European Maritime Safety Agency

EU/EFTA STATES PRACTICAL GUIDELINES ON HEALTH AND SAFETY OF OIL SPILL RESPONDERS

EMSA

EU/EFTA STATES PRACTICAL GUIDELINES ON HEALTH AND SAFETY OF OIL SPILL RESPONDERS

EMSA

ACKNOWLEDGEMENTS

The European Maritime Agency (EMSA) on behalf of the Consultative Technical Group for Marine Pollution Preparedness and Response (CTG MPPR) would like to thank the members of the Working Group for their efforts and contributions in developing this document:

- Ole Kristian Bjerkemo, Norwegian Coastal Administration, Norway
- Birgitte Brockstedt Kvamme, Norwegian Coastal Administration, Norway
- Jens Rauterberg, Central Command for Maritime Emergencies, Germany
- Sebastian Kroll, Central Command for Maritime Emergencies, Germany
- João Filipe Mota Duarte, Marine Pollution Response Directorate, Portugal
- Eric Donnay, Marine Environment Service, Belgium
- Lothar Lieck, European Agency for Safety and Health at Work

DISCLAIMER

These guidelines are intended to provide practical information about the main health and safety considerations linked to marine oil spill response operations, both at sea and on the shoreline. The guidelines were developed by a Working Group comprised of experts from EU / EFTA Member States, as well as EU-OSHA and EMSA representatives, under the framework of the EMSA Consultative Technical Group for Marine Pollution Preparedness and Response (CTG MPPR). The guidelines are intended to provide guidance and information based on existing national practices and real incident experience.

Under no circumstance do these guidelines replace individual, legal or technical advice rendered that considers the individual circumstances of each case and situation, nor do they replace national health and safety regulations, recommendations and practices applicable in each country. Under no circumstances shall EMSA or any of the other contributors be liable for any loss, damage, liability or expense incurred or suffered that is claimed to have resulted from the interpretation and the use of the information presented in this document.

FOREWORD BY THE EXECUTIVE DIRECTOR OF EMSA

I am pleased to introduce these practical guidelines on health and safety for oil spill responders from EU/EFTA States. Developed by a group of experts within the Consultative Technical Group for Marine Pollution Preparedness and Response (CTG MPPR), these guidelines constitute a valuable toolkit born out of real-incident experiences.

The guidelines are a result of the collaborative efforts of EU/EFTA Member States, the EU Agency for Safety and Health at Work (EU-OSHA) and, of course, the European Maritime Safety Agency (EMSA). They demonstrate once again the immense value that comes from such cooperation.

The topic of occupational safety and health (OSH) covers all aspects that can affect the wellbeing of workers involved in a specific task or operation. Noting the particular challenges associated with marine oil spill response operations, this has been a topic of common interest across national administrations under the work of the CTG MPPR. They have highlighted the need for practical guidance and exchange of experience on how best to plan for and integrate health and safety measures in such challenging and demanding operations.

Such challenges include the hazards associated with working on board vessels or on different types of shorelines, under difficult environmental conditions, hazards associated with the oil itself and the handling of large equipment for its containment and recovery, as well as physical tiredness and public pressure. While large marine oil spills are becoming rarer, thanks to the increased focus on the prevention of such incidents, this in turn presents another challenge because, if not properly compiled and shared, the valuable experience gained in responding to previous spills will be lost.

These guidelines will serve as a comprehensive companion, covering the three main phases of oil spill response operations: pre-operations planning, during operations and post-operations. Within each phase, readers will find practical guidance on the main health and safety considerations that need to be addressed for which OSH requirements should be established and coordinated.

The relevant practical and operational experience of the countries involved in this work, combined with the support of both Agencies, have resulted in these EU/EFTA States practical guidelines on safety and health of oil spill responders, which we hope may further strengthen the proper planning and effective integration of health and safety measures in oil spill response operations across Europe.

Maja Markovčić Kostelac
Executive Director EMSA

FOREWORD BY THE EXECUTIVE DIRECTOR OF EU-OSHA

Oil spill accidents pose an immediate and strong threat to the marine environment and the nearby shores. Any effective oil spill response needs to be fast and adequate to the size of the spill to limit the damage as far as possible – in often unknown and dangerous environments, during day and night. Such circumstances can cause high risks for the health and safety of responders who are employed to undertake clean-up work covering operations at sea, on the shore or from boats.

It is essential, therefore, that oil spill response operations incorporate highly effective health and safety measures. And for this to work, health and safety measures must form an integral part of the oil spill response operation, already during the preparation of such measures and of course during the operation itself.

During oil spill incidents, there is very little time to assess the risks and to organise the necessary health and safety measures, so effective preparedness is key. Responsibilities for occupational safety and health (OSH) should be clear and organisation and logistics well prepared. The necessary equipment needs to be available, be it showers with black and white zones, sufficient light during night work, all types of effective personal protective equipment, etc. These guidelines provide an extensive and complete overview on what has to be done.

These guidelines for oil spill incidents are based on experience and guidance from several countries. They make good practice available for all Member States in the EU - and beyond - and promote a common OSH reference across Europe.

As the EU agency responsible for occupational safety and health, EU-OSHA was delighted to be invited by EMSA to contribute to the development of these guidelines. The opportunity to collaborate with our sister agency and the members of the Working Group has been enriching and we hope will make a real difference to the health and safety of oil spill responders.

William Cockburn
Executive Director EU-OSHA

TABLE OF CONTENTS

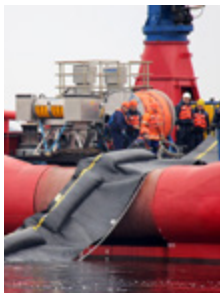
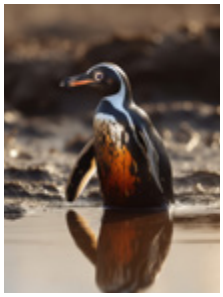


TABLE OF CONTENTS (cont.)



CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Oil spill response is a vital measure to mitigate environmental impacts at sea and on the shore caused by an oil spill. A fundamental principle of incident management is that any activities in connection with oil spill response operations should not cause harm to the life and health of the oil spill responders. For that reason, Occupational Safety and Health (OSH) considerations should be an integral part of the oil spill response operation preparation, implementation and management.

The topic of occupational safety and health is very wide and covers all aspects that can affect the wellbeing of workers involved in a task or operation. While all EU countries have specific laws or regulations on occupational safety and health, that adapt the EU OSH-directives (or legislation) to their specific infrastructure and needs, these are often quite generic and not specifically aimed to address OSH considerations regarding the particular challenges of oil spill response operations (see chapter 2.1).

Under the framework of the Consultative Technical Group for Marine Pollution Preparedness and Response (CTG MPPR), European Union (EU) and European Free Trade Association (EFTA) Member States have expressed interest in sharing best practices and gathering more information on health and safety approaches in place in Europe, specifically for marine oil spill response operations. Throughout the years, efforts to facilitate this exchange of good practice have been made at national, EU and international levels through dedicated workshops, technical papers, reports and industry guidance documents. A (non-exhaustive) list of relevant regulations and guidance documents addressing OSH for marine pollution responders is included in chapter 1.4 below and in Annex 10.1.

Following a proposal submitted by Norway to the CTG MPPR, a voluntary working group of experts from EU / EFTA Member States was established under the CTG MPPR work to draft OSH practical guidance for oil spill responders, based on best-practices, existing guidance, and real incident experience. Considering the subject matter, the European Agency for Safety and Health at Work (EU-OSHA) was also invited by EMSA to contribute to this work in reviewing existing OSH documents and practices and in drafting this guidance document.

This document is the outcome of the work of this working group, as approved by the CTG MPPR at its 17th meeting in October 2023 and is publicly available on the websites of EMSA and EU-OSHA.

1.2 PURPOSE

These guidelines are intended to provide useful and practical information to relevant responders, administrations or industry when addressing health and safety issues linked specifically to marine oil spill response operations both at sea / offshore and on the shoreline. While publications regarding occupational safety and health of emergency personnel (e.g., fire-fighters, rescue workers, etc.) are generally available, this document specifically addresses oil spill response operations.

The practical guidance provided is based on the review of existing documentation, national practices, operational approaches, and most importantly real incident experience, as shared by the members of this working group. The guidelines have an operational focus and aim to provide examples of national OSH good practice and (where possible) promote a minimum OSH reference based on such practices, focusing on the frequently found risks of oil pollution response operations.

This document provides specific OSH examples and approaches from different countries, thus offering "food for thought" regarding relevant regulations and practices, sharing OSH procedures and experiences across Europe. It is, in no way, mandatory. Each country and any relevant authority should determine its own occupational safety and health policy and approach for oil spill response operations, in line with its own domestic laws, policies and practices.

1.3 SCOPE

These guidelines cover OSH considerations specifically for marine oil spill response operations (i.e., at-sea / offshore, on the shoreline), providing an overview of the main types of risks that can be encountered when conducting such operations, and the main steps to be taken to identify, assess and address these risks. The document covers three phases of oil spill response operations: (i) pre-operational, (ii) during operations and (iii) post-operational phases.

Regarding the "pollutants" considered in this document, the primary assumption is the response to the hazardous substance "oil", in the sense of petroleum in any form, including crude oil, fuel oil, sludge, oil refuse and refined products, as well as oleophilic, hydrophobic, non-polar oil-like substances. Oil spill responders may also encounter other chemicals, like e.g., dispersants ([1, 2]), during oil spill response operations, however these are not covered in this document.

It should be noted that these guidelines are focussed on health and safety guidance needed for a large oil spill response operation. However, the principles outlined in this document should be the same no matter what size the response is. The scale of the health and safety response and the equipment and facilities needed will depend on the scale and type of the operation and will vary due to the type of oil being cleaned up, the environment it is being cleaned from, and the weather. All of these issues are addressed in the risk assessment process described in this document, a process that will tailor the health and safety considerations to the type and scale of response that is being put into operation.

Response operations to marine spills of chemical substances or mixtures, or hazardous and noxious substances (HNS) are not covered by this document. Considering the complexities of managing and responding to chemical spills or releases at sea, and noting that the fire brigades, the chemical industry, the salvage industry, and other specialized organisations have established specific OSH standards applicable for dealing with such incidents, this issue is kept outside the scope of this document.

While these guidelines focus on OSH for oil spill responders, they also include OSH information relevant for the management levels of Incident Commander and On Scene Commander during the response operations. They also provide an overview of the main OSH responsibilities and actions for all the levels of actors during oil spill response operations, from the "top" to "the field".

1.4 RELEVANT OSH REGULATIONS AND GOOD PRACTICE DOCUMENTS

General aspects of health and safety when working with dangerous substances, are normally covered by the European Agency for Safety and Health at Work (EU-OSHA), and specific aspects of worker safety at sea, are addressed by the international conventions of the International Maritime Organization (IMO). The International Labour Organization (ILO) has also completed considerable work on occupational safety and health in many fields and individual countries have taken different approaches to this subject.

The main relevant national or international OSH regulations and standards, guidance documents, as well as subject-specific industry generated guidance and workshops are listed in Annex 10.1 (please note this is a non-exhaustive list). Noting and acknowledging that many countries have their own national OSH legislation, regulations or standards in place, it is not possible to refer to all of them in this document. Specific references to national OSH standards will appear when they are relevant in specific chapters of these guidelines.

At EU level, the Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (OSH Framework Directive), establishes a common framework to be applied by the EU Member States (MS) in this area, aiming to secure a minimum level of protection from work-related safety and health risks for all workers. This Directive is fundamental, as it is the basic safety and health legal act in the EU which lays down general principles concerning the protection of workers against occupational accidents and diseases. It contains basic obligations for employers and workers, and sets principles concerning the prevention of risks, the protection of safety and health, the management of risks (risk assessment and risk control). It also ensures that workers and their representatives are informed, consulted, participate in planning and are trained. Most methods of risk assessment as described in the OSH Framework Directive and in national legislation have been designed for workplaces with few changes or more 'static' work environments, and usually involve time-consuming steps (processes) of assessment, consultation, or decision-making.

Therefore, a "formal" risk assessment by an OSH expert (e.g., operations safety manager) and with written documentation of the actions and sites that may be involved in an oil spill clean-up should be performed or prepared before the actual response, which will need only a short revision and possible minor adjustments during the response operation. In those cases, a frequent update of the pre-prepared risk assessment in a permanently changing work environment such as the one of oil spill response operations is proposed.

Reference should also be made here to the ISO 45001 standard "Occupational health and safety management systems – Requirements with guidance for use", which sets the minimum standard of practice to protect employees worldwide.

Beyond the EU regulatory framework and international guidance available on the subject, there are also OSH legislative provisions at a national level, but only a few countries have developed handbooks or other guidance specifically covering the OSH of oil spill responders (e.g., Germany, Norway). This guidance document draws on such national regulations and experience.

