ON-LAND RECOVERY

OBJECTIVE & STRATEGY

OR

The objective of On-land Recovery is to remove free-oil from the land's surface and transfer it into primary storage, while minimizing impacts to the environment. This tactic does not include the removal of sub-surface oil or oiled soil/ gravel.

On-land Recovery is usually deployed in association with containment tactics such as Dikes, Berms, and Dams; Pits, Trenches and Slots; or Passive Recovery.

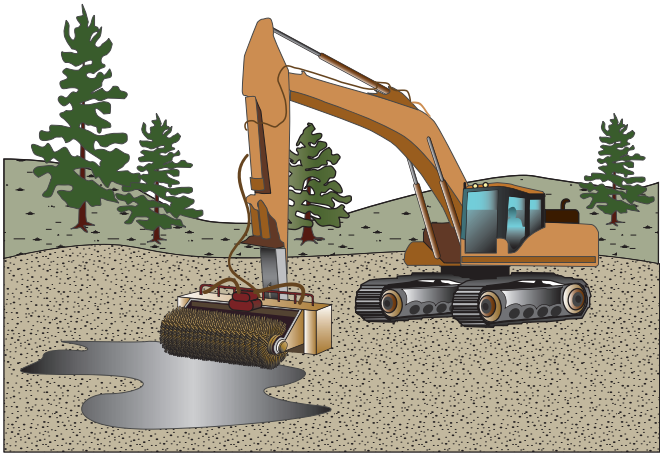

Figure OR-1. On-land recovery using a bucket skimmer attached to an excavator.

The general strategy is to:

1. Identify the recovery site and assess the site conditions.
2. Determine the appropriate recovery and storage systems based on oil type and site conditions.
3. Mobilize and deploy equipment to recover and store the oil at the designated recovery site.
4. Man and monitor the system as appropriate.
5. Store and transfer recovered oil and debris according to an approved waste management plan.

TACTIC DESCRIPTION

If oil spilled on land has not penetrated the surface, it will move to and pool in the lowest part of the landscape. Responders should seek to minimize the spread of oil and remove pooled oil. This can be achieved through immediate recovery of the oil, containment using existing land depressions, or by mechanically creating pits, trenches, slots, dikes, berms, or dams. Where oil has incorporated in the surface materials, mechanical removal will be necessary using hand tools and/or heavy machinery. In both situations on-land recovery is comprised of a removal system, oil storage system, and associated vehicles and personnel. Differing types of recovery systems and primary oil storage devices are available for a variety of oils in numerous operating environments (see Land-based Storage and Transfer).

On-land Recovery

Oil Removal Systems

Typical equipment used for oil removal on-land consists of earth-moving equipment from shovels to heavy machinery, skimmers/ vacuums or sorbents, associated hoses (suction and discharge with fittings), and repair kits (tools and extra parts).

The primary methods of collecting oil that has not entered the subsurface is through the use of sorbents or skimming systems. There are a variety of sorbents and skimmer systems available. The most appropriate for on-land recovery are:

- Sorbents may be used in different configurations, such as loose or continuous materials. In cold weather environments oil can be incorporated with snow, using it as a sorbent material. Continuous material can be booms, pads, mops, pom-poms, etc. Loose materials are smaller particulates such as peat moss. Sorbents are spread over a spill and then removed with a vacuum or by raking and collecting (Figure OR-4). Sorbents should be minimized for larger spills due to the considerable solid waste stream that is produced. See the Passive Recovery tactic for further description.
- Suction skimmers use a vacuum to lift oil from a surface (Figure OR-3). These skimmers require a vacuum pump or air conveyor system. Suction skimmers may also collect large amounts of water and debris if not properly operated. Most land-based suction skimmers are truck-mounted and require road access nearby the spill site, although trailer-mounted systems are available that may allow access to more remote sites.
- Oleophilic skimmers may also be used in situations with adequate amounts of pooled oil or if the oil has pooled on water (Figure OR-2). These skimmers pick up oil that adheres to a collection surface, leaving most of the water and debris behind. The oil is then scraped from the collection surface and pumped to a storage device. Oleophilic skimmers can be used in any type of oil and are most effective for on-land recovery. Some manufacturers have adapted brush systems that can be mounted on the buckets of front-end loaders or excavators for land based recovery (Figure OR-1). These versatile "bucket skimmers" can be used in several modes. Oleophilic skimmers may be used where oil is very thin on the surface of pooled water and are useful for land-based recovery.

