling and Storing Samples
- Vessel Seawater Sampling
- Waste Management
- Data Collection and Management
- Safety



## EQUIPMENT AND PERSONNEL RESOURCES

Resources for this tactic include collection baskets, oil snares, decontamination equipment, log books, and sampling technician(s). Configuration and specific resources required will be determined by site conditions, spilled oil type and volume, as well as resource availability. Resource sets may need to be refined as site-specific requirements dictate.

### *Seafood Processor Seawater Intake Sampling*

Equipment	Function	Quantity	Notes
Collection Basket Recommended specifications: 10" diameter, 10" depth.  Basket material: Phifertex vinyl-coated polyester yarn woven into an 11 x 17 strands/inch mesh, 34% open, 11 oz./yd. Reinforced with nylon strapping at stress points.	Contain the sampling snare and collect whole oil in sample water flow.	1 primary, with 1 backup/alternate	Construction of the basket should allow for adequate water flow and be robust enough to endure long-term deployment.
Oil snare or sorbent pads	Collect oil sample.	Sufficient amount to fill the basket during each sample period, and adequate numbers to allow for replacement.	Oil snare is appropriate for persistent oils. Sorbent pads are appropriate for non-persistent oils.
Sorbent pads	Line sorting/sampling table to examine sample snare.	2-3 pads per test site	
Detergent (e.g. degreaser)	Decontaminate/clean sample basket.	1 bottle	Consult bottle regarding recommended dilution. Refer to MSDS for safety. Use only products registered on the National Contingency Plan product schedule.
Wash basins	Soak basket for decontamination.	At least 2 basins - one to wash and one to rinse	
Oily waste storage	Store contaminated water from washing baskets and soiled sorbent pads.		
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.	Varies	Refer to Data Keeping Procedure.
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.
Personnel	Function	Quantity	Notes
Sampling technician(s)	Deploy sampling basket, collect data.	1	Technicians must have sufficient Hazmat certification, basic vessel safety training, and orientation to the facility.



*(This page is intentionally blank)*



## VESSEL TANKS & FISH HOLDS

### OBJECTIVE & STRATEGY

The objective of the Vessel Tanks and Fish Hold Sampling strategy is to collect data regarding the presence of whole oil as tar balls, tar patties, mousse, or other whole oil form, in the catch storage areas (holds and tanks) of commercial fishing vessels. Oil is detected using passive sampling and direct observation. Data collected using this tactic will not indicate the overall presence or distribution of oil in water, but provide direct information about the presence or absence of oil in a potential exposure pathway for commercial fish species, within the refrigerated or recirculating seawater hold.

The sampling scheme should be designed based on the real time questions posed for the incident by focusing on in-season fisheries using or transiting potentially affected areas. Different sampling schemes are required to determine the answer to the following types of questions:

- Is oil present in the water column (in areas of transit or tank down)?
- Is oil present in the seawater in fishing vessel holds?
- Has oil come in contact with fish catches or vessels?

Water in vessel fish holds may also be sampled for dissolved phase oil. This would involve the application of either the Fluorometry method or the Whole Water Sampling method to water samples from vessel fish holds. Since both methods require trained technicians, these are unlikely options for monitoring the vessel fleet. However, if dissolved phase oil is the primary concern, then a sampling program may be designed to retrieve and analyze samples from vessel holds, or to deploy fluorometers in live tanks.

### TACTIC DESCRIPTION

#### *Operating Environments*

Vessel Tank and Fish Hold sampling can take place on any vessel that takes on and stores its catch, and/or in any water body where fishing vessels transit or tank down. Applicable operating environments are therefore any area in which the target fishing vessels may operate.

#### *Deployment Configurations*

This tactic focuses on passive sampling devices that may be used within the fish holds of commercial fishing vessels to sample for the



presence of oil. Another way to collect information regarding potential oiling of commercial fishing vessel holds is through water column sampling at the desired depth and location (often, to correspond with the keel depth or water intake depth of fishing vessels). Refer to the Water Column sampling procedures for additional tactics to sample for whole or dissolved phase oil in the water column.