1.5 OSH MAIN STEPS FOR PHASES 1 - 2 – 3 OF OIL SPILL RESPONSE OPERATIONS

Three main phases can be identified in oil spill response operations during which occupational safety and health (OSH) requirements should be established and effectively coordinated:

1. Phase one – Pre-operations

During this preparatory or **contingency planning** phase, the OSH responsibilities and actors should be identified, the OSH planning (risk identification and mitigation procedures) should be developed for all proposed operations and sites covered by a potential oil spill (including e.g., establishing stockpiles of personal protective equipment (PPE), and establishing an OSH reporting framework). Relevant OSH training of the oil spill response personnel should also be regularly conducted during this phase..

2. Phase two – Operations

During the actual oil spill response operations, the following five steps are recognised OSH steps to be conducted:

- **Step 1 –** Identify and assess any risks or risk factors linked to the specific response operation;
- **Step 2 –** Implement risk reducing and protective measures;
- **Step 3 –** Organise the site of the operations, provide relevant instructions, guidance and safety briefing to responders and all involved personnel on-site;
- **Step 4 –** Apply the (previously developed / available) real-time documentation and reporting system;
- **Step 5 –** Continuously monitor risks and the level of implementation of the OSH rules during all steps of the operation, update OSH guidance, document every step taken and compile all the documentation together in preparation for the post-operational phase.

3. Phase three – Post-operations

During this post-operational phase, an overall evaluation of the response and the relevant OSH plan should be conducted, including a health follow-up of the personnel involved in the response , and the identification and documentation of any OSH lessons learned from the specific response operation.

Figure 1: OSH main steps – covering the three phases of oil spill response operations

The above OSH requirements or steps should (where possible) form the minimum basis for systematic OSH work during oil spill response operations at sea / offshore and on the shore, however these may be addressed or implemented differently at national level. The above requirements also highlight the responsibility of the authority in charge of the overall management of the response operations in addressing OSH concerns and planning adequate measures in the response operation. This can vary from country to country and some countries / administrations / industry might have additional requirements over and above these.

KEY MESSAGE

A MINIMUM SET OF OSH REQUIREMENTS SHOULD BE CONSIDERED AND PUT IN PLACE BEFORE, DURING AND AFTER THE OIL SPILL RESPONSE OPERATIONS.

CHAPTER 2

CHALLENGES OF OIL SPILL RESPONSE OPERATIONS

2.1 OIL SPILL RESPONSE CHALLENGES

Particular challenges that can be encountered for those participating in oil spill response operations include:

- **Oil hazards:** In case of large spills multiple hazards to health and life can arise, even from a known substance like petroleum / oil; health hazards that can manifest during or after the response operations;
- **Use of PPE:** The mandatory use of Personal Protective Equipment (PPE) (e.g., life jacket, mask, helmet, gloves, boots, connecting / safety line to vessel....) in oil spill response operations makes the responder's work more complicated and can cause health hazards by itself (e.g., reduced vision capacity, less mobility, heat stress, ...);
- **Environment:** The responders must often work in potentially hazardous weather conditions (e.g., hot or cold weather, poor visibility, high waves, strong winds, tides, etc.) or in workplaces or terrains which are unknown to them and can be potentially hazardous even without the presence of oil (i.e., on vessels, rocky beaches, ice ground, etc., with the potential hazard of drowning, falling, slipping, etc.), and where wildlife (e.g., birds, mammals, etc.) may also be present. When working on shore there are risks provided by the tides, waves and local currents;
- **Work activities and equipment:** The responders must do manual work and often handle large equipment for the mechanical recovery and containment of the oil, which may come with their own risks associated with operating machines, handling of objects, carrying by hand, movement;
- **Physical tiredness (fatigue):** Clean-up operations are physically exhausting, last long (initial stages of response, long shifts,), and might require handling of (heavy) loads and equipment;
- **Time pressure:** When an oil spill is threatening the shoreline, the response at sea has to be executed very fast or it may become necessary to protect sensitive or other important areas from contamination very quickly (e.g., by setting up booms, etc.);
- **Psychological pressure:** Like other response operations, clean-up operations at-sea may be undertaken in conjunction with search and rescue (SAR) operations, which may involve sightings of dead bodies or contact with victims (drifting bodies) and may cause additional stress to the responders;
- **Training / Personnel:** Diverse and rapid training and the varied level of knowledge of responders can be challenging during the actual operations;
- **Public pressure:** There is often large pressure on the responders by the public, politics, media, etc., to remove the oil from the environment or oiled wildlife as quickly and efficiently as possible, which may add to the overall stress of the responders.

KEY MESSAGE

OIL SPILL RESPONSE OPERATIONS AND THEIR ASSOCIATED TASKS COME WITH PARTICULAR CHALLENGES AND HEALTH AND SAFETY HAZARDS, BOTH AT-SEA (ON-BOARD VESSELS), AS WELL AS ON THE SHORELINE, WHICH SHOULD BE THOROUGHLY AND SEPARATELY ASSESSED EACH TIME.

2.2 OIL SPILL RESPONSE ENVIRONMENTS AND WORKING CONDITIONS

When considering health and safety principles, the reader should also consider the specific environment and challenging working conditions applicable to oil spill response operations, which usually take place:

- On board vessels such as,
  - dedicated oil spill response vessels,
  - vessels of opportunity / fishing vessels,
- On the shoreline.

Some additional descriptions of the specific working conditions and environments applicable to oil spill response operations are listed below. It should be noted that some countries' OSH handbooks do not differentiate between on board and shoreline operations. For more details, see Annex 10.2.

Stand-by Oil Spill Response Vessel Norden during a drill with oil boom deployment.

2.2.1 Work on-board dedicated oil spill response vessels

Operations on-board vessels with oil recovery systems can include, for example:

- Deploying booms from vessel and operating booms at sea for collecting oil;
- Protection of areas inside the vessel to avoid oil contamination;
- Spraying dispersants from the vessel onto the oil spill;
- Skimming of oil;
- Preparation for oil recovery ;
- Termination of oil recovery;
- Storing the collected material / pollutant;
- Transporting and delivering collected oil to dedicated waste disposal facilities;
- Cleaning and maintenance of equipment or the vessel;
- Repairing or replacing components of the oil spill response equipment.

The requirements of this manual apply analogously for work on board vessels, as for land / on-shore operations. This means that these are also to be implemented on board, taking into account the vessel's special characteristics (e.g., citadel operation, etc.). Oil and thus the risks emanating from it are the same everywhere – whether on land or at sea!

Clean up operations of the half-sunk cargo ship OS35 in the Bay of Algeciras - 2022.

2.2.3 Working on the shoreline (different types of beaches and shoreline environments)

In a large oil spill incident, oil may reach the shoreline. The oil-water-debris mixture that reaches the shoreline can be much larger in quantity and affect a wider geographical area compared to the initial oil spill at sea. Shoreline oil spill response operations can go on for quite a long period, are time-consuming and labour intensive, and require a large and well organised logistics supports, including a large number of oil spill responders, equipment and additional facilities. In addition, different types of beaches or shorelines may be affected by the same oil spill, raising different and often unique risks. There are also large variations in climate and geology of the coastline, making the need for local adjustments highly necessary. Cleaning operations can also take place in inaccessible areas and the shoreline oil spill clean-up methods and techniques used are usually manual, and therefore ergonomically challenging for those contributing to the clean-up operations.

The use of volunteers in shoreline clean-up in some countries also raises specific risks and logistical challenges. For more details on spontaneous, non-trained volunteers in shoreline oil spill response operations see Annex 10.3.

Here are some OSH elements that need particular consideration during the planning of shoreline oil spill response operations:

- Organising the site (e.g., in red, yellow and green zones, as described in phase 2 below, etc.);
- Appointing managers on-site;
- Logistics (e.g., transportation, equipment, PPE, accommodation, food, etc.);
- Personnel (e.g., hiring, insurance, health check-up, identification and control, working time and shift management, etc.);
- Communication plan (internal and external);
- On-site training and instructions;
- On-site risk assessment;
- Decontamination and (general) hygiene on site;
- Air monitoring of hazardous substances;
- Emergency preparedness (e.g. response in case of injury, evacuation plan, etc.);
- Waste management plan and localised waste storage;
- Reporting of adverse events;
- Documentation (as described in phase 2 below).

Beach covered with oil that leaked from an oil tanker that sank on September 10 off the shores of Salamina island, at the suburb of Faliro in Athens, Greece, September 14, 2017.

CHAPTER 3

OSH PHASE 1 – PRE-OPERATIONS

During the preparatory phase, the OSH responsibilities and actors should be identified, the OSH planning (risk identification and mitigation procedures) should be developed and relevant OSH training of oil spill response personnel should be conducted.

3.1 IDENTIFYING OSH RESPONSIBILITIES

3.1.1 GENERAL

Before commencing health and safety planning, the OSH responsibilities in the respective country the response operations are taking place should be identified. This is because there will be slight differences in the national / local authority supervising the oil spill response and in the OSH implementation on the working site.

3.1.2 OSH AUTHORITIES

National laws and regulations in addition to EU Directives and international legislation are the foundation of the governmental authorities' responsibility to ensure worker safety requirements are instigated in the response by the responsible parties. These governmental authorities will have, in most countries, the administrative, supervisory and information responsibilities in connection to the relevant national OSH acts and regulations. An overview of the OSH authorities and relevant OSH institutions in the different Member States and at EU level can be found at [3].

During oil spill response operations, it may be useful for the incident command to inform the relevant national OSH authority about the operations, as regards to their organisation and how the OSH is implemented. It is very important to have a good and proactive communication between the incident command / management and such national authorities to avoid misunderstandings and to involve them in the planning phase, in order to facilitate the exchange of information and guidance.

3.1.3 OSH KEY ACTORS

According to EU and international legislation everyone involved in practical work, i.e., an oil spill response operation, has a smaller or bigger responsibility for the implementation of OSH, depending on their level in the command structure. Everyone taking part in an oil spill response operation has the responsibility to be aware of and obey the OSH rules.

Main OSH actors include, for example:

- OSH coordinator [4] / safety officer [5] (see description of OSH coordinator function below);
- Overall incident command / commander;
- Local coordinators / on scene coordinator (OSC);
- Team leaders / ship captain;
- Persons involved in the response (individual responders);
- Occupational medic [4];
- National / local OSH supervisory authority [3].

KEY MESSAGE

OSH KEY ACTORS SHOULD BE ADDRESSED IN EVERY OSH PLAN AND SHOULD BE INVOLVED IN ITS PREPARATION

INFO BOX

Special function: OSH Coordinator

The incident command / management team should appoint an individual and, if necessary, a supporting team, with the skills to undertake responsibility for occupational safety and health management on their behalf for the specific response operation.
Responders can often become too involved in operations and not be able to have an overall view of the situation. The responsible individual needs to be able to step back from the operation and consider wider issues such as OSH monitoring and maintaining awareness of active and developing situations, assessing hazardous and unsafe situations, and developing measures to assure personnel safety.

OSH measures to be taken to assure personnel safety during response operations may include:

- Conducting an initial site assessment or checking and adapting the existing pre-operation risk assessments from OSH plans with documented processes for: hazard identification; risk assessment; selection of responders, including local labour; provision of controls (e.g., zoning, specialized equipment, and PPE); assessment of training needs, and identification of decontamination areas;
- Developing and implementing a Site Safety and Health Plan (SSHP). Information to develop the plan can be obtained from competent health and safety professionals, the risk assessment process and environmental monitoring. The SSH Plan should be reviewed regularly with regard to the safety and health implications of the activities proposed or in progress;
- Planning and participating in meetings to identify health and safety concerns inherent in the operation's daily work plan and communicating the hazards and mitigation measures to all personnel.
- Correcting unsafe acts or conditions through the regular line of authority, although the responsible individual should be authorized to exercise emergency authority to prevent or stop unsafe acts when immediate action is required. They should also ensure that any accidents or exposures occurring during the spill response are investigated.

It is also very important that competent personnel, i.e., those appropriately trained and experienced in the issues surrounding spill safety, is used to manage and supervise the response.

3.2 OSH PLANNING AND IMPLEMENTATION

Noting the particular challenges mentioned earlier, the primary objective of the OSH work during oil spill response operations is to prevent accidents and ensure that no harm to human life and health is caused during clean-up operations or as a result thereof. Furthermore, the oil spill clean-up operations should not cause further damage to the environment (beyond that caused by the oil spill incident itself) and equipment and material used for the oil spill response should not be damaged.

To achieve this health and safety objective, the oil spill response incident command should establish an OSH plan with the necessary OSH guidelines that assign responsibilities and ensure efficient follow-up and control of the risk factors in the particular workplace (i.e., on the response vessels and other vessels involved in the operation, on shore, on different types of beaches, etc.).

When drafting an OSH plan, the principles of logistics, communication, personnel etc. as described in chapter 2.2 should be considered.

3.2.1 PRE-OPERATION RISK ASSESSMENT

It is recommended to conduct risk assessments (as detailed in chapter 4.1) before any actual response operation or exercise (e.g. as part of the contingency planning), because standard operations, jobs, methods and machineries as well as most types of oil are well known. In case of an incident or exercise, the risk assessment then only needs a brief "check-up" and possible slight adaption to the real situation. This consumes much less time and resources during the initial stages of a response.