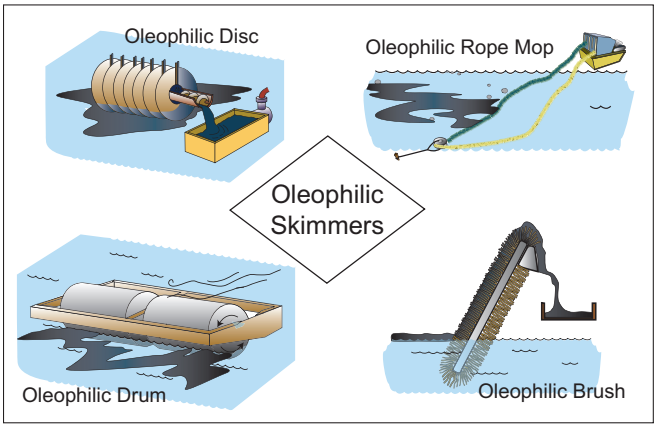

Figure OR-2. Oil recovery using oleophilic skimmers.

Primary Oil Storage Devices

Primary oil storage can be provided by tank trucks, portable tanks, or lined pits (Figure OR-5). Tank trucks are mobile and do not require additional transfer of recovered fluids in the field, but they are usually limited to road access.

Portable tanks can be quickly set up in remote locations, but usually cannot be moved when they contain oil, thus requiring additional transfers.

Lined pits are the least preferred primary storage system, because building them may require soil disturbance and necessitate additional oil transfers. Lined pits are good choices for oiled debris and soils.

Vehicles

Transportation to the site should be on established roads or with all-terrain vehicles or helicopters for sensitive environments. Foot traffic and small motorized vehicles, like ATVs, can traverse sensitive areas such as marsh and tundra by using paths created with sheets of plywood, outdoor carpet, or other material.

Operating Environments

The On-land Recovery tactic is used to collect oil in a variety of terrestrial environments. These include snow/ice, tundra/marsh, and other lands. The strategies described here should be adapted to the environment encountered.

ORs SNOW/ICE

On-land recovery operations in snow should utilize the sorbent properties of the snow. Use the snow to create containment berms and dikes and, if conditions are predicted to remain below freezing, incorporate heavily oiled snow with lightly oiled snow to create a "mulch-like" consistency for removal. For small spills, use hand tools to remove the oiled snow and small containers for transfer. For larger spills, where access is available, use front-end loaders and dump trucks for removal and transportation to disposal sites. If the snow will not remain solid when handled, remove with a vacuum skimmer or move to a lined pit for temporary storage.

If the oil is frozen in place, a trimmer may be used to break up the surface and ready it for loading. If these activities create safety concerns or risk more harm to the environment, stabilize the area, create berms, and otherwise prepare for recovery operation with vacuum systems when break-up occurs.

ORt TUNDRA/MARSH

Tundra and marsh environments present challenges for operations due to their sensitivity. Plywood or similar material should be used to establish foot and ATV routes to the site. Initial response should be to remove the oil on the surface with vacuum systems. When conditions

permit, the area can be flushed downslope into natural depressions or containment structures. Oil then can be removed via shallow skimming or vacuum systems. Another option is to construct a berm around the spill with soil, sand bags, or boom. The content inside the berm is then flooded and the oil is removed either by skimming or passive recovery.