Sampling devices used for this tactic may be configured depending upon the types of vessels used in a fishery and materials available. The sampling devices can be designed and assembled ad hoc with locally available materials. The basic components of a vessel hold sampling device are:

- **Oleophilic device:** An oil snare or sorbent pad is the device that is suspended in a fish tank/hold. Oil snare is appropriate for persistent oils; sorbent pads are appropriate for non-persistent oils.
- **Mesh bag (optional):** A mesh bag may be used to hold the oleophilic device suspended in the fish tank/hold. It should be large enough for the snare devices that will be used, and be able to be opened and closed to inspect the snare device. The mesh size should be appropriate to the type of oil spilled and expected state of weathering. A plastic-coated mesh may be more oleophilic.
- **Small trawl float:** A small trawl float or similar device should be used to keep the snare device near the top of the tank/hold for easier access and mobility through the water.

Unlike many other sampling techniques, Vessel Tank and Fish Hold Sampling is conducted by the fishing vessel crew while underway. The sampling devices must be easy to assemble and use during the course of fishery operations; clear instructions for when and how to collect data, and where to report findings, must be included.

Vessel tank and fish hold sampling devices can be used in any vessel fish hold or tank that can be accessed by crew for inspection.

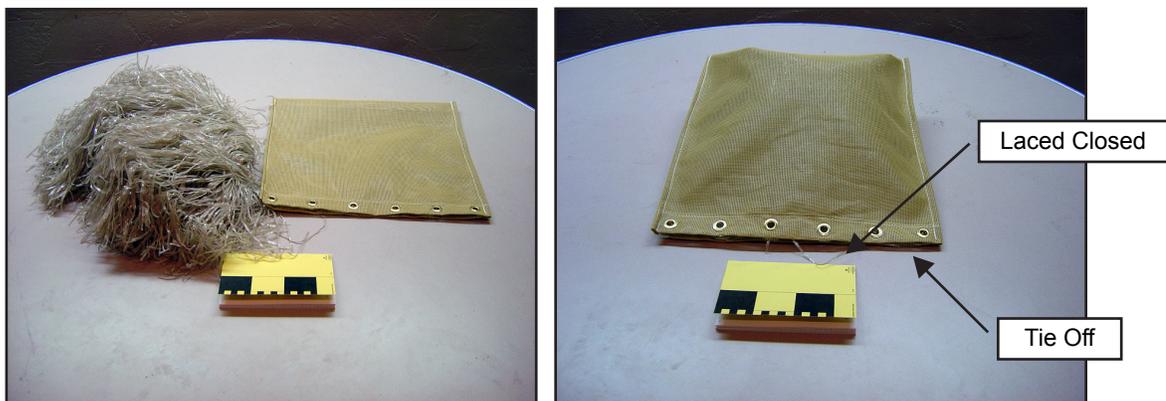


Figure VFH-1. Example of a snare device in mesh pouch.



## PROCEDURE

### 1. Construct sampling device.

- Enclose oleophilic device inside mesh bag and suspend in fish tank/hold.
- If no mesh bags available, attach snare to line with float and instruct vessel crew to secure with a line in fish tank/hold.

### 2. Secure sampling devices in tank.

- For vessels with refrigerated seawater holds (non-recirculating), install device prior to tank down.
- For vessels with recirculating seawater tanks, install device while tank is empty of fish.

### 3. Tank down following normal procedures.

### 4. Before fish are placed in tank, remove sampling device and check for signs of oil.

- Smell mesh bag and snare.
- Look for tar balls or other oil contamination visible on and inside pack.
- Check tank itself for sheen or odor of oil.

### 5. If oil contamination is detected, save sampling device for further inspection and notify sampling program manager/ staff (point of contact should be provided to each vessel with sampling devices).