3.2.2 PERSONAL PROTECTIVE EQUIPMENT (PPE) PREPAREDNESS

3.2.2.1 IN GENERAL

A person may be exposed to oil / chemicals through skin and eye contact, inhalation and ingestion. In most oil spill response operations, it is inevitable that personnel will come into close contact with the oil (and / or dispersants or other chemical substances). To avoid harm or injuries the use of proper personal protective equipment (PPE) will be a paramount necessity in these circumstances. Therefore, based on the importance of PPE, there is detailed information on PPE included in this guidance document.

It is vital to emphasize that the use of PPE is not the only risk control measure, but rather the last item in the hierarchy of control measures [4] (see also the STOP concept in chapter 4.2).

The choice of necessary PPE is based on the definition of the protection goals and the respective risk assessment made. This PPE may only be used for as long as it is ensured that there is no "worst-case scenario" (i.e., if the risk posed by the specific scenario can no longer be controlled by the selected PPE, see also chapter 4.1.3) and if it is suitable.

The whole PPE is made up of various components, such as body protection, respiratory protection, face protection, etc. However, there are significant differences in the performance, the protection capacity or the application area in the various components. These are defined in the relevant (international) standards and must be observed when selecting the proper PPE [4].

KEY MESSAGE

THE PROPER SELECTION AND USE OF PPE REQUIRE SKILL AND EXPERIENCE. REGULAR TRAINING OF RESPONDERS ON THE USE OF PPE IS VITAL IN THIS REGARD.

3.2.2.2 SELECTION OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

The following points should be taken into consideration when selecting the appropriate PPE for oil spill response operations [6]:

- Conducting an initial site assessment or checking and adapting the existing pre-operation risk assessments from OSH plans with documented processes for: hazard identification; risk assessment; selection of responders, including local labour; provision of controls (e.g., zoning, specialized equipment, and PPE); assessment of training needs, and identification of decontamination areas;
- The expected working conditions and hazards;
- The activities to be performed;
- The person(s) being exposed; and
- The compatibility of the equipment — each item of PPE should be capable of performing effectively without hindering the proper operation of other PPE items (balance between protection and work ability).

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

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

The working environment (see chapter 2.2) 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 climates, impermeable clothing will intensify any heat-related health problems. Responders should therefore be given adequate rest breaks and liquids to assure their welfare, or an acceptable compromise should be reached in the type of PPE that they wear (as a minimum must).

By taking an activity-based approach to PPE selection, a response organisation is able to set some working parameters. These working parameters should include mechanical protection, the elements / climate, and hazardous substances. The mechanical and chemical resistance of the PPE as well as any manufacturers' and suppliers' instructions have to be considered. The safety officer or OSH coordinator can determine the most suitable type of PPE, bearing in mind the points mentioned above. Records should be kept of selection, maintenance and testing of PPE [6].

KEY MESSAGE

THE SELECTED PPE MUST FIT THE SIZE OF EACH RESPONDER USING IT.

Proper size-fitting of individual PPE is very important, otherwise, its effectiveness and mobility of the responder may be seriously harmed which is another safety risk. As not all responders have average body sizes, all PPE components should be kept ready in all normally available sizes (e.g., XS, S, M, L, XL etc).

KEY MESSAGE

BEFORE THE USE OF PPE, WHICH WILL BE NECESSARY IN MOST CASES, THE RESPONDERS MUST PERFORM A COMPULSORY MEDICAL CHECK-UP WITH FIT TEST AND THE RECEPTION OF CLEARANCE, DEPENDING ON NATIONAL LEGISLATION.

3.2.2.3 PROTECTION FOR SPECIFIC BODY AREAS

The table below provides an overview of PPE per body area and hazard [6]

AREA	HAZARD	PPE
Eyes	Chemical (e.g., oil, dispersants, beach cleaning agents, etc.) or metal splash, dust, projectiles, gas and vapour, radiation	Safety spectacles, goggles, face shields, visors, all specific to the hazard involved
Head	Impact from falling or flying objects, risk of head bumping, hair entanglement	A range of helmets and bump caps
Body	Temperature extremes, adverse weather, chemical or metal splash, spray from pressure leaks or spray guns, impact or penetration, contaminated dust, excessive wear or entanglement of own clothing	Conventional and / or disposable overalls, boiler suits, high-visibility clothing and specialist protective clothing (e.g., for chemical exposure), flotation suits, life jackets
Hands and arms	Abrasion, temperature extremes, cuts and punctures, impact, chemicals, skin infection or contamination	Gloves, gauntlets
Feet and legs	Wet, slipping, cuts and punctures, falling objects, chemical splash, abrasion	Safety boots and shoes with protective toecaps and penetration-resistant mid-sole, gaiters, leggings, spats
Hearing	Noise at levels of 85 dBA or more	Hearing protection devices in the form of plugs or muffs, with an element of personal selection

Table 1: Protection for specific areas [6]

3.2.2.4 RESPIRATORY PROTECTIVE EQUIPMENT (RPE)

Airborne substances can be in solid, liquid or gaseous state. The following are examples which may occur during oil spill response operations:

- During dry and windy weather sand particles can fill the air on beaches;
- Aerosols containing an oil-water-mixture will occur when using high pressure cleaners (e.g., to clean contaminated rocks or other solid surfaces);
- Volatile components of oil will evaporate from the oil slick during warm / hot weather.

RPE is designed to protect the user against inhalation of these hazardous substances in the air.

There are two main types of RPE:

1. **Respirators (filtering devices)**: these use filters to remove contaminants in the workplace air. They should never be used for protection in situations with reduced oxygen levels;

2. **Breathing apparatus (BA)**: this requires a supply of breathing quality air from an air cylinder (self-contained breathing apparatus – SCBA) or compressor and is used for protection in situations with reduced oxygen levels or very high levels of hazardous chemicals.

Both types of RPE are available with a range of different face pieces:

- **Masks** are tight-fitting face pieces (filtering face pieces, half- and full-face masks) and rely on having a good seal with the wearer's face. They can be part of both respirators and BA, and fit-testing should be always carried out. Depending on the type of work (low, medium or heavy physical activity), tightness of the masks and corresponding breathing resistance, the masks should be worn for between one and two hours. A 30-minute break should be foreseen after such a wearing period. Different filters have different protective levels, i.e., the level of insulation from the atmosphere. The higher this level is, the more difficult it is for the user to breath and more breaks are necessary;
- **Hoods**, **helmets and suits** usually have loose-fitting face pieces which rely on enough clean air being provided to the wearer to prevent contaminants leaking in. They are only used on fan-powered respirators and / or air-fed equipment.

Any items of headwear, spectacles with side arms or facial hair can interfere with the seal to the face when wearing tight-fitting face pieces, that can lead to leakage. If this cannot be eliminated, a loose-fitting face piece should be considered.

Air-purifying respirators must be fitted with a filter, and these do not protect against oxygen deficient atmospheres. There are three main types:

1. **Particle filters:** these trap and hold particles from the air flowing through them. They do not trap gases or vapours including organic liquid mists and sprays;

2. **Gas / vapour filters:** these are designed to remove gases or vapours, as specified by the manufacturer. They do not protect against particles, and their capacity for removing gases and vapours is limited;

3. **Combined filters:** these provide protection against particles, gases and vapours.

KEY MESSAGE

IF OXYGEN DEFICIENCY IS LIKELY, A BREATHING APPARATUS (BA) IS REQUIRED

Special considerations when selecting RPE include:

- **Visual clarity:** for discerning fine detail, half mask RPE or scratch / mist-resistant designs may be necessary;
- **High temperatures or humidity:** wearing RPE increases heat stress, sweating and discomfort. Using fan-assisted or compressed air-supplied BA can help; proprietary cooling devices are available from RPE manufacturers;
- **Extreme cold:** air-flow associated with fan assisted or compressed air-supplied BA can cause chilling; proprietary heating devices are available from RPE manufacturers;
- **Communication:** all RPE affects communication and specialist devices or other arrangements may be necessary to ensure communication capability;
- **Mobility over large areas:** trailing hoses can drag, snag or be a trip hazard;
- **Potentially explosive atmosphere (ATEX):** intrinsically safe, light-alloy free and antistatic RPE is required;
- **Relevant medical conditions:** for example claustrophobia, heart disease, asthma.

3.2.2.5 COMBINATION OF DIFFERENT PPE COMPONENTS

In order to facilitate the selection of suitable PPE for the first response units on site, certain levels or modules of PPE combinations for certain activities should be defined in advance (see Annex 10.9) [4].

SUMMARY BOX

Issues to be considered while choosing PPE:

- **Is PPE appropriate for the risks involved and the working conditions at the place where exposure to the risk may occur?**
- **Does it prevent or adequately control the risks involved without increasing the overall level of risk?**
- **Can it be adjusted to fit the wearer / user correctly?**
- **Has the state of health of those who will be wearing it been considered?**
- **What are the needs of the job and the demands it places on the PPE wearer / user?**

  (For example, consider the length of time the PPE needs to be worn, the physical effort required to do the job and the requirements for visibility and communication.)
- **If more than one item of PPE is being worn, are they compatible? (For example, does a particular type of respirator make it difficult to get the eye protection to fit properly?)**

Because PPE is the last resort after other methods of protection have been considered, it is important that users wear it during all the time they are exposed to the hazard. Where possible, choose equipment where the different forms of protection required are integrally combined (e.g.., eye, face, head and respiratory protection provided by a fan-assisted helmet respirator) [6].

For details / more info on selection and usage of PPE see Annexes 10.9, 10.10, 10.11

KEY MESSAGE

THE MAIN PRINCIPLE WHEN SELECTING PPE SHOULD BE: FIND THE RIGHT BALANCE BETWEEN PROTECTION AND WORK ABILITY.

3.3 OSH TRAINING AND EXERCISES

A key element to prevent harm to responders is the participation in regular job-specific training and exercises. The training might include practical training with oil response equipment and methods for containing the oil spill or different cleaning techniques. The training can be hands-on, practical on the job training or also consist of table-top scenario-based training. It is very important that such training for response personnel is held regularly and that it includes occupational safety and health topics like risk assessments, reporting of non-conformities and establishment of safety zones on-site (red, yellow and green zones).

The high risks and complex hazards of the oil spill response equipment, heavy machinery, PPE and the pollutants demand that generally only well-trained responders should be deployed in the response operations. This varies from country to country generally.

In most countries, predefined special first response units receive their OSH training during dedicated courses at their home base or at special training centres. Depending on each country's and each organisation's specific regulations this OSH training should cover:

- Hazards of pollutants;
- Recognition and assessment of hazards and spills;
- Basic safety rules;
- Prevention of contamination spreading;
- Response and protection strategies;
- Hazards, safe operation procedures and correct deployment of response equipment;
- Hazards, correct usage and correct removing of PPE;
- Basics on decontamination;
- Response site organisation.

Beside the different OSH training courses, these topics should also be integrated and addressed during oil spill response exercises (e.g., at sea, on the shoreline or during table-top exercises) on a regular basis.

KEY MESSAGE

A KEY ELEMENT TO PREVENT HARM TO RESPONDERS IS THE PARTICIPATION IN REGULAR JOB-SPECIFIC TRAINING AND EXERCISES, INCLUDING KEY OSH CONSIDERATIONS.

SUMMARY
PHASE 1
PRE-OPERATIONS

IDENTIFY OSH RESPONSIBILITIES & KEY ACTORS

ESTABLISH AN OSH PLAN

PREPARE PPE

CONDUCT OSH TRAINING

CHAPTER 4

OSH PHASE 2 – OPERATIONS

During the actual oil spill response operations, the following five steps are recognised OSH steps to be conducted:

4.1 STEP 1 – IDENTIFY AND ASSESS RISKS RELATED TO THE OPERATION

4.1.1 OVERALL RISK ASSESSMENT

As soon as an oil spill incident occurs, the incident command is obliged to carry out an initial risk assessment of the overall situation of the specific incident as soon as possible to ensure that oil spill responders (and the wider population) are not in danger. In this risk assessment, which will follow the principles of the OSH Plan developed in the pre-operational phase, assessing the potential "worst case scenario" for the specific incident, in parallel to the actual incident, is very important.

This initial risk assessment approach for an incident aims to answer such key questions[1], as:

- Is there a potential explosive atmosphere and therefore an explosion risk? (See Annex 10.4)
- Should people be evacuated or exclusion zones set-up?
- Are there any specific concerns regarding the spill location (can responders safely approach the incident location at sea / on shoreline? if on the shoreline, what type of beach is involved?)
- Are there any specific concerns regarding the weather (e.g., wind, temperature, waves, drift / flow, etc.)?
- Will the oil spill contaminate water systems that may affect or harm people on land?

This initial assessment may lead to the establishment of safety or exclusion zones, whilst the area is being monitored in more detail. This may include the use of monitoring equipment to detect volatile compounds or lack of oxygen if there are going to be operations inside / on the disabled vessel. The Safety Data Sheet (SDS) of the spilled compound can provide valuable information about its behaviour, possible intrinsic hazards and risks. From a safety point of view, the response to the oil spill can begin when the levels of volatile compounds are at an acceptable level (see Annex 10.4). Oil spill responders are not to enter areas in which there is a risk of explosion, toxic vapours or enclosed spaces where there may be a lack of oxygen. Trained and well-equipped special response teams (e.g., from fire brigades) are the ones most likely to enter such high-risk areas with appropriate breathing apparatus (see chapter 4.1.3).