OR OTHER LANDS

Removal techniques on other lands differ depending on the permeability of the soil. In porous, large-grain, well-drained soils, thin oil may immediately drain and become a sub-surface plume. Such plumes will move down through the sediment, contaminating the soil matrix until it reaches the water table or an impermeable soil layer. This manual is not intended to deal with such sub-surface contamination. An oil contamination remediation project is usually required for the sub-surface component of land-based spills.

In other cases the permeability of the soil or the volume or viscosity of the oil is such that all or part of the oil remains at the terrestrial surface. In these cases, quick removal of the oil and contaminated surface soils is recommended, unless the response would cause more environmental damage than the oil contamination itself. Responders should define the oil plume (see Plume Delineation), anticipate its movement, and consider using berms, dikes, dams, trenches, or pits to contain and concentrate oil for recovery (see Dikes, Berms and Dams, Pits, Trenches, and Slots). Consider using an artificial water table to float the oil for recovery. Recovery tactics are discussed below.

Deployment Configurations

Typical configurations are shown below, but responders should consider the actual conditions and modify their deployment accordingly.

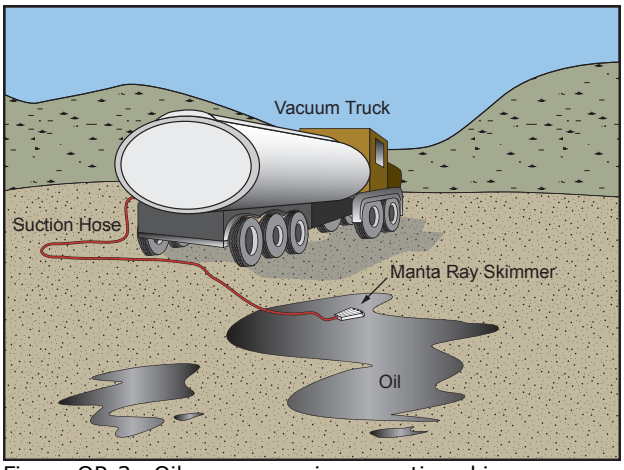

Figure OR-3. Oil recovery using a suction skimmer.

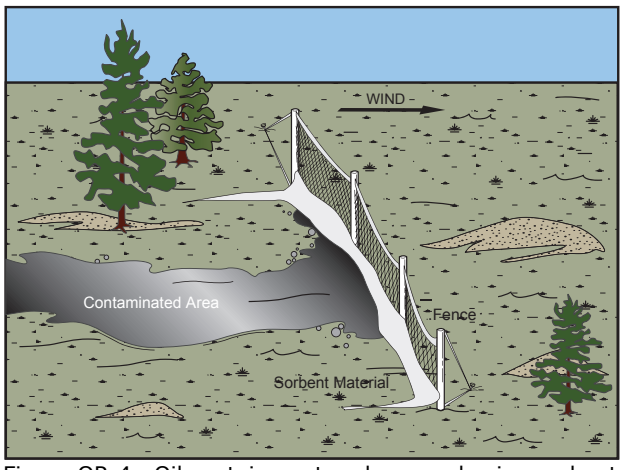

Figure OR-4. Oil containment and removal using sorbent material.

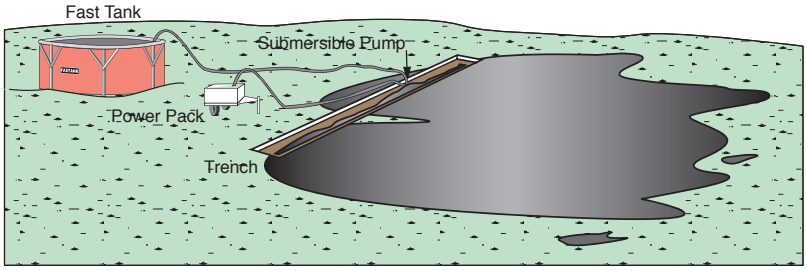

Figure OR-5. On-land Recovery using trench containment, submersible pump, skimmer, and portable storage tank.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

SAFETY

- A spotter should be used around heavy equipment.
- Response personnel should wear PPE as required by the incident-specific Site Safety Plan.

