2.1 Purpose of oil spill response

The aim of any oil spill response to a potential oil spill will be to reduce the damage that could be caused by the oil spill. The damage that might be caused by an oil spill can be to the ecological resources or to the economy of those who use the sea or coastline for business or leisure. Mitigating the damage that could be caused by an oil spill can be achieved in several ways:

2.2 Salvage actions to prevent oil pollution

The best way of responding to oil pollution is to prevent it from happening, rather than responding to it once it has occurred. It is often said of oil pollution that "prevention is much better than cure".

If a vessel is damaged at sea, salvage operations will be carried out, if feasible, to try and save the cargo and the ship. There is a comprehensive system of law and practice surrounding salvage operations and several large salvage companies operate in UK waters. The motivation for commercial salvage companies is financial; they can take effective ownership of the damaged vessel and the reward for saving it and the cargo can be very high. Timely actions to prevent further damage or to transfer or remove the oil cargo or bunker fuel oils are often part of salvage operations and will limit or prevent oil pollution. However, these actions are primarily undertaken for commercial salvage reasons, rather than being explicitly undertaken to prevent oil pollution.

In recognition that there may be a disparity between the commercial interests of the salvage company (salvor) and the environmental interests of the UK, the role of Secretary of State's Representative (SOSREP) has been introduced. The role of SOSREP is to secure the safety of any ship, person or property, or to prevent or reduce any risks to such safety; and to prevent or reduce pollution – or the risk of pollution – in the UK, the UK territorial sea, or the UK pollution control zone.

If there is a threat of significant pollution, HMCG issues a broadcast to the salvor or, if not yet appointed, the master or owner of the ship, and the harbour master, if the incident is in a port or its approaches, stating that intervention powers may be exercised and directing him to give the (SOSREP) information. This information must include:

- whether the owner has appointed a salvor and, if so, its name and contact details;
- the broad nature of the contract between owner and salvor;
- information on the intentions of the salvor; and
- any other important information that has not yet been gathered.

It is for SOSREP to decide whether the salvor has the capability to carry out the necessary salvage actions, in terms of experience, personnel, and material. He decides whether it is necessary to set up a Salvage Control Unit (SCU). SOSREP can then direct salvage operations to minimise the risk of oil pollution. The role of SOSREP is described in more detail in the National Contingency Plan (NCP).

The MCA has chartered four Emergency Towing Vessels (ETVs) or tugs that are kept on station at strategic locations around the British Isles to help vessels that suffer breakdowns or are likely to cause pollution. Figure 1 is the Anglian Sovereign.

Figure 1 ETV Anglian Sovereign

2.3 At-sea response

The aim of at-sea response measures is to prevent the spilled oil from getting to where it does most damage, that is in shallow water or on the shoreline. This can be achieved by using two basic methods:

Mechanical containment and recovery of spilled oil at sea

Booms can be deployed from ships to corral the spilled oil which can then be picked up using skimmers. This has the obvious advantage of removing oil from the sea and returning it to secure containment. While this often seems to many to be the preferred oil spill response option, using booms at sea suffers from some fundamental difficulties.

Once an oil spill has occurred it may take quite a long time before vessels equipped with booms and skimmers can reach the spill site. Even when vessels reach the oil spill site, the mechanical recovery process can be slow because oil spills can spread more rapidly over the sea than vessels towing booms can move contain it. The vessel speed is limited because oil will pass under a boom if the water velocity exceeds more than 0.7 knot. Using ever longer booms to sweep a greater area in a unit time is not a feasible solution because very long booms towed between two ships greatly inhibit the manoeuvrability of the vessels. These factors severely limit the speed at which oil can be recovered.

Booming operations at sea can be severely limited by sea conditions; oil will pass under or over the booms if the waves are too high. Using bigger and deeper-draught booms in an attempt to be able to operate in rougher seas introduces major engineering problems in deploying the booms; massive hydraulically operated winches are needed to deploy and recover the booms. Skimmers for recovering the oil suffer a similar limitation in bigger waves; they begin to recover more water and relatively less oil as the sea becomes rougher. This limit on recovery rate can be quite severe even in quite moderate seas.

Containment of spilled oil in booms and recovery with skimmers can be effective in calm conditions and in confined water, such as in a harbour, but is rarely successful on the open sea. At large oil spills it is rare for more than 10 to 15% of the spilled oil volume to be recovered at sea. The majority of the spilled oil often drifts ashore before a significant proportion of it can be recovered.

Oil spill dispersants

Oil spill dispersants are chemicals that are sprayed onto spilled oil and cause the spilled oil to be rapidly removed from the sea surface and dispersed into the water column where it is rapidly diluted to non-harmful concentrations.