For an example of such an initial / overall risk assessment, see Annex 10.7.

[1] Please note that these questions are just examples. Time of the year, local conditions or other issues might influence which key questions to consider each time.

When preparing for oil spill response operations, the early identification of potential hazards and risks is very important to ensure the safety and health for all the responders. What are the risk factors? and what are the hazards in the given situation? The incident commander, or the OSH coordinator, have the responsibility to perform these risk assessments. All the responders should participate in both the execution of risk assessments as well as in implementing any risk reducing measures.

INFO BOX

List of potential health and safety risks and hazards for oil spill response operations

In national, as well as international guidelines, a detailed (but not exhaustive) list of potential health and safety risks and hazards for workers has been established (see Annex 10.5). This can be used as a basis for the initial overall risk assessment in oil spill response operations as well.

For operations or tasks that consist of high risks, written instructions / job descriptions should be prepared for use by the responder. The intention is to describe in detail the operations and tasks in addition to the identification of the risks and the necessary safety measures.

Written instructions / detailed job descriptions should be prepared and applied for:

- Usage of oil spill recovery equipment (e.g., booms, skimmers, etc.);
- Methods for recovering oil (e.g., towing of booms, skimming, shoreline cleaning techniques, etc.);
- Type of, and the correct usage of, PPE;
- Proper handling of spilled materials and chemicals.

There are several methods to assess the risk to occupational safety and health. There might be national legislation regulating which method or approach to use, or already adapted methods developed and used by organisations involved in the oil spill response. However, the requirement to perform a risk assessment will most likely not differ between countries.

KEY MESSAGE

THE RESULT OF THE RISK ASSESSMENT IS THE KEY TO DEVELOP A SAFE WORKING ENVIRONMENT, NOT THE METHOD USED TO IDENTIFY THE RISKS.

General approach to risk assessment

The individual steps to take for general risk assessments are [4]:

1. Define oil spill response activities to be taken in connection with the response operation; **(hazard identification)**
2. Identify associated hazards (from e.g., spilled substance, working environment, activities, methods and machinery, etc.); **(hazard identification)**
3. Assess these hazards; **(Risk Analysis)**
4. Determine measures to eliminate or reduce the risks; **(Risk Evaluation)**
5. Evaluate these measures; **(Risk Evaluation)**
6. Check their effectiveness; **(Risk Control)**
7. Update risk assessment **(Risk Control)**.

Once completed, the probability and the severity (= risk) of any potential incident / accident should be predicted and assessed. The next step is to mitigate the risks from those incidents / accidents most likely to occur frequently or those most likely to cause the greatest harm. Considerations should be taken of who might be harmed, and how.

There are a few techniques in common use for the assessment of risk. Some rely on descriptive ranking, while others employ a numerical scoring system to produce an order of priority.

Whatever system is employed, it is important that all the assessments are carried out in a consistent manner, are based on informed analysis of the incident and documented appropriately.

Once the risks have been considered, the safety and mitigation measures available should then be examined to determine their effectiveness. If the hazard continues to present an unacceptable risk, then additional measures should be put in place [7]. If the unacceptable risk remains despite these additional measures, then the planned operation should be cancelled or an alternative operation with less risk should be initiated.

KEY MESSAGE

NO MATTER WHICH RISK ASSESSMENT METHOD IS USED, THE RISK ASSESSMENT MUST BE DOCUMENTED.

The documentation should contain:

- Identified hazards that require action due to the outcome of the assessment;
- Technical and organisational measures to be implemented, as well as PPE and behavioural requirements to be used;
- Results of the effectiveness review of the safety measures;
- Any additional information on risk assessment priorities, on the timetable of actions and those responsible. These should be validated by the OSH coordinator [4].

As a result of the risk assessment written instructions on how to implement the safety measures should be prepared and communicated to the responders.

4.1.2 SHORT-TERM ASSIGNMENTS / HAZARD ASSESSMENT

For short-term assignments, where a full-scale risk assessment process cannot be completed (e.g. when sufficient time is not available, personnel are lacking training in the proposed operation, the prepared risk assessments and instructions are not applicable, etc.), the use of the method so-called "command process" may be used (see Annex 10.6). This method is comparable to the steps of a classic / general / overall risk assessment and consists of three sub-steps (see Figure 2) [4]:

- Assessment (survey / monitoring, effectiveness check / identification of hazards),
- Planning (determination / evaluation),
- Commanding (implementation of protection).

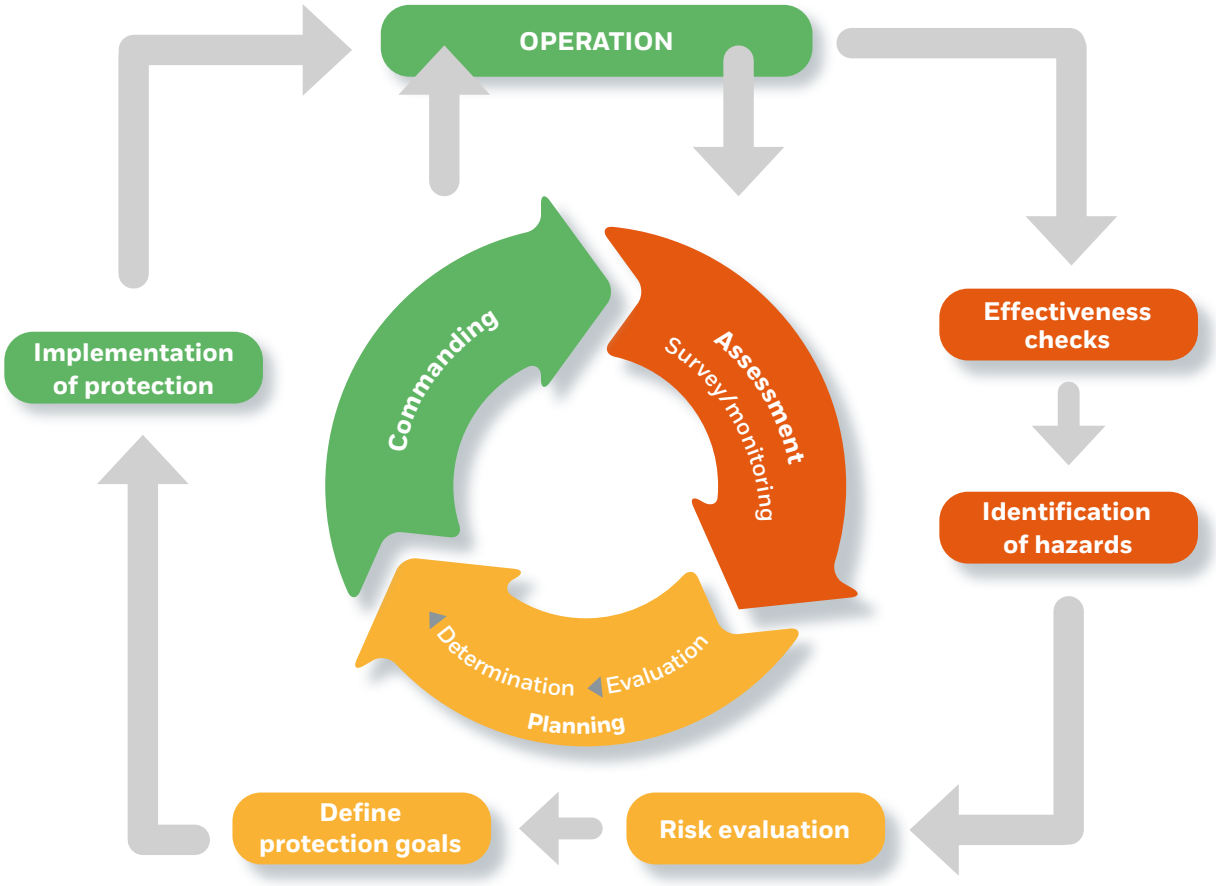


Figure 2: Hazard assessment steps for short-term assignments [8]

In this method only one part of the "assessment" step is performed (i.e., the identification of hazards. When the hazards have been identified, if deemed necessary, measures to reduce risk can be implemented prior to the execution of the assignment. Once the hazard assessment is completed, communicating the result to all personnel who are, or will be, performing that assignment is important.

Using appropriate forms (e.g., the Site Safety Survey Checklist example in Annex 10.16), can facilitate the risk assessment.

RISK ASSESSMENT	SHORT TERM ASSIGNMENTS / HAZARD ASSESSMENT
• Identify assignment / job • Identify related hazards • Identify safety measures • Implement safety measures • Communicate safety measures to involved personnel	• Identify operations • Assessment • Planning • Commanding
Examples of when it could be used: • Planning at sea operations • Planning shoreline operations • Planning demobilizing operations • Deployment of a boom • Operating a skimmer • Specific Shoreline cleaning equipment or techniques	**Examples of when it could be used:** • A special situation which is not covered by prepared risk assessments and requires immediate action.

Table 2: Comparison between assessment methods

4.1.3 WORST CASE SCENARIO PLAN AND EMERGENCY PLAN FOR UNFORESEEN EVENTS

The incident command should have a plan for emergency measures in case of maritime accidents / incidents. Minimum necessary preparations for emergencies may include for example:

- Access to immediate first aid on the scene;
- Ensuring that the local health service / authorities are pre-notified and included in any pre-incident emergency plan;
- Having in place an agreement with the local fire and rescue service, etc. [7].

The local health authorities should be informed of the activities taking place in connection with the oil spill response operation. It should be clarified whether the operation requires extra medical measures and if yes, who will oversee these. It is also recommended to have rescue vehicles ready for use on the beach, on the shore and near the water in case of emergencies.

KEY MESSAGE

THERE SHOULD ALWAYS BE A PLAN IN PLACE FOR PREPAREDNESS MEASURES FOR EACH OPERATION IN THE EVENT OF AN ACCIDENT

Example: In the event of accidents, remove injured persons from the danger zone, secure the accident site, provide first aid. If necessary, use first responders. In the event of serious injuries, call the emergency medical services.

Personal injuries requiring medical treatment should be notified as follows:

ON LAND / IN THE COASTAL ZONE	ON VESSELS / AT SEA
• Directly to medical emergency services and then the operation leader • The operation leader notifies operation management and verifies that the report has been received by the medical emergency services	• In accordance with the vessel's preparedness plan (large vessels) • The captain contacts the Rescue Coordination Centre (RCC) directly, and the on scene commander at sea (OSC) • The OSC notifies operation management and verifies that the RCC has received the report

Table 3: Notifying personal injuries

All levels of management are responsible for reporting serious injuries to the incident command, ensuring that the incident has been appropriately dealt with at the incident site or if needed, that it has been notified to the emergency services. The incident command is responsible to further report to the relevant authority responsible for worker safety. For incidents / accidents on board ships, reporting according to national maritime rules is applicable. [4]

In this handbook, unforeseen or worst-case scenarios cover any event that is unforeseen or that has not been foreseen and may include the following developments (please note this list is non-exhaustive):

- Unclear or unexpected danger situations;
- The inclusion of other hazardous substances (such as hazardous chemicals or radioactive substances) in the incident;

- When the risk of fire or explosion increases;
- Situations where there is a lack of oxygen;
- Situations where measured values exceed the emergency thresholds;
- The on-site assessment shows that the personal protective equipment (PPE) available or stockpiled for oil spill response may not be appropriate or sufficient;
- Dumped ammunition or chemical warfare agents are encountered during clean-up operations, etc.

KEY MESSAGE

IT SHOULD BE NOTED THAT THE ESCALATION OF AN INCIDENT CAN HAPPEN AT ANY TIME AND ANYWHERE IN THE RESPONSE PHASES

In the case of other hazardous chemicals becoming involved in the incident, then, standard Chemical, Biological, Radiological and Nuclear (CBRN) / Hazard Noxious Substances (HNS) emergency procedures should be followed.

Personnel not properly trained or equipped for responding to incidents concerning chemicals other than oil should implement as a minimum the following four basic emergency actions as soon as they become aware of such an escalation (for more information please go to Annex 10.20):

1. Recognise (possible) hazards;
2. Close off area and evacuate danger zone;
3. Perform first aid rescue and lifesaving measures, if necessary;
4. Request Specialised Response Units or Teams with trained personnel and suitable equipment.

The results of each of these four actions, as well as information on the further course of action deriving from these should be passed on without delay to the leadership or the response and the responders.

KEY MESSAGE

THE RESPONDERS SHOULD BE CONSTANTLY AWARE OF THEIR SURROUNDINGS AND WHEN THEY BECOME AWARE OF SOMETHING UNUSUAL, THEN THEY NEED TO RESPOND RAPIDLY TO REDUCE RISKS TO THEMSELVES AND OTHER RESPONDERS.

4.2 STEP 2 – IMPLEMENT RISK REDUCING AND PROTECTION MEASURES

After the identification and assessment of the risks related to the response operations (step 1 described in chapter 4.1), putting in place the most appropriate risk reducing and protective measures to ensure the OSH of the responders is the next important step to be taken.