DEPLOYMENT

- Do not excavate materials if these activities will create more damage than the spilled oil.
- Do not excavate into frost laden soil or permafrost.
- Lightly oiled snow contains 0.3 bbl per cubic yard of snow.
- Constant monitoring of system efficiency is required.
- Procedures to decant should be considered; a permit is required to decant.
- If wildlife or historic properties are encountered, see Wildlife Checklist on page A-19 or Historic Properties Checklist on page A-20.

REFERENCES TO OTHER TACTICS

Other tactics associated with On-land Recovery include:

- DBD • Dikes, Berms, and Dams
- PTS • Pits, Trenches, and Slots
- PR • Passive Recovery
- ISv • In-situ Burning, Oily Vegetation
- ISo • In-situ Burning, Pooled Oil
- LST • Land-based Storage and Transfer

EQUIPMENT AND PERSONNEL RESOURCES

Resources for this module have been defined as a recovery system, a storage device, associated vehicles, support personnel, equipment, and materials. Quantity of units required will be determined by operating environment, site conditions, and resource availability.

On-land Recovery System on Snow/Ice

ORs

Equipment	Function	Quantity	Notes
Hand tools, front-end loader, excavators, trimmer, scraper	Move snow into berms, recover oil and snow mixture	Varies	Depending on site conditions and oil volume
Vacuum skimmer	Remove oil/slush mixture	Optional for liquid phase oil	Includes power pack, hoses, fittings, and rigging
Primary oil storage system(s)	Store recovered oil and saturated snow	Depending on recovery operations and volume of oil	Depending on site conditions
Vehicle	**Function**	**Quantity**	**Notes**
Truck, snow machines with sleds, dump truck	Transportation to and operations at the site. Removal of snow/oil from the recovery site	Varies	Depending on site conditions
Personnel	**Function**	**Quantity**	**Notes**
Field Team Leader	Supervise operations	1	
Heavy Equipment Operator	Operation of equipment	Varies	Depending on equipment and hours of operation
Spotter	Ensure safe operations of heavy equipment during response activities	Varies	Depending on equipment and hours of operation
Skilled Technicians	Operate response equipment	1 to 2	Depending on recovery system and hours of operation
General Technicians	Work under the direction of skilled technicians or vessel operators	2 to 4	Depending on recovery system and hours of operation

On-land Recovery System in Tundra, Marsh, and Other Lands

OR

Equipment	Function	Quantity	Notes
Hand tools, front-end loader, backhoe, trimmer, scraper	Move soils into berms, recover oil and oiled debris	Varies	Depending on site conditions and oil volume
Vacuum skimmer, oleophilic skimmer	Remove the liquid phase of the oil	1	Includes power pack, hoses, fittings, and rigging
Plywood	Create access path to the site	Optional	Use from established access to site
Pump	Provide water for flushing actions	Optional	High flow, low pressure is required
Tidal-seal or other boom	Containment	Optional	Use to isolate the oil and float within the boom
Vehicle	**Function**	**Quantity**	**Notes**
Trucks, ATV with trailers, front-end loaders, or excavators	Digging containment structures and removal of contaminated materials from the recovery site	Varies	Depending on site conditions
Personnel	**Function**	**Quantity**	**Notes**
Field Team Leader	Supervise operations	1	
Heavy Equipment Operator	Operation of equipment	1 to 2	Depending on amount of equipment and hours of operation
Spotter	Ensure safe operations of heavy equipment during response activities	1 to 4	Depending on recovery system and hours of operation
Skilled Technicians	Operate response equipment	1 to 2	Depending on recovery system and hours of operation
General Technicians	Work under the direction of skilled technicians or vessel operators	2 to 4	Depending on recovery system and hours of operation