- Place contaminated pack in plastic bag and record date and time, vessel name, location of tank down (latitude/longitude) in vessel log and on bag. Give bag and information to sampling program staff or other specified personnel.
- Notify point of contact that oil has been encountered.
- Follow regular tank cleaning procedures.

### 6. If no oil contamination is detected, store the pack where it will not be contaminated. The devices can be re-used during the season as long as no contamination is detected.

- If oil is detected, state regulations require that the tank be inspected by ADEC/EH prior to introducing fish.

### 7. Repeat steps 2-6 prior to each tank down.

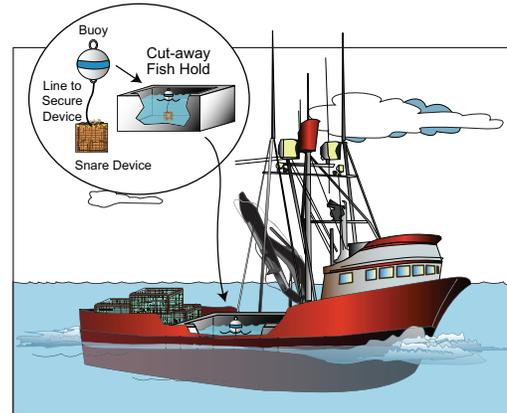


Figure VFH-2. Example of a snare device deployed in a fishing vessel hold.



## CONSIDERATIONS AND LIMITATIONS

---

- + Detection limits may be affected by depth of vessel's seawater intake, affinity of sampling materials for spilled oil, vessel track through area of concern, background hydrocarbon or tar ball levels, and human error.
- + Participation by vessels is voluntary.
- + For vessels with recirculating seawater tanks, the use of sampling devices will not indicate where oil is or is not present in the water column.
- + Select participating vessels based on information needs as identified in the sampling plan.
- + Instructions for vessel operators must be clear and disseminated with adequate time before the fishery begins to ensure the necessary preparations can be made.
- + If the devices are not secured properly within the fish hold or tank, they have the potential to disable the vessel's seawater circulation system.
- + It may be beneficial to coordinate efforts with fish processors, as they may be in frequent contact with the fleet.
- + Consider that observed oil may come from sources onboard the vessel.

## REFERENCES TO OTHER TACTICS

---

Other methods associated with Vessel Tanks and Fish Holds Sampling include:

- Water Column Sampling
- Waste Management
- Data Collection and Management



## EQUIPMENT AND PERSONNEL RESOURCES

Resources for this tactic may include oil snare, mesh bag, vessels, vessel operators, small trawl floats, and waste bags for storage of contaminated devices. Configuration and specific resources required will be determined by site conditions, sampling design, and resource availability. Resource sets may need to be refined as site-specific requirements dictate.

### *Vessel Seawater Intake Sampling*

Equipment	Function	Quantity	Notes
Oil snare or sorbent pads	Collect whole oil in sampling device placed in vessel tank/hold.	Minimum one per participating vessel hold	Oil snare is appropriate for persistent oils. Sorbent pads or materials are appropriate for non-persistent oils.
Line	Fasten mesh bag, position snare device and float in tank.	Length sufficient to suit vessel configuration	
Mesh bag	Holds snare in vessel tank/hold.	One per snare device	
Small trawl float	Keeps sampling device floating near top of tank/hold.	One per sampling device	
Waste disposal materials	Collect and store contaminated snare.	Varies	Refer to Sample Handling Procedure.
Log books and data collection supplies	Record data regarding oil observations, conditions, etc.	Varies	Refer to Data Keeping Procedure.
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
Any vessel participating in a fishery in the area can be used	Deployment platform	Varies	
Personnel	Function	Quantity	Notes
Vessel crew	Deploy equipment, collect data.	At least one per vessel trained in procedures	Crew should have Hazmat awareness level training before handling oily materials.



*(This page is intentionally blank)*