4.2.1 GENERAL APPROACH – THE STOP CONCEPT

In general, the protective measures are derived according to the "STOP" principle:

- "S" - substitution or replacement;
- "T" - technical measures;
- "O" - organisational measures and;
- "P" - personal and behavioural safety measures.

Substitution (replacement) of sources of hazard

Either eliminate sources of hazard or "defuse" them to the extent that they are no longer deemed to be hazards.

Examples: Substitution of hazardous substances by less harmful substances for chemical absorption of the oil, or instead of low voltage (230 V) use extra-low voltage (24 V) etc.

Technical measures

"Lock in" or "lock out" hazards or reduce them by use of protective devices. Sometimes called "collective measures".

Examples: Insert safety locks in hazardous areas, use protective barriers or protective housing for mechanical systems, installation grates on vessels to prevent falling.

Organisational measures

Spatial and / or temporal separation of a hazard from humans.

Examples: Separation of footpaths and forklift routes, limitation of the number of persons in a certain work area, limitation of working hours when working with high noise or hazardous substances, never work alone, never work out of sight of others.

Person-related measures

Individual protection of human beings through behavioural measures and, if necessary, use of personal protective equipment (PPE). These will be subordinate to the previous measures, which means that measures should be taken first, if possible, to replace the hazard source, install technical measures or implement organizational measures, before taking and relying on person-related-measures (e.g. use of PPE).

Examples: Use of safety goggles, safety helmet or safety shoes, work safety instructions, forklift driver training, rules of conduct, such as operating instructions promoting safety-critical behaviours, that are then monitored by observation, constructive feedback and incentives to promote safety.

4.2.2 PERSONAL PROTECTIVE EQUIPMENT (PPE) SELECTION AND USAGE

The selection of the personal protective equipment (PPE) to be used in the response operations is based on a variety of factors, including:

- **An assessment of the requirements specific to the incident**

  A checklist should be developed in the pre-incident phase to identify and offer all options to the response. The OSH Manager or his assistants should then select the necessary equipment via a filter function.

- **Factors affecting the response :**

  - The PPE quantities needed based on the size of the incident;
  - Type of crude oil, its viscosity, vapours;
  - Climate (hot, cold, wind);
  - Daylight / night / both;
  - Risks of acute health problems (skin, breathing);
  - The training / experience of the responders;
  - The need to install a decontamination station with clear separation between contaminated / unclean (black area) and clean (white area) sides (see Figure 3), such as for example, a double locker room with showers in between. The border between black and white areas is where you take off the PPE suite and step into the 'clean' area.

- **Site related issues**

  - Definition of tasks and persons / groups performing these tasks;
  - Selection of adequate PPE per person or groups for the tasks;
  - Necessary instructions for use, including possible difficulties in PPE (acute health issues) or observation of damages, malfunctioning or degeneration;
  - Whether work will be undertaken on vessels or onshore;
  - Risk of drowning;
  - Risk of slipping or falling (for example on oily rocks);
  - Instructions on disposal / cleaning of PPE.

For details on PPE preparedness see chapter 2.2. For more information on PPE, see Annex 10.10.

4.3 STEP 3 – ON-SITE ORGANISATION, GUIDANCE AND SAFETY BRIEFING

4.3.1 ORGANISATION OF THE RESPONSE SITE

The information below focuses on on-site organisation on the shoreline / land side, however it should be noted that the principles presented here are applicable, by analogy, also to oil spill response operations at sea on board response vessels.

Safety zones

An important measure of the organisation of the response site, is the closure of danger areas and the formation of safety zones. There will be areas where special hazards exist and therefore may only be entered by response personnel in appropriate PPE and with specific training, as well as areas without any special hazards [4].

In defining the respective range limits, the propagation of the hazardous materials and contamination shall be considered according to meteorological conditions (e.g., wind, temperature, etc.) and topographic features (e.g., elevation grade, etc.).

Usually there are three zones defined:

- **Hot zone or red zone:** this is the area which is contaminated by pollutants and where the actual response takes place. Everyone entering this zone is required to have the highest level of PPE on them.
- **Warm zone or yellow zone:** this is the zone between the cold and the hot zone and it can also be called the transition area. The warm zone is a buffer area between hot and cold zones. In this area, personnel must be prepared to use PPE, due to the risk of occasional contamination. The reduction of contamination or the actual decontamination happens here as well.
- **Cold zone or green zone:** this is the zone that is the farthest from the pollutant contamination, it is not contaminated, and it is considered a safe zone for the supporting units to work in. There is no need to wear oil spill response PPE in this zone. The cold zone defines the outer limits of the whole restricted, or response area. The cold zone also needs to be controlled, and anyone who is not involved in the response operation, or authorised by the operational command structure, should not be allowed to access this zone.

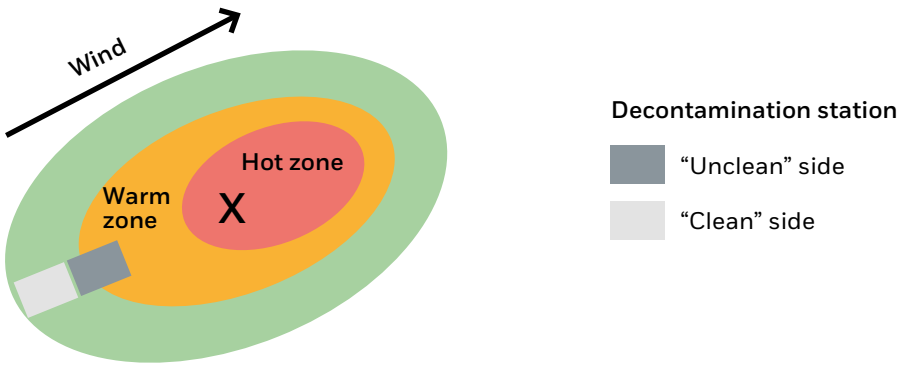


Figure 3: Safety zones overview [9]

Establishing clean and dirty zones. Picture: NCA [7]

One instrument for the determination of the safety zones, especially the hot or red zone, are air measurements of harmful, flammable and oxygen-displacing volatile substances (see Annex 10.4).

Site facilities requirements

- Emergency equipment / teams;
- Food and water;
- Sanitation and personal hygiene facilities;
- Decontamination facilities;
- Handling of contaminated equipment and PPE;
- Waste handling.

Emergency equipment / teams

The following emergency equipment / teams, to ensure health and safety of the responders, have to be available on the response site or be on call:

- Rescue vehicle / vessels on land and at sea;
- Medical emergency teams;
- Firefighting teams (if needed);
- First aid kits;
- Fire extinguishers.

When the response site is not in operation, e.g., during night-time, appropriate security should be in place to prevent unauthorised entry, burglary and / or vandalism.

Food and water

The supply of drinks and food should always be ensured for all staff. Drinking water supply is a critical issue, since the responders wearing PPE will have increased fluid needs and so potable water or (better) isotonic beverages should be readily available [6]. Beverages should therefore be dispensed to the workforce during entry to and exit from the site. In addition, beverage / food supply for operating staff should be provided at a staging area within the cold zone, with appropriate decontamination facilities for the responders.

The quality of food should be guaranteed, from its source, through transport, storage, and (where applicable) the cooking and preparation process. If ambient temperatures are high, extra vigilance is necessary to avoid deterioration or infection. Extra calories are required while working in extreme cold. Heavy work in both hot and cold climates may lead to dehydration due to heavy sweating and responders should be encouraged to drink enough isotonic fluids.

For rest periods, accommodation options adapted to the weather (e.g., tents, etc.) at or near the response site should be provided. The need, type and quantity of rest area options may be established once the working conditions are known (see an example in Annex 10.21).

Sanitation and personal hygiene facilities

Eating, drinking, smoking, using cosmetics (such as lip balms) and urination / defecating are strictly prohibited in the warm and hot zones. This may only be done in designated, non-contaminated areas leeward of the green / cold side of the response site. Before and after the response activities, hand and possibly facial cleaning with skin cleanser / soap and water should be undertaken, and cleaning instructions and a skin care and protection plan should be developed for use by the responders. Skin protection measures should not only provide protection against oil, but also against UV radiation (sun).

Appropriate sanitary facilities or at least temporary facilities should be provided at all response sites. Potable water, non-potable water, toilets and personal hygiene facilities should be readily available.

For work in hot environments, where the responders may sweat heavily, the possibility to shower on site should also be offered .

The disposal of sewage, the storage of waste collected in the response and rubbish should be designed to protect the health of humans as well as the environment [4].

Decontamination facilities

Decontamination is best performed in a specific sequence to reduce levels of contamination on personnel, PPE, equipment or transport until no contaminant remains. Facilities should be established to deal with the waste from cleaning stations so it can be stored and disposed of in an approved manner in order to prevent secondary pollution [6]. Annex 10.22 provides some key principles for decontamination of personnel.

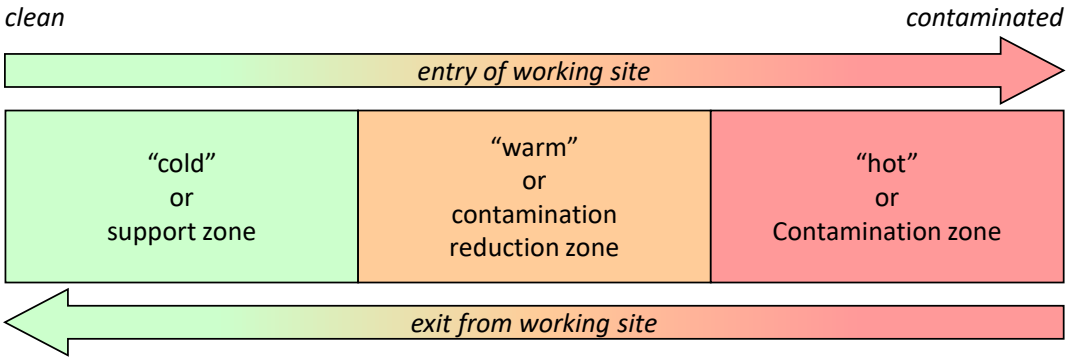


Figure 4: Safety zones details [6]

Decontamination stations should take personnel and equipment from the "hot" contaminated zone through a "warm" cleaning zone into the "cold" zone of the operation area. Movement through these zones should be coordinated to reduce the possibility of cross-contamination.

The following provides a recommended step-by-step process for a decontamination station [4]:

- **Before entering the hot zone:**

1. Briefing and registration when entering the hot zone, including the documentation of the briefing and the registration;
2. Medical control / checks;
3. Distribution of relevant PPE and undersuit (see Table 7);
4. Change from unnecessary private or work clothes (e.g., fire-fighter suit, etc.) to the PPE and undersuit (e.g. simple overall, sweat suit) provided for the operations;
5. Storage of the private or work clothes;
6. Register working time in hot zone (name, entry time, etc.);
7. Enter the hot zone.

- **When leaving the hot zone:**

1. Admission to the decontamination site in the warm zone;
2. Delivery of any small equipment used (e.g., buckets, shovels, etc.);
3. Pre-cleaning of person whilst still wearing PPE;
4. Removing the PPE (used and contaminated PPE is usually treated as waste and should be disposed of in the proper way, specifically taking into account if it is contaminated with hazardous material);
5. Define decontamination (decon) requirement for the person;
6. Hand and facial cleansing, maybe full-body shower;
7. Rapid medical control / checks;

8. Registration of leaving the hot zone;
9. Reclaiming personal private or work clothes;
10. Undress the undersuit (which should not be contaminated) and putting on the private or work clothes;
11. Handing over the undersuit (which should be cleaned or disposed of / case by case);
12. Enter the cold zone.

Concerning the equipment and the organisation of the decontamination facilities for oil spill response operations, it is recommended that standardised decontamination units used by the "normal" emergency services, adapted to oil contamination, are deployed. This means that decontamination can be performed by taking off contaminated PPE only ("dry decontamination") instead of using common decon showers ("wet decontamination") [4].

Usually, these special units can be deployed by trucks, container, etc. with the required equipment (e.g., tents, mountings, hygiene equipment, including the necessary forms, etc.) and with personnel that are well trained to use the equipment.

For large response sites, several decontamination stations should be set up to avoid the spread of contaminants from the hot and warm zones to the other areas and to shorten the decontamination process for the increased numbers of responders.

KEY MESSAGE

IT SHOULD BE ENSURED THAT THE RESPONSE PERSONNEL ALWAYS LEAVE THE HOT ZONE VIA THE DECONTAMINATION SITE, THROUGH WHICH THEY ENTERED THE HOT ZONE. THIS SIMPLIFIES DOCUMENTATION, PERSONNEL PLANNING AND LOGISTICS AT THE DECONTAMINATION SITE.

All persons leaving the hot zone should be registered by name and the time they leave should be noted. In addition, any injuries, however minor, or skin contamination should be registered during this process.

When wearing PPE for cleaning any contaminated equipment, the decontamination process described above should also be used by the people undertaking the equipment decontamination. Under certain circumstances, vehicles (and their crews) entering the warm zone from the hot zone should also be decontaminated.

KEY MESSAGE

EVERYONE SHOULD BE DECONTAMINATED IF CONTAMINATED.

