

When an oil spill occurs, the issue of health and safety, both for the public and oil spill responders, is the most critical consideration. A response management system, with safety as its core element, should start from the top and penetrate to all levels within the organisations participating in response activities.

9.1 Initial risk assessment

The first task that should be undertaken when preparing to conduct oil spill response operations is a comprehensive risk assessment and hazard analysis. The initial approach should be to answer such questions as:

- Is there a potential gas cloud and therefore an explosion risk?
- Should people be evacuated or excluded?
- Is the environment safe for people?
- Will oil enter water systems that may affect people?

This initial safety assessment may lead to the establishment of safety or exclusion zones whilst the area is monitored in more detail. This may include the use of monitoring equipment to detect flammable or toxic gases and materials. The persistence of these sorts of hazards is not usually great, but this issue is more significant with the more volatile oil types and in calm weather conditions. Monitoring should continue until it can be established that the risk has reduced to acceptable levels. Once the overall situation has been stabilised from a safety point of view then the work of responding to the oil spill can begin. Once the likelihood and severity of risks have been considered, the precautions available should then be examined to determine their effectiveness. If the hazard continues to present a risk then additional measures should be put in place. There is an accepted hierarchy of approach that may be summarised as follows:

1. Prevent access to the hazard;
2. Organise the work in a way that exposure to the hazard is reduced; and
3. Use PPE (Personal Protective Equipment).

The risk assessment should be fully documented and filed. In the main, hazards can be seen to arise from a number of specific areas:

- The spilled product itself and response chemicals;
- The working environment;
- Risks during response operations;
- Risks from machinery used in the clean-up operation; and
- Risks from external factors.

9.2 Spilled oil hazards

Oils, whether in the crude state or as refined products, represent a safety hazard. The main hazards that can arise are as a result of the following properties:

- Flammability;
- Explosive vapours;
- Toxicity;
- Hydrogen sulphide;
- Exclusion of oxygen;
- The slippery nature of oil; and
- Skin contact with oil.

Flammability

Crude oils and some refined oil products may be ignited by a source of ignition. The period for which crude oils and distillate fuels (petrol and kerosene) remain easily ignitable is usually short because of the evaporation of the more volatile oil components and the incorporation of water into the spilled oil if the spilled oil emulsifies. Light refined products such as petrol or kerosene are a particular hazard and great caution should be taken when dealing with spills of these oil products. Smoking, sparking tools, vehicles or any other potential source of ignition should be kept out of the spill area. Responders should be careful to select equipment that does not cause ignition of the spilled product. Access to the spill operations areas should be controlled whilst any danger of ignition persists.

Explosive vapours

When a light refined product or volatile crude oil is spilled, hydrocarbon vapour will be released during the initial stage of the incident. This vapour cloud may drift, under the effects of the prevailing winds, towards a population centre or an ignition source. Safety exclusion zones and air monitoring stations may need to be established to determine the vapour levels to monitor whether or not they are within explosive limits.

Toxicity

Most oils contain some quantities of potentially harmful chemical components, but it is relatively easy to prevent them entering the body and causing harm by using appropriate PPE (Personal Protective Equipment). The toxic components of an oil may enter the body by different routes; by breathing the vapour, absorbed through the skin or eyes, swallowed or accidentally injected.

Hydrogen sulphide

“Sour” crude oils’ release hydrogen sulphide gas (H_2S). H_2S can be easily detected by its ‘rotten eggs’ smell at low concentrations, but at much higher and lethal concentrations it is impossible to detect without specialist equipment. If the presence of H_2S gas is suspected, based on information from the shipper of the oil or other sources, a monitoring system should be established to determine the levels. Specialist PPE will be required to deal with spills of sour crude oils.

Air displacement

Heavy hydrocarbon gases and vapours can displace air from a confined environment. Oxygen content readings should be taken prior to entering any confined space, trench or area where reduced ventilation may lead to an accumulation of hydrocarbon vapours.

Slipperiness

Spilled oils are slippery. Slips, trips and falls on oiled surfaces are one of the main causes of injury at oil spill response and awareness of these hazards should be raised. Responders can also find it difficult to handle equipment when wearing oily gloves, which can increase the time taken to complete familiar tasks and may make some more complicated tasks impossible without decontaminating the equipment first.

Skin contact with oil

Oil can have a degreasing effect on the skin which may cause dermatitis and inflammation of the skin and can also cause medical problems if ingested. Responders working on a clean-up operation should wear suitable PPE such as protective gloves, suits and boots and use moisturising barrier creams to protect the skin. Decontamination facilities should be established which permit responders to remove oiled clothing in a controlled environment, and which provide them with access to suitable washing facilities prior to taking meal breaks and at the end of the working day.

9.3 The working environment and safety during shoreline response

Oil spills can occur in any type of coastal environment and in all weathers. This poses a number of challenges to responders and influences the feasible response options. Some aspects of the working environment, such as site layout, security, working shifts, can be controlled by the responders, but others factors, including the weather and the terrain, must be carefully considered when planning the response. Safety must remain the top priority, and measures to control any risks put in place.