The MCA maintains several dispersant-spraying aircraft under contract for use at short notice. The use of aircraft, rather than ships, enables spraying operations to start with a few hours of the oil spill occurring, wherever the spill occurs in UK waters. This is particularly important as many spilled oils become resistant to the effects of dispersants over a matter of hours or days. Figure 2 shows the Electra aircraft that can spray 15 tonnes of dispersant and Figure 3 shows the Cessna F406 with a 'belly tank' that can hold 1.3 tonnes of dispersant.

Figure 2 Dispersant-spraying Electra aircraft

Figure 3 Dispersant-spraying Cessna F406 aircraft

While dispersing oil into the depths of water present around most of the UK presents little risk to marine organisms, dispersing oil into shallow water might, in some circumstances, cause damage to some marine organisms. The use of dispersants in shallow water is regulated by Department for Environment, Food and Rural Affairs (Defra). Defra has a role to prevent contamination of the human food chain and dispersing oil into shallow water could possibly contaminate fish stocks.

Dispersants are not an appropriate response to all types of spilled oil; spills of MDO (Marine Diesel Oil) and other light oils will eventually evaporate and dissipate without intervention and dispersants should not be used because these oils contain high proportions of toxic components. Heavier grades of bunker fuel oils cannot be dispersed in most conditions.

The decision to use, or not to use, dispersants will be made by the MCA in consultation with Defra and other experts. The decision will made with due regard to Net Environmental Benefit Analysis (NEBA). NEBA is a way of considering the potential risks and benefits of a particular response action and only proceeding if it is clear that the potential benefits substantially outweigh the potential risks. In the open sea, the benefit of using dispersants will be the dispersal of the spilled oil, thus preventing it from subsequently drifting ashore. The risks of using dispersants on spilled oil in the open sea around the UK coast are generally low; the dispersed oil will be rapidly diluted. In very shallow water, the chances of preventing to oil from coming ashore are much less and the possibility of damaging marine life is higher; dispersants are therefore not generally used in shallow water.

Consideration of these factors can be a complex process and needs to be carried out by the appropriate experts on a case-by-case basis. The operational use of dispersants sprayed from low-flying aircraft is also only a job to be undertaken by specially trained crews. The decisions about when and where to use dispersants are therefore made within the Marine Response Centre (MRC) by the MCA, in consultation with the relevant outside bodies.

2.4 Preventative or protection booming

It is most unlikely that all the spilled oil from a particular incident will be recovered or dispersed at sea and some oil is likely to come ashore. Damage to particularly oil-sensitive resources, such as salt-marsh or mud-flat habitats, may be avoided by preventing the oil from contaminating them with the use of booms.

Booms deployed at sea and along the shoreline will prevent the spilled oil from coming into contact with the resource and the oil may be deflected to another less sensitive part of the shoreline, or may be collected with skimmers or vacuum devices. Booms cannot be used to protect very long sections of shoreline; they are best used to protect particularly sensitive sites such as estuaries. Booms used in this way are 'current-limited' in the same way as booms used at sea; oil will pass under the boom if the current exceeds more than 0.7 knot.

The use of booms is considered in more detail in Chapter 5.

2.5 Shoreline clean-up

Shoreline clean-up is an active oil spill response method in that an oil-contaminated habitat retains the ability to cause damage for as long as the oil remains there. Cleaning the oil off of the shoreline also prevents it being remobilised by the next high tide and subsequently contaminating a previously clean shore.

Shoreline clean-up is considered in more detail in Part 3 of this manual.

2.6 Storage and disposal of recovered oil and oily waste

Despite actions taken at sea to try and stop the spilled oil coming ashore, it is almost inevitable that some spilled oil will come ashore at most incidents. In some cases, all of the oil will eventually impact the shoreline at a variety of scattered locations.

Spilled crude oils will often lose a proportion of their volume or weight by the evaporation of the more volatile components, typically the petrol, kerosene and diesel fuel that they contain, to the atmosphere. This may initially reduce the spilled oil volume by one quarter or a third. However, most spilled crude oils also rapidly incorporate water into the body of the oil, up to a typical value of 75% water in the oil.

An initial spill of 1,000 tonnes of crude oil may be reduced to 700 tonnes by evaporation, but this spilled oil will then incorporate around 2,000 tonnes of water to form nearly 3,000 tonnes of sticky, emulsified oil. When this 3,000 tonnes of emulsified oil drifts ashore it will be impossible to clean it off without incorporating some beach material during clean-up operations. Even with very careful control of the shoreline clean-up it is probable that at least 10,000 tonnes of recovered oil and oily wastes will be generated and in some cases, there has been an even greater 'magnification' of wastes volumes.

Cleaning up, handling, storing and disposing of the recovered oil and oily wastes can be a very time-consuming and expensive process. This is considered in more detail in Part 4 of this manual.