In the decontamination facilities opportunities for personal hygiene (sinks for cleaning hands and face, showers, etc.) should be offered to the personnel [4].

Handling of contaminated equipment and PPE

Used and contaminated equipment from the spill response operations should be handed over at the end of the working shift and placed directly in an equipment repository in the contaminated area. In all cases, any contaminated PPE should be handled by personnel also protected by appropriate PPE.

After the end of the response operation, the status of contaminated (large scale) equipment or assets should be assessed to decide whether it can be cleaned and repaired for reuse or disposed of as waste (see below). People involved in this assessment may include technical personnel, the owner of the equipment, the responsible authority for the clean-up, a representative of the insurance company or P&I club, etc.

Some of the PPE components usually used during oil spill response (see Table 7) are mostly intended for single use as they will become contaminated with oil. Used PPE should not be allowed to enter clean areas to prevent spreading of any contamination. Cleaning of PPE is difficult and as the donning of new PPE has to be performed in the clean area, this strictly forbids re-using any contaminated PPE. Furthermore, during the removal of contaminated PPE components, they usually have to be cut off to allow removal without contaminating the undersuit or any underwear (see Annex 10.11 for PPE removal instructions). The undersuit is the only part of the PPE which is reusable. Used and contaminated PPE is usually therefore treated as waste (see below).

In the exceptional case where contaminated PPE is reused, it should be handled with special care and contamination spreading should be prevented, as far as possible. Between the working shifts the contaminated PPE should be stored in separated repositories in the unclean zone where it can easily be accessed by the responders entering the contaminated area.

Furthermore, every responder should reuse his own PPE only (for hygiene reasons).

Waste handling

Strict separation and safe storage of generated, partly hazardous waste (e.g., oil-water mixtures, oil-sand mixtures, contaminated filter materials, contaminated PPE, packaging, residual waste) has to be maintained at both the response site and the decontamination station [4].

Figure 5: Waste handling © Cedre / design Hippocampe.com [10]

This waste has to be placed in suitable containers, which have to be closed and marked. Disposal should be coordinated with the relevant waste authorities and registered waste contractors according to specific regional or national regulations [10].

4.3.2 ON-SITE INSTRUCTIONS AND SAFETY BRIEFING

When general emergency response units, e.g. fire fighters, military or other emergency response trained personnel who come with their own response processes and who are not specifically trained in oil spill response, have to be deployed, they should, as minimum, receive a brief training on spill response and safety at the staging area. This may also include the medical check-up / clearance, if the required PPE demands this. Such a brief training can qualify the personnel for simple response measures only, e.g., manual shoreline clean-up, even though these personnel are already trained for emergency situations and behaviour on operations sites.

INFO BOX

Possible switch of command:

The army and fire brigade usually have their own command structure that needs to be integrated with the on-site command to ensure the same OSH risks are controlled. For example, in Germany they would all work under the same overall command in case of an oil spill. If other hazmat is involved, the whole responsibility and operation «environment» steps back and the responsibility «acute emergency and hazard control» with their own responders, structures and equipment takes over.

A common situation with such switch of command is the occurrence of an explosive atmosphere when light products or crude oils are spilled and the population can be affected. For example this happened during the crude oil spill response on the Kiel Channel on Christmas of 2022, where the local fire brigade temporarily took over the command from the state coastal and environmental agency, until the explosive atmosphere was spread with the wind and was no longer detectable.

More sophisticated tasks, like deployment of specialised oil spill response equipment (e.g., power packs, skimmers, etc), require working together in pairs or smaller teams with well-trained oil spill responders.

In principle, the same applies to non-trained volunteers as well, although the fact that they lack any training on emergency situations and behaviour on operation sites makes their deployment even more complicated and critical. On the other hand, volunteers can have special qualifications, skills or knowledge due to their profession or local background, which might be very useful for the whole response operation.


Kiel Channel incident-December 2022-Pictures: CCME

During compulsory registration of the volunteers, the responsible authorities should find out:

- Whether the volunteer has any relevant existing qualifications or skills;
- Whether the volunteer has local knowledge of the spill area;
- Their personal attributes and preferences;
- How long they anticipate being available to offer their services;
- Their health and fitness status.

Depending on the outcome of this survey, the overall risk assessment and their planned deployment, the volunteers should at least receive an adapted brief training of spill response and safety at the staging area.

Safety Briefing

Before commencing any response work on the operation site or entering the hot zone (e.g., before shifts), all response personnel – including volunteers – should receive a compulsory safety briefing. Safety information should be communicated at the correct level to suit the audience; for example, clean-up crews will require a different content and style of briefing to the personnel in the command centre. This safety briefing should address the following topics [4, 6, 7]:

- The impact of the weather;
- The impact of the working environment and work zone characteristics;
- Hazard information on the spilled product;
- Hazards that are relevant to the area and the planned tasks;
- Risk-reducing and control measures;
- PPE, work equipment and applicable procedures;
- Evacuation routes;
- Assembly points;
- First-aid post locations;
- Location of staging areas;
- Command post locations;
- Review of relevant incidents and safety issues received;
- How to respond to other emergencies that may arise.

Any safety briefings and debriefings should be documented and issues raised should be followed-up. Each attendee should register his or her attendance. By signing this attendance sheet he or she will confirm that they have understood the briefing and will follow the safety rules on site. This information can be combined with the compulsory registration of every responder or volunteer.

Kiel Channel incident-December 2022-Pictures: CCME

There are several forms and posters available for briefings, their documentation and the registration of personnel. Examples of these can be found in Annex 10.15.

It is recommended that any training, as well as any briefing, is undertaken by a small team, consisting of the OSH coordinator (or one of his team), a team leader from the responders and probably a person familiar with the local environment and conditions [4, 6, 7].

After the work is terminated it is recommended to always conduct a short debriefing, so the responders can report any issues, unforeseen hazards, incidents, accidents and/or injuries.

4.4 STEP 4 – REAL-TIME COMMUNICATION, DOCUMENTATION AND REPORTING

4.4.1 ON-SITE COMMUNICATION

Having reliable and known communication channels during an oil spill response operation is very important for the overall effectiveness and safety of the operations. Such communication may require regular contact with the vessels taking part in the at sea operations, as well as with the various shoreline clean-up teams. Coordinated and good communication is vital in such large scale or complex operations. The responsible organisation / command authority for the oil spill response operation should have a communications plan. The communication plan should reflect the command structure from the overall command authority down to the single responder. It must be possible to contact all parties in the response through the communication network at any time and from all locations [7].

The communication plan should be part of the overall contingency and response plan and therefore adapted not only to the command structure, but to the local situation. It should be regularly tested during exercises.

The communications equipment should have been tested in advance for use in the respective area (coverage, transmitter strength, etc.) and with all the relevant stakeholders. The technical ability to communicate with different organisations and companies is important and should be regularly tested. In most cases the communication channels and radios of public safety and security organisations

Kiel Channel incident-December 2022-Pictures: CCME

form a closed system, which cannot be opened to private companies. In case radio communication between these organisations is needed, alternative ways have to be provided, such as PMR 466 radios [4].

The necessary training in the use of the assigned communication equipment and procedures should be given.

All radio and communications should be checked before the response work starts. All batteries must be fully charged. A sufficient number of extra / spare batteries (fully charged) should be available and ready for use. Cold temperatures reduce the available capacity of batteries, so it is important to keep radios and extra / spare batteries warm in cold weather conditions. For example, keep them in pockets close to the body and the use of remote hand microphones should be considered [7].

4.4.2 DOCUMENTATION AND REPORTING

The purpose of documentation / proper record-keeping and reporting OSH procedures is to:

- Improve safety, working conditions and exchange of best practice during oil spill response operations and exercises; and,
- To have a basis for decisions and measures in case of long-term health effects of the responders.

A comprehensive documentation and reporting system will be set up by the incident command in oil spill response, following the requirements of national legislation. This should include OSH information so the health and safety of the operation can be monitored and be controlled accordingly.

OSH documentation for each site should include:

- Site-specific risk assessment / job safety analysis [11, 12];
- Risk reducing measures and their implementation;
- Types and combination of PPE components;
- Flow charts and / or checklists or instruction document for decision making;
- Details, topics and participants of safety briefings;
- Working time, place and task of every responder;
- Emergencies, injuries and adverse events.

To facilitate the process of documentation and reporting it is recommended to use prepared and standardised forms like the examples included in the Annexes 10.17 and 10.18.

The reporting documentation should be completed on a daily basis at every command level and sent to the overall incident command and the OSH Manager. Depending on national legislation and the organisation of the OSH system the incident command will eventually forward the documents to the responsible authorities.

Emergencies, injuries and adverse events should be reported immediately to an immediate superior on site and dealt with immediately and appropriately. They should also be reported to the incident command for further actions and investigation (see also chapter 5). The purpose of reporting undesirable incidents (emergencies, injuries, adverse events or near incidents) and non-conformance to OSH, is necessary to improve safety, working conditions and exchange of best practice during oil spill response operations and exercises. Establishing a system for registering undesirable incidents helps improve safety monitoring and identifies hazardous situations and actions that may occur elsewhere. This system helps identify information required in order to be able to take the necessary action to reduce the risk of it happening again and also to assess the effect of any resulting action [4, 7].

The following incidents should be reported:

- Personal injury / death;
- Fire;
- Oil, HNS or gas leak that does not originate from the source of the oil spill response operation;
- Chemical spills;
- Damage of equipment;
- Damage to property;
- Near misses and hazardous situations;
- General proposed improvements.

As a minimum, the reports arising from the response operation should contain the following information:

- The situation at the scene when the incident occurred;
- Description of the sequence of events;
- Description of any personal injury or damage to property;
- Description of the direct cause of the incident;
- Action taken;
- Who was notified (police, fire brigade, rescue service, next-of-kin, etc.).

All individual operations should report the OSH status in their routine reports.

The following principles should form the basis of any reporting procedure :

1. Everyone is responsible for reporting to an immediate superior if he or she has witnessed or has been involved in an undesirable incident or sees that improvements in the workplace are required;
2. The supervisor should ensure that the incident is investigated and reported in the desired form;
3. If there are personal injuries, medical personnel should be contacted and the necessary first aid given;
4. If practically possible, the reporting during the response operations should be done daily and further processing should be carried out immediately and no later than the end of the working day;
5. The principal company or organisation should ensure that the reports are registered in an OSH or quality assurance system;
6. All incidents and proposed improvements should be investigated, analysed or assessed by a person responsible for safety in the management. In the event of incidents where special action is identified, it should be clear who will ensure further action and a deadline for its implementation;
7. Relevant reports should be presented in the briefings.

4.5 STEP 5 – REGULARLY CHECK, UPDATE AND IMPLEMENT OSH ON-SITE

After conducting and implementing OSH measures as described in steps 1 to 4, it is important to regularly check their effectiveness, if the balance between protection and work ability is achieved and if any new risks or hazards have occurred. Any shortcomings or new situations identified should lead to an update of the OSH plan and its implementation.

In the beginning of a response or during dynamic situations the OSH requirements can change often and within short periods of time, so the check, update and implementation process, which closes the "circle" to step 1 (see Figure 1), – should be completed in corresponding short intervals.

This regular check, update and implementation process is also subject to thorough documentation and record-keeping.

SUMMARY PHASE 2 OPERATIONS

1 IDENTIFY & ASSESS RISKS OF SPECIFIC OPERATION

2 IMPLEMENT RISK REDUCING & PROTECTION MEASURES

3 PROCEED WITH ON-SITE ORGANISATION AND SAFETY BRIEFING

4 ENSURE ON-SITE COMMUNICATION, DOCUMENTATION & REPORTING

5 CHECK, UPDATE & IMPLEMENT THE OSH PLAN ON-SITE

CHAPTER 5

OSH PHASE 3 – POST-OPERATIONS

5.1 EVALUATION OF RESPONSE AND OSH PLAN

During the post-operations phase, an overall evaluation of the response operations and of the OSH plan ,implemented during the response, should be conducted to help improve the effectiveness of future operations. The following list gives an idea of OSH related topics and questions which may be assessed during this evaluation process (non-exhaustive list):

- Were all relevant risks identified in time?
- Were the chosen protective measures sufficient?
- Were the chosen / available PPE components suitable / appropriate / adequate?
- Was the balance between protection and work ability achieved?
- Were the safety briefings (and any short trainings conducted) sufficient?
- Was everyone aware of the overall situation, their individual tasks and personal responsibility?
- Was the on-site communication well organised and sufficient?
- Was the documentation / record-keeping conducted throughout the operations?
- Were shortcomings, incidents, etc. identified and measures implemented in time?

This evaluation leads to the identification of verified adverse factors (VAF) and good practices (GP) as described in chapter 5.3.

5.2 HEALTH EVALUATION OF RESPONDERS

In terms of occupational health, if necessary, based on the risk assessment, a doctor should consider - daily and at the end of the operation - the following monitoring and control actions:

5.2.1 DAILY

Screening for possible acute symptoms related to exposure to hydrocarbons, including any changes in the following organs or systems:

- Eyes (tearing, red eyes);
- Skin (itching, eczema, itching and erythema - commonly spots / rashes, ...);
- Respiratory System (cough, shortness of breath, oropharyngeal irritation);
- Central Nervous System (headache, drowsiness, dizziness, loss of knowledge).