Weather

Working outside in extreme weather conditions places a considerable strain on human performance. Problems could include from heat stroke, sunburn and dehydration at one end of the scale to frostbite and hypothermia at the other. Weather conditions can be potentially hazardous and must be assessed accordingly. Suitable control measures need to be provided and these might include appropriate clothing, adequate shelter or adjustments to work patterns to provide adequate rest breaks.

Shoreline environments

An oil spill can impact shorelines in rugged and remote locations. The proximity to water presents its own set of hazards which give rise to increased risks, particularly among inexperienced or unfamiliar responders. Tides, currents and waves create a dynamic environment that can catch out the unwary and needs constant monitoring and

reassessment. Safe access and egress must be arranged for vehicles and responders on foot with account being taken of shoreline type and tidal patterns and ranges.

The nature of shoreline deployments often poses problems in terms of communications, access and movement of heavy equipment, together with the provision of adequate first-aid and evacuation resources. Unless access to oil-contaminated areas is properly controlled, the local population can be exposed to risks from which they are not protected. Additionally, vehicles and persons entering the spill area may generate secondary contamination and possibly cause unnecessary damage to sensitive environmental resources. It is essential that shoreline responders are trained to recognise the hazards present in their working environment, and are provided with adequate means to control the risks.

Working at night

Although there is often a perceived need for people to work for as long as possible to clean up spilled oil, night operations present particular risks for responders. It is difficult to see oil in low light conditions and the risk of slips, trips or falls increases dramatically. Worker fatigue will increase through night working and the operational benefits of this work need to be assessed. Unless adequate lighting can be guaranteed to ensure that responders can have safe and secure access to the worksite, and that an acceptable level of operational efficiency can be guaranteed, night clean-up operations should be avoided.

Slips, trips and falls

As mentioned previously, the most common hazard to responders is the danger from slips, trips or falls. Oil spills can occur in locations where the access to the work site is difficult. The problem is made worse when the surface is coated with oil, but even uncontaminated rocky shorelines can be very slippery due to seaweed, wet rocks or mud. When working on the shoreline, it is advisable for responders to keep clear of cliffs or rocky shorelines until a safe means of access has been provided, either in the form of access bridges or guide ropes. Clean-up crews should be warned of the hazards of any particular site access and be given information on the safest access routes.

Manual handling and equipment lifting

Care must be taken by responders when lifting equipment or recovered waste bags by hand. Mechanical lifting equipment should be used where possible. If manual handling is required, the loads should be restricted to manageable proportions and persons instructed in the proper lifting techniques. When using lifting equipment, responders should be provided with safety helmets and only those trained in the operation of the equipment permitted to use it.

Transport of materials/waste disposal

When oil is recovered and stored in temporary pits on the shoreline, these pits should be cordoned off from the public. The pits should be well marked with suitable signs to warn any person against accidentally falling into them. Oil spills require significant logistics support with regard to the transportation of equipment, and the use of specialist vehicles

and personnel transport. To prevent degradation of local road safety, care must be taken to avoid secondary contamination beyond the initially oiled areas.

First aid

The arduous nature of shoreline response increases the risk of illness and injury to responders. Often they are undertaking difficult tasks, under pressure and in unfamiliar surroundings. Preventative measures need to be taken to protect responders from the health effects of the oil-contaminated environment. Responders should be trained in first aid and also have an awareness of medical facilities available locally and how to access them and evacuation arrangements which should be available in the case of serious injury.

9.4 Personal protective equipment (PPE) selection

Personal protective equipment (PPE) is an essential element in ensuring responders are able to work in a safe manner. The proper selection and use of PPE requires skill and experience. The following points should be taken into consideration when selecting the appropriate PPE:

- the expected working conditions and hazards;
- the activities to be performed;
- the person(s) being exposed; and
- the compatibility of the equipment—each piece of PPE should be capable of performing effectively without hindering the proper operation of other pieces.

Consideration should also be given to the nature of the task and the demands placed on the worker, including:

- the physical effort required to do the job;
- the methods of work involved;
- how long the PPE will need to be worn;
- the need for adequate vision and communications whilst wearing the items;
- whether high cost, durable equipment or lower cost disposable items be selected; and
- whether the task is critical to the overall clean-up.

Consultation with the safety manager and experienced responders is advantageous in determining the most suitable type of PPE. These personnel are best placed to provide first hand knowledge of the task, environment and any other unique factors.

The working environment will often dictate the PPE selection criteria. For example, cold weather environments require the use of thermally insulating clothing. This type of clothing can be rendered unusable if it comes into contact with liquid oils, hence a robust and well-sealed impermeable layer should be worn above the cold weather clothing. Conversely, in hot weather, impermeable clothing will exacerbate the problem of heat stroke. Workers should therefore be given adequate rest breaks and liquids to ensure their welfare, or an acceptable compromise should be reached in the type of PPE that they wear. PPE should not be issued without information and training in its use and maintenance. Without this, its effectiveness will be severely reduced. Proper decontamination and cleaning facilities should be provided so that the equipment remains in a good condition for as long as

possible. Without these facilities PPE supplies will be wasted, straining supply lines and reducing cost-effectiveness.

