DISCHARGE TRACKING ON WATER

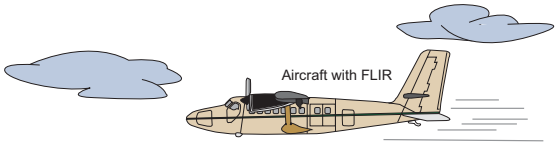
OBJECTIVE & STRATEGY

DT

The objective of the Discharge Tracking On Water tactic is to determine the extent and trajectory of an oil spill slick on the surface of the water.

The general strategy used in performing Discharge Tracking On Water is to:

1. Identify the approximate location of the spill.
2. Assess the site characteristics and determine equipment and personnel needs.
3. Deploy equipment and personnel to the location.
4. Commence tracking operation.
5. Repeat as necessary to determine oil movement and trajectory.



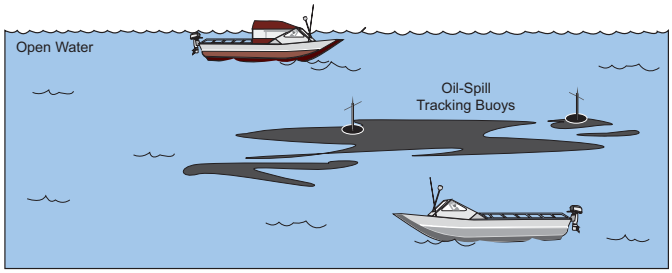


Figure DT-1. Discharge Tracking using aircraft, marine vessel viewing platforms, and tracking buoys.

TACTIC DESCRIPTION

One of the first steps in a response to an oil spill on the water is to assess the location, character and spatial extent of the oil slick. When oil spills on water it behaves in predictable ways; it will begin to spread laterally and it will begin to change character through a process called weathering. The oil slick will move and change shape and size over time, driven by wind, sea state, currents, and tides. Weathering is caused by evaporation, dissolution, dispersion, and emulsification. The rate of weathering is dependent on the characteristics of the oil, wind, sea state, air temperature, water temperature, and exposure to sunlight.

The purpose of the Discharge Tracking On Water tactic is to use simple methods to quickly assess the spatial extent of surface oil to aid response planning during the emergent phase of the spill response (Figure DT-1). Repeat observations will establish the direction and rate of movement of the slick, establishing a trajectory. The process of predicting the movement and weathering of oil using vector analysis or computer modeling is not covered in this manual.

Discharge Tracking On Water

The best and most direct method of tracking oil slicks is by direct observation. Oil spill observations should be done by a trained observer using an aircraft or marine vessel as a viewing platform. No other method can accurately document the location, shape, size, thickness, coverage, state of weathering, and trajectory of an oil slick. Aircraft, either fixed-wing or rotary-wing, are the most common viewing platforms. Fixed-wing aircraft usually travel farther and faster than rotary-wing aircraft and allow for a rapid assessment over a larger area. Rotary-aircraft can fly slower and lower, allowing the observer a better view of the slick. After site characterization has taken place, marine vessels can be used to make direct observations, but the observer does not have the advantage of perspective available from an aircraft. However, an observer aboard a marine vessel can actually sample the oil and better assess its consistency and thickness and is less likely to misidentify other naturally-occurring slicks as oil. It is useful to have correlated aerial and marine observations taken at the same time and place.

Aerial and marine observations should be made by a team of observers comprised of representatives of each organization in the Unified Command (RP, FOSC, SOSC). The observation team should strive for consensus agreement on the area, type, and thickness of the oil observed to negate later disagreements about what was observed.

If the oil slick cannot be directly observed, due to non-availability of aircraft or vessels, visibility, darkness, or remoteness, then indirect methods, such as infrared technology or tracking buoys, may be used. These indirect methods are useful to keep track of the slick until direct observations can be made.

Operating Environments

Discharge Tracking On Water can be used in the following operating environments:

- Open Water,
- Protected Water,
- Calm Water,
- Fast Water, and
- Broken Ice.

Deployment Configurations

THE SPILL SLICK IS VISIBLE

If the oil spill is visible and accessible, it should be assessed and mapped by a trained observer. If the slick has distinctly different thicknesses, as evidenced by different colors, then each thickness of the slick is mapped separately. Repeating the observation procedure after a period of time has passed will aid in the assessment of the direction and rate of movement of the spill. The accuracy of the

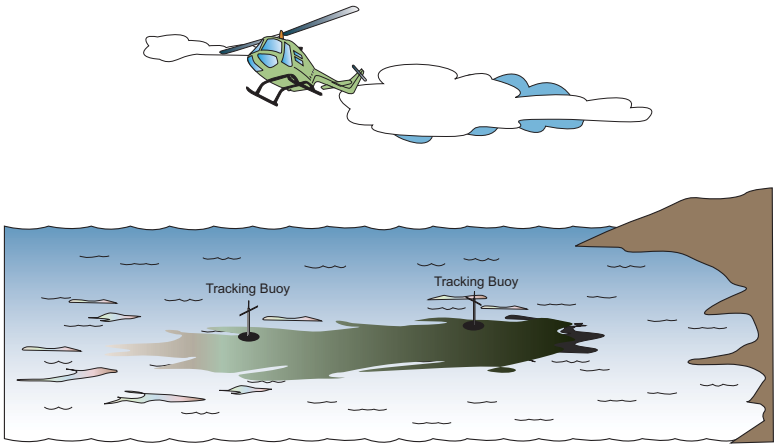


Figure DT-2. Discharge Tracking using tracking buoys.

technique is largely dependent on the experience and training of the observer. NOAA has developed an Open-Water Oil Identification Job Aid for Aerial Observation which includes: checklists, example photographs and sketches, and coverage charts. Other oil observation standards have been developed by the American Society for Testing and Materials (ASTM) International.