If there are complaints, they should be subject to additional examinations taken by appropriate personnel.

5.2.2 AT THE END OF OPERATIONS

- Carry out a post-ops exposure assessment;
- Prepare a post-ops questionnaire to be filled-in by all responders;
- Conduct an annual medical examination with the analyses provided for in the general profile and exposure profiles for dust / chemicals and biological agents that are in force in the country or, if none exist, in accordance with the protocols of analysis suggested in Annex 10.19.

5.3 LESSONS LEARNED

From the time the authorities are initially notified of a pollution incident until the end of the clean-up and oil spill response operations, several decisions are taken and various processes and activities are carried out in the response. However, its success may not be exempt from the occurrence of adverse factors.

These verified adverse factors (VAF), may result from various factors such as wrong decisions, accidents during operations, equipment and system breakdowns, incorrect individual or collective procedures, etc. Any OSH-specific VAF should be identified and taken into consideration when listing the lessons learnt from each response operation.

Sometimes, on the other hand, during the search for immediate solutions in the response to an incident, some good practices (GP) are created and successfully implemented. However, because they are often not recorded and integrated into the organization's procedures / doctrine, these good practices are eventually lost and not used in future incidents.

Thus, to ensure the desired continuous improvement in oil spill operations, it´s important to ensure both the non-repetition of these VAF / adverse factors, or the reduction of their impact, and the future use of innovative solutions and good practices (GP) that may have been created.

To meet this objective, it's highly recommended to implement a process which ensures that each identified OSH VAF or GP is analysed, registered and managed through the following sequential steps:

1. Report

At this stage, the VAF or GP should be reported in a separate form (see Annex 10.17) so that they can be addressed in the post incident phase.

2. Registration

The important information contained in the report should be recorded in a VAF and GP control sheet (see Annex 10.18).

3. Analysis

At this stage, the necessary study and research should be carried out so that the VAF and GP is properly treated in the following "two steps (4. Recommendation and 6. Disclosure)"

Note: This step should not be confused with the revision of the risk analysis process, which can, however, also be considered.

4. Recommendation

A final recommendation should be recorded in the respective column of the VAF and GP control sheet. The recommendation should be considered as one solution or group of solutions, aimed to correct a particular VAF or promote a GP.

5. Implementation

At this step, the recommendation is to be implemented.

Note: In order to simplify the process a review (post-implementation step) has not been included but, if justified, should be considered.

6. Disclosure (sharing, publication etc.)

Based on the analysis (step 3), it is important to recognize the level of disclosure that the VAF or GP, and any recommendations, should have. Any adverse factors that are recorded are important to be disclosed so that your organization, or other organizations, can avoid them in the future or be prepared if the same VAF occurs in another response. However, the distribution of this information should depend on the specificity and interest that the response community may have in the issue. Disclosure may be INTERNAL (own organization), NATIONAL ORGANIZATIONS (to other local stakeholders) or EUROPEAN ORGANIZATIONS (to international stakeholders), in which case disclosure could be made through EMSA (e.g.: CTG MPPR forum).

In time, steps 1 to 4 should take place during the period of response operations (phase 2 – Operations) while steps 5 and 6 could also take place in the post-operational phase, as can be seen in the following diagram.

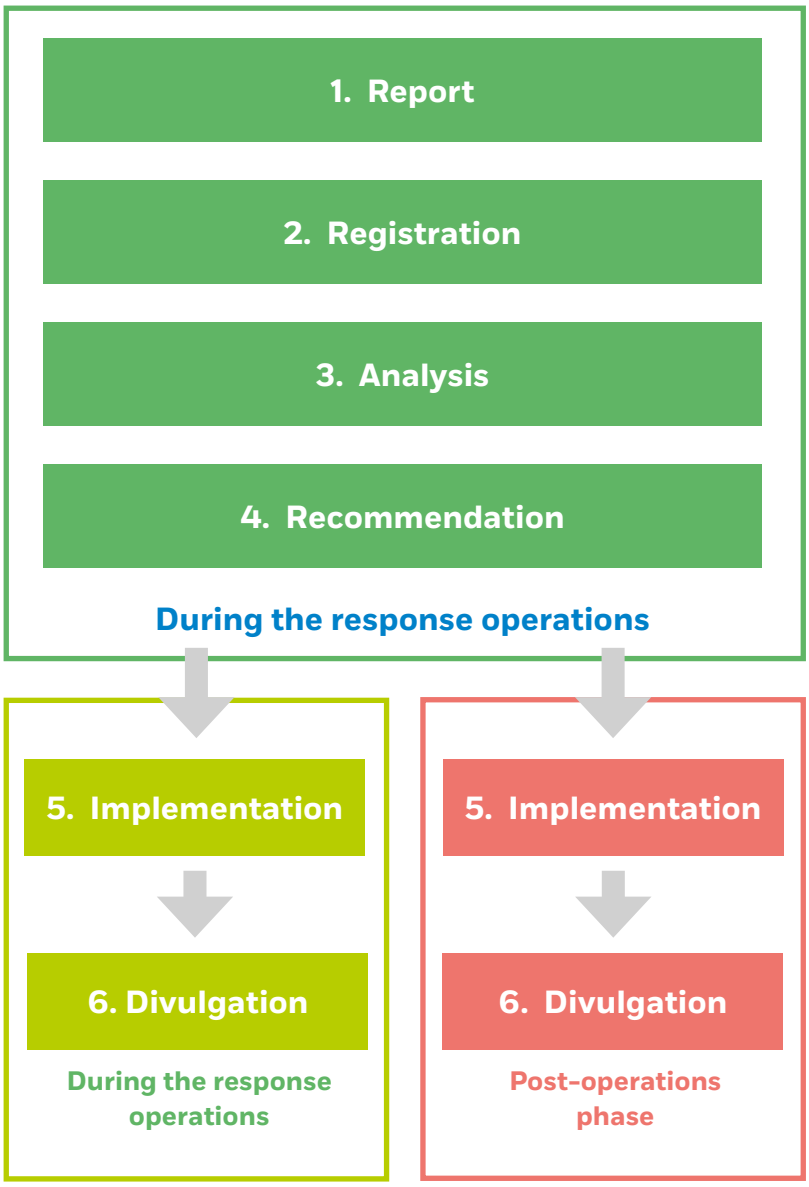


Figure 6: VAF & GP analysis process

This decision to immediately or later implement and disclose a recommendation will depend on the technical interest and benefits, the logistical and financial implications, the expected and necessary time to implement the recommendation, and other factors defined at national level.

SUMMARY
PHASE 3
POST- OPERATIONS

EVALUATE RESPONSE OPERATIONS AND OSH PLAN

CHECK & EVALUATE RESPONDERS' HEALTH

IDENTIFY, ANALYSE & SHARE MAIN OSH LESSONS LEARNT

UPDATE THE OSH PLAN FOR FUTURE OPERATIONS

CHAPTER 6

SUMMARY

This guidance document provides specific OSH examples and approaches of different countries, mainly deriving from the relevant experiences of the countries that drafted the guidelines, thus offering 'food for thought' for the relevant regulations and practices utilised for oil spill response operations at sea and on the shore in the EU.

Three main phases are identified in oil spill response operations during which OSH requirements should be established:

1. **Phase one – Pre-operations**
2. **Phase two – During operations**
3. **Phase three – Post-operations**

1

In the **first phase**, the preparatory phase before actual operations, health and safety planning should be developed, including conducting a pre-operational risk assessment, selecting PPE and conducting relevant training of responders.

This phase includes identifying the specific challenges (e.g., time pressure, oil hazards, use of PPE, work environment and conditions, physical tiredness, public and psychological pressure, training / personnel) of the typical working environments on board of vessels and on the shoreline that could be affected. It also includes identifying the relevant OSH authorities (depending on national laws and regulations) and key OSH actors (e.g., overall incident command, OSC, team leader / ship captain, individual responders, OSH coordinator / safety officer, occupational medic, OSH supervisory authority) during an oil spill incident.

Furthermore, risk assessments for standard operations, jobs, specific sites that could be affected, response methods and response equipment for the common types of oil should be prepared. Therefore, when an incident occurs these plans will only need a brief "check-up", refocussing, and a slight adaption to the real situation.

Based on these prepared risk assessments, the required PPE should be defined and stockpiled in reasonable quantities and sizes. These planning and preparations should be part of the regular trainings and exercises.

2

In **phase two**, during the actual response operations, five circular repeating steps are identified and should be followed:

Step 1 – Identify and assess any risks or risk factors linked to the specific operation;

Step 2 – Implement any risk reducing and protective measures;

Step 3 – On-site organisation, guidance and safety briefing;

Step 4 – Real-time communication, documentation and reporting;

Step 5 – Regularly check, update and implement OSH on-site.

Step 1 includes the revision of the previously prepared risk assessments as well as the hazard assessments during short-term assignments , which follow the principles and course of the so-called "command process". Furthermore, the incident command should also prepare a worst-case scenario plan (in case of, for example, the inclusion of other

hazardous substances, the risk of fire or explosion, situations where there is a lack of oxygen, situations which exceed emergency thresholds, or, insufficient PPE) and an emergency plan for unforeseen events (e.g. accidents, injuries).

The necessary risk reduction and protection measures, following the STOP concept (substitution / replacement of hazard sources, technical measures, organisational measures, person-related measures), are implemented during **step 2**.

The first measure in **step 3** is the organisation of the response site. This includes the establishment of safety zones (hot / red zone, warm / yellow zone and cold / green zone), facilities (e.g. for decontamination, sanitation and personal hygiene) and logistics (e.g. emergency equipment, PPE, food and water). General response units (e.g. fire-fighters, military) which are not trained specifically on oil spill response and volunteers may require special on-site instructions and training. Finally, a safety briefing, covering hazards and risks, PPE and work equipment, logistics, communication and command structure and emergency procedures, should be held for all personnel on the response site.

In **step 4** a communication plan and necessary communication equipment required for on-site communication should be prepared and implemented. Even more important is the thorough documentation of all OSH related measures, actions and events (e.g. risk assessment and protective measures, decisions, safety briefings, responders tasks and work, unforeseen events). Finally, incidents like injuries, damages, fire, chemical spills and hazardous situations should be reported to the overall command and responsible authority.

Step 5 is the regular effectiveness check of the conducted OSH measures. If the measures prove not sufficiently effective or even ineffective or they prove to be too "strong" and impede effective response work, the OSH action plan should be updated and implemented. The goal is to achieve the balance between protection and work ability.

After the end of the response operations, **the third and final phase (post-operations)** comes into effect. Here the follow-up and health evaluation of the responders is a crucial part, although the continuous screening for possible acute symptoms related to exposure to hydrocarbons should be conducted also during response operations.

Finally, it is strongly recommended to evaluate the response and OSH plan (some key questions are defined in the respective chapter) and to identify lessons learnt. This can be done by documenting verified adverse factors (VAF) and good practices (GP) and implementing a process which ensures that each VAF or GP is analysed, registered and managed. An example of sequential steps (report, registration, analysis, recommendation, implementation and disclosure) for this purpose is provided in the respective chapter.

These identified key phases of the oil spill response operations and main steps to address health and safety considerations for oil spill responders, should provide a good overview of current national examples and OSH approaches in Europe and food for thought for countries wishing to practically address the topic in more detail.


3P
2P

CHAPTER 7

ABBREVIATIONS

API	American Petroleum Institute
BA	Breathing apparatus
CBRN	Chemical, biological, radiological, nuclear
CCME	Central Command for Maritime Emergencies Germany
CPR	Center for Progressive Reform
CTG MPPR	Consultative Technical Group for Marine Pollution Preparedness and Response
DIN	German Institute for Standardisation
EFTA	European Free Trade Association
EMSA	European Maritime Safety Agency
EN	European Standard
ERC	Event risk classification
EU	European Union
EU-OSHA	European Agency for Safety and Health at Work
GP	Good practices
HNS	Hazardous and noxious substances
ILO	International Labour Organization
IMO	International Maritime Organization
IPIECA	International Petroleum Industry Environmental Conservation Association
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ISO	International Organization for Standardization
MS	Member States
MSDS	Material safety data sheet
NCA	Norwegian Coastal Administration
NCP	National contingency plan
NGO	Non-governmental organization
NIEHS	National Institute of Environmental Health Sciences
OHSAS	Occupational Health- and Safety Assessment Series
OSC	On-scene coordinator
OSH	Occupational safety and health
PPE	Personal protective equipment
PRM	Private mobile radio
RA	Risk assessment
RCC	Rescue coordination centre
SAR	Search and rescue
SCBA	Self-contained breathing apparatus
SDS	Safety data sheet
SSHP	Site safety and health plan
THW	Federal Agency for Technical Relief Germany
VAF	Verified adverse factors
WG	Working group

CHAPTER 8

GLOSSARY

Accident	An unintended event that causes death, injury, environmental or material damage
Black area	'Unclean / contaminated' side within the decontamination station
Confined space	Enclosed space or area, such as a tank, compartment or pit where ventilation or access, or both, may be limited
Consequence	Outcome of an event affecting objectives
Event	Occurrence or change of a particular set of circumstances
Event risk classification (ERC)	Classification of operational safety events, using the ERC matrix
Exposure	People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses
Green zone / support zone	Minimal exposure area maintained as an uncontaminated location for support functions
Hazard	The intrinsic property or ability of something (e.g. work materials, equipment. work methods and practices} with the potential to cause harm, a source of potential harm, or a situation with a potential to cause loss; "a source of possible damage or injury"
Hazardous and noxious substances (HNS)	Under the OPRC-HNS Protocol 2000, hazardous and noxious substances or HNS are defined as "any substance other than oil which, if introduced into the marine environment, is likely to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea"
Incident	Occurrence, caused by a human or natural phenomenon, that requires notification, assessment, and may require action to prevent or minimize loss of life or damaged to property and / or natural resources
Level of risk	Magnitude of a risk or combination of risks, expressed in terms of the combination of consequences and their likelihood
Likelihood	Chance of something happening
monitoring	Continual checking, supervising, critically observing or determining the status in order to identify change from the performance level required or expected
Noxious liquid substance	Any substance referred to in appendix II of the MARPOL Annex II or provisionally assessed under provision of regulation 3(4) as falling into Category A, B, C or D
Oil	Petroleum in any forms including crude oil, fuel oil, sludge, oil refuse and refined products (other than chemicals which are subject to the provisions of Annex II of the present MARPOL Convention) and, without limiting the generality of the foregoing, includes the substances listed in appendix I to Annex I

Oil fuel	Any oil used as a fuel in connection with the propulsion and auxiliary machinery of the ship in which such oil is carried
Oily mixture	A mixture with any oil content
PMR446	PMR446 (Private Mobile Radio, 446 MHz) is a licence exempt service in the UHF radio frequency band and is available for business and personal use in most countries throughout the European Union. PMR446 is typically used for small-site, same-building and line of sight outdoor activities. Equipment used ranges from consumer-grade to professional quality walkie-talkies (similar to those used for FRS / GMRS in the United States and Canada). Depending on surrounding terrain range can vary from a few hundred metres (in a city) to a few kilometres (flat countryside) to many kilometres from high ground
Red zone / early response zone	Area where there are potential exposure hazards
Risk	The likelihood that the potential for harm will be attained under the conditions of use and / or exposure, and the possible extent of the harm.
Risk analysis	Process to comprehend the nature of risk and to determine the level of risk
Risk assessment	Overall process of risk identification, risk analysis and risk evaluation Here: The process of evaluating the risk to the health and safety of responders while at work arising from the circumstances of the occurrence of a hazard at the workplace.
Risk criteria	The terms of reference against which the significance of a risk is evaluated
Risk evaluation	Process of comparing the results of risk analysis with risk criteria to determine whether the risk and / or its magnitude is acceptable or tolerable
Risk identification	Process of finding, recognizing and describing risks
Risk management	Coordinated activities to direct and control an organization with regard to risk
Risk management framework	Set of components that provide the foundations and organizational arrangements for designing, implementing, monitoring, reviewing and continually improving risk management throughout the organization
Risk management process	Systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analysing, evaluating, treating, monitoring and reviewing risk

Risk source	Element which alone or in combination has the intrinsic potential to give rise to risk
Risk treatment	Process to modify risk
Risk value (risk index value)	A numerical weighting given to each square of a risk matrix to enable differentiation of risk for the purpose of quantitative analysis
Safety	Safety refers to the ability of a system or process to mitigate the negative consequences of undesirable events that arise due to a combination of passive hazards and active failures
Safety data sheet (SDS)	SDS provide information about the properties of a chemical product, its hazards, and instructions for handling, disposal and transport, first-aid, fire-fighting and safety measures to reduce exposure. The information in SDS is needed to understand the risks and know how to handle the chemical product safely. Outside EU often the abbreviation MSDS (Material safety data sheet) is used for such safety information documents.
Safety issue	A manifestation of a hazard or combination of several hazards in a specific context
Site safety and health plan	Framework that defines safety and health considerations and strategy for a specific site
Site safety and health supervisor	Individual in the field responsible for ensuring that the site safety and health plan is implemented as prescribed
Staging areas	Locations set up at an incident where resources can be placed while awaiting a tactical assignment (definition from DIN ISO 16165)
Volunteers	Spontaneous, non-organized volunteers, in some cases including NGOs, excluding organisations integrated in public response systems with trained voluntary responders (e.g. voluntary fire brigade, civil defence)
Wellbeing	Workplace Wellbeing relates to all aspects of working life, from the quality and safety of the physical environment, to how workers feel about their work, their working environment, the climate at work and work organization. The aim of measures for workplace well-being is to complement OSH measures to make sure workers are safe, healthy, satisfied and engaged at work. [https://www.ilo.org/safework/areasofwork/workplace-health-promotion-and-well-being/WCMS_118396/lang--en/index.htm]
yellow zone / contamination reduction zone	Area where oil is present but in a generally weathered state
White area	'Clean' side within the decontamination station

Sources: [13, 14, 15, 16, 17, 18]

CHAPTER 9

BIBLIOGRAPHY

[1]	NOAA Office of Response and Restoration, „What Have We Learned About Using Dispersants During the Next Big Oil Spill?," 15. April 2020. [Online]. Available: https://response.restoration.noaa.gov/about/media/what-have-we-learned-about-using-dispersants-during-next-big-oil-spill.html. [Access on 29. Juli 2021].
[2]	National Center for Biotechnology Information, „Cleanup in the Gulf: Oil Spill Dispersants and Health Symptoms in Deepwater Horizon Responders," 7. Februar 2018. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6066356/. [Access on 29. Juli 2021].
[3]	European Agency for Safety and Health at Work, „OSH authorities," [Online]. Available: https://visualisation.osha.europa.eu/osh-barometer/generic-information/osh-authorities/. [Access on 20. August 2021].
[4]	Havariekommando, Handbuch zum Arbeits- und Gesundheitsschutz von Einsatzkräften bei einem Schadstoffunfall, Cuxhaven, 2020.
[5]	Health and Safety Authority, „Safety Representatives and Consultation," [Online]. Available: https://www.hsa.ie/eng/Topics/Safety_Representatives_and_Consultation_/. [Access on 23. September 2019].
[6]	IPIECA / OGP, Oil spill responder health and safety, London, 2012.
[7]	Kystverket / NOFO, HSE Handbook - Oil spill response, Ålesund / Stavanger, 2019.
[8]	Bundesanstalt Technisches Hilfswerk, Gefahren an der Einsatzstelle - Gefährdungsbeurteilung, Bonn / Mainz, 2018.
[9]	Ausschuss Feuerwehrangelegenheiten, Katastrophenschutz und zivile Verteidigung, Feuerwehr-Dienstvorschrift 500 - Einheiten im ABC-Einsatz, March 2022.
[10]	Centre of Documentation, Research and Experimentation on Accidental Water Pollution (Cedre), Guidance on Waste Management during a shoreline pollution incident, Brest, 2011.
[11]	Norwegian Oil and Gas Association, 090–Norwegian Oil and Gas recommendedguidelines on a common model for safe job analysis (SJA), Stavanger, 2017.
[12]	Canadian Centre for Occupational Health & Safety, „Job Safety Analysis," [Online]. Available: https://www.ccohs.ca/oshanswers/hsprograms/job-haz.html. [Access on 20. September 2019].
[13]	European Commision, Guidance on risk assessment at work, Luxembourg: Office for Official Publications of the European Communities, 1996.

[14]	HELCOM, OpenRisk Guideline for Regional Risk Management to Improve European Pollution Preparedness and Response at Sea, Helsinki, 2018.
[15]	International Standard, Ships and marine technology - Marine environment protection - Terminology relating to oil spill response, Berlin: Beuth, 2013.
[16]	International Labour Organization, „Workplace well-being," [Online]. Available: https://www.ilo.org/safework/areasofwork/workplace-health-promotion-and-well-being/WCMS_118396/lang--en/index.htm. [Access on 20. August 2021].
[17]	European Agency for Safety and Health at Work, „Glossary," [Online]. Available: https://eguides.osha.europa.eu/dangerous-substances/glossary. [Access on 20. August 2021].
[18]	W. contributors, „PMR446," Wikipedia, The Free Encyclopedia, 01. August 2021. [Online]. Available: https://en.wikipedia.org/wiki/PMR446. [Access on 20. August 2021].
[19]	National Institute for Occupational Safety and Health, „Oil Spill Response Resources," 28. März 2018. [Online]. Available: https://www.cdc.gov/niosh/topics/oilspillresponse/. [Access on 28. Oktober 2021].
[20]	National Institute for Occupational Safety and Health, „NIOSH Fast Facts: Protecting Yourself from Heat Stress," 1. Juni 2018. [Online]. Available: https://www.cdc.gov/niosh/docs/2010-114/. [Access on 28. Oktober 2021].
[21]	Havariekommando, „Containerverlust MSC ZOE," 02. Januar 2019. [Online]. Available: https://www.havariekommando.de/SharedDocs/Fotogalerie/DE/2019/20190102_MSC_ZOE.html. [Access on 05. Juli 2019].
[22]	Stadt Borkum, „Herzlichen Dank für Ihre Unterstützung!," 14. Januar 2019. [Online]. Available: https://www.stadt-borkum.de/city_info/webaccessibility/index.cfm?modul_id=33&record_id=100861. [Access on 05. Juli 2019].
[23]	S. Voßschmidt, „Spontanhelfer – Ein Ansatz aus dem Blickwinkel der Gesetze," in 5. Sitzung Arbeitsgruppe Überarbeitung Arbeitsschutzhandbuch, Jever, 17.06.2019.
[24]	H. Erkens, „Rechtliche Koordinaten für den Einsatz von Spontanhelfern," Bevölkerungsschutz, Nr. 2, pp. 28-32, 2016.
[25]	Industry Technical Advisory Committee , Technical Paper: Safety Processes for Volunteers, Southampton, 2006.
[26]	Centre of Documentation, Research and Experimentation on Accidental Water Pollution (Cedre), Management of Volunteers in Coastal Pollution Response, Brest, 2012.

[27]	Centre of Documentation, Research and Experimentation on Accidental Water Pollution (Cedre), Management of Volunteers in Coastal Pollution Response, Brest, 2012.
[28]	International Standard, Security and resilience - Community resilience - Guidelines for planning the involvement of spontaneous volunteers, Berlin: Beuth, 2017.
[29]	REBEKA Projekt, „REBEKA - Resilienz von Einsatzkräften bei eigener Betroffenheit in Krisenlagen," [Online]. Available: http://www.rebeka-projekt.de. [Access on 19. Juni 2019].
[30]	Fraunhofer-Institut für Arbeitswirtschaft und Organisation, „REBEKA - Resilienz von Einsatzkräften bei eigener Betroffenheit in Krisenlagen," [Online]. Available: https://www.muse.iao.fraunhofer.de/de/ueber-uns/projekte/REBEKA.html. [Access on 19. Juni 2019].
[31]	Bundesamt für Bevölkerungsschutz und Katastrophenhilfe, „KUBAS – ein System, das freiwillige Helfer koordiniert," 21. Februar 2018. [Online]. Available: https://www.bbk.bund.de/SharedDocs/Kurzmeldungen/BBK/DE/2018/Projekt_KUBAS.html. [Access on 19. Juni 2019].
[32]	Bundesamt für Bevölkerungsschutz und Katastrophenhilfe, Rahmenempfehlungen für den Einsatz von Social Media im Bevölkerungsschutz, Bonn, 2017.
[33]	Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Ratgeber zur Gefährdungsbeurteilung - Handbuch für Arbeitsschutzfachleute, Dortmund, 2016
[34]	Ausschuss Feuerwehrangelegenheiten, Katastrophenschutz und zivile Verteidigung, Feuerwehr-Dienstvorschrift 100 - Führung und Leitung im Einsatz, Lübeck, 1999.
[35]	Bundesanstalt Technisches Hilfswerk, THW-DV 1-101 - Handbuch Führen im Technischen Hilfswerk, Bonn, 2006.
[36]	Portuguese Directorate-General of Health, Technical Guide No. 2: Health surveillance of workers exposed to carcinogenic, mutagenic or toxic chemical agents, Lisbon, 2018.
[37]	Portuguese Labour Committee on Labour Medicine in Hospitals, Work accidents with exposure to blood and other organic fluids, Lisbon, 2017.
[38]	Deutsche Gesetzliche Unfallversicherung e.V., DGUV Grundsätze für arbeitsmedizinische Untersuchungen, Stuttgart: Gentner Verlag, 2014.

CHAPTER 10

ANNEXES

10.1 RELEVANT HSE REGULATIONS OR GUIDANCE DOCUMENTS (NON-EXHAUSTIVE LIST)

- Council Directive 98 / 24 on the protection of the health and safety of workers from the risks related to chemical agents at work;
- Regulation (EU) 2016 / 425 of 9 March 2016 on personal protective equipment;
- PPE Regulation Guidelines - Guide to application of Regulation (EU) 2016 / 425 on personal protective equipment (2018);
- Accident prevention on board ship at sea and