Where possible, systems should be established to ensure that workers remain responsible for the condition of their own PPE. Simple systems which require workers to hand in used PPE before new stocks are issued will assist in the control of waste. Separate disposal facilities for used PPE should be established to segregate the waste.

By taking an activity-based approach to PPE selection, a response organisation is able to set some working parameters. These should include mechanical protection, the elements/climate, and hazardous substances. It is vital to emphasise that PPE is not, in itself, the only risk control method but in most circumstances it is inevitable that personnel will come into close contact with the oil and PPE will be a necessity.

9.5 Sources of specialist assistance and guidance

During incidents specialist advice will be available as required from the MCA and specialist stockpile operators. As well as the emergency services, the County (or Council) Waste Disposal Officer, the Environment Agency, SEPA in Scotland, EHS in Northern Ireland, the Health and Safety Executive (HSE), oil companies - via United Kingdom Petroleum Industry Association – (UKPIA) and safety advisors from the owners of the cargo or vessel. Names and addresses for specialist advice should be included in the emergency response plan with copies in the health and safety file during operations. Details of any specific requests for assistance or advice, and relevant responses, should be held in the health and safety file.

9.6 Roles regarding safety in oil spill response

The Health and Safety at Work Act 1974 is the key legislation relating to health and safety matters in the UK. The Act establishes a number of duties and responsibilities, which can be summarized as follows:

- Employers have a duty to establish and maintain a safe system of work;
- Employers must take all reasonably practicable steps to protect the health safety and welfare of their employees and others including the public;
- Employers must prepare and maintain written safety policies; and
- Employees have a duty to comply with all health and safety instructions and requirements and not to put their own, or anyone else's health, safety and welfare at risk.

The 1974 Act is supported by a great many sets of Regulations and other relevant statutory provisions. A response management system, with safety as its core element, should start from the top and penetrate to all levels within the organisations participating in response activities. Please refer to the NCP and STOp 1/98, for more detailed information.

The MCA

The MCA is also responsible for ensuring that any equipment or material it provides in respect of shoreline clean-up, meets current safety requirements.

Local Authorities

Local authorities are responsible for the creation of emergency response plans and for ensuring that appropriate health and safety information is included. Where local authorities undertake to prepare and apply oil spill contingency plans, the plans must address health and safety considerations. Where maritime local authorities undertake shoreline clean-up operations, they will be responsible for dealing with the clean-up and as a consequence for overall management of health and safety issues.

Stockpile operators

In the event of an incident the MCA may require the stockpile operator to go to the scene with appropriate material drawn from the stockpile and specialist personnel. Where required by the MCA, usually at the request of the local authority, the stockpile operator will deploy their personnel and equipment on clean-up operations. In addition to mobilising MCA equipment to be operated by their own personnel, the stockpile operator will also provide equipment and materials for use by local authority personnel, and will ensure that appropriate operational and safety instructions and training are given.

Oil spill contractors

Oil spill contractors can provide oil clean-up equipment and personnel under commercial contracts. In addition to specialist equipment to be operated by their own personnel the contractor may provide equipment and materials for use by local authority personnel under their guidance. During shoreline operations contractors must liaise with the local authority, via the SRC, to ensure proper co-ordination of operations and health and safety.

9.7 Management control of spill response safety

There should be clear and documented arrangements for health and safety management during shoreline incidents. During small-scale incidents, where local resources are adequate to deal with the incident, it is assumed that existing local authority management arrangements and systems will provide suitable health and safety management and control.

In operations which involve a number of organisations, and in particular where a SRC is established, each organisation involved has a statutory duty to safeguard the health, safety and welfare of its employees and others. However, the overall co-ordination of health and safety management rests with the local authority via the SRC.

Key to these arrangements will be two documents. First, the emergency spill response plan which should contain information on proposed health and safety management arrangements in the event of a spill, and second, the health and safety file, which should provide a record of actual health and safety arrangements, provisions and decisions in the event of the plan, being activated.

The management approach recommended is based on that established by the Construction (Design and Management) Regulations 1994 (CDM Regs.) for construction sites. These regulations implement the objectives of the EC Directive dealing with safety on temporary or mobile construction sites.

The reasons behind the adoption of the CDM Regs as a model are the many similarities between the organisational and operational issues encountered on both major shoreline clean-up and construction projects. The main similarities are:

- Both involve temporary work sites;
- Both involve multiple organisations on-site;
- Both can involve significant numbers of personnel; and
- Both involve similar plant and equipment.

However, it must be borne in mind that whilst the CDM Regs are considered to represent a recommended management model, the regulations may not legally apply to any or all aspects of a clean-up operation. Also there will be detailed requirements and terminology within the regulations, which may have no parallel or equivalent in general shoreline clean-up operations.

It should also be noted that under most organisations' health and safety policy statements it is incumbent on those responsible for managing the clean-up operation to inform any trade union safety representative of their health and safety arrangements and proposed operations. In protracted operations, the SRC should be aware that safety representatives have the legal right to undertake safety inspections. Consideration should be given to liaison with the Area Health Authority and the Health and Safety Executive and to the keeping of proper records.