If the oil slick is reasonably continuous, a track of the edge of the slick can be recorded with the GPS. Many GPS have a function to calculate the area of a track that forms an enclosure. Digital photographs of the slick, taken from several perspectives, are also very useful.

An initial hand-drawn sketch is best drawn on a nautical chart, topographic map, aerial photograph, shoreline map or other depiction of the area. The sketch should have as much detail and labeling as possible. Make sure to note the time, date, and person making the drawing. Logs, GPS data, maps, and photographs of oil slick observations should be given to the Situation Unit in the Planning Section as soon as possible.

THE SPILL SLICK IS NOT VISIBLE

If the oil slick cannot be seen, because of fog, darkness, or lack of an observation platform, then a different approach is required. Two alternative methods are observation with the aid of infrared technology and tracking buoys.

Infrared technology involves using an infrared camera to detect the difference in temperature between the oil slick and the surrounding water. As the slick spreads and cools to the ambient temperature, infrared technology becomes less effective. Infrared cameras are available as handheld and fixed/mounted devices. Infrared sensors can be an effective remote sensing system when mounted on an aircraft, vessel, or helicopter. Using infrared technology requires training specific to the system in use and works best when calibrated by comparison with visual observations. Use the same procedures described above to map the slick when using infrared technology.

Discharge Tracking On Water

Tracking buoys are another alternative to visual tracking of oil slicks on the water (Figure DT-2). Tracking buoys are floating radio devices that broadcast a signal, which can be used to remotely locate the buoy. Some buoys contain a GPS device that allows a very precise location. Some tracking buoy systems transmit to portable radio receivers and other systems transmit to satellites. If the tracking buoy remains within the slick, then relocating the oil spill is greatly simplified. Unfortunately, experience has shown that tracking buoys often do not remain within an oil slick. Tracking buoys do not indicate the thickness, area, coverage, or consistency of the oil slick.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

SAFETY

- PPE is required of all personnel in aircraft and marine vessels, see the incident Site Safety Plan and check with the aircraft operator for PPE and PFD requirements.
- Flight following procedures should be observed for all observation aircraft.
- Vessels, including skiffs, must have a minimum of two crew aboard.
- If possible, vessels in transit to/from an operation or staging area should transit in pairs.
- A communications schedule should be established and followed, between vessels in transit and the Operations Section or Radio Dispatcher.

DEPLOYMENT

- Consider wildlife impacts.
- The time on digital cameras used for aerial surveys should be set to coincide with the GPS or a photograph of the GPS time can be taking allowing the time tags on the photographs to be adjusted later.
- All GPS used for surveys should be set to the same datum, ie. NAD 27, NAD 83, or WGS.
- It is best to have multiple observers from different organizations on aerial surveillance flights. The surveillance team should strive for "consensus of observations", resulting in a single report (map, GPS tract, etc.) being given to the Situation Unit or Documentation Unit.

REFERENCES TO OTHER TACTICS

None

EQUIPMENT AND PERSONNEL RESOURCES

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Resources for Oil Spill Tracking On Water include a GPS, a digital camera, a diagram or map of the area, marking pens/pencils, log book, and an aircraft or vessel to be used as an observation platform. If the oil is not visible, tracking buoys or an infrared sensor will be needed.

Equipment	Function	Quantity	Notes
GPS	Determine locations	1 or more	Personnel should be familiar with operation for the model and the Situation Unit should be capable of downloading data from the GPS. Should have extra battery and antenna.
Digital camera	Capture images of oil slick	1	Extra batteries and media
Log book and maps or diagrams	Taking notes, drawing sketches, and recording data	As necessary	Folding knee board or clip board
Infrared camera or video system	Detection of oil in low visibility	Situation specific	Requires trained operator and should be calibrated on the specific spill
Tracking buoy system (transmitting buoys and receivers)	Detection of oil in low visibility	Situation specific	Does not indicate thickness, area, coverage, or consistency
Vessel/Vehicles	**Function**	**Quantity**	**Notes**
Aircraft, helicopter, or marine vessel with crew	Observation or buoy deployment platform	1 to 2 optional	Situation dependent
Personnel	**Function**	**Quantity**	**Notes**
Observer(s)	Observe and assess the nature of the slick and record data	1 or more	Should be trained in oil observation and any equipment that is being used
Skilled Technicians	Work under the direction of Lead Observer	0 to 2	Operates infrared cameras or tracking buoy system as dictated by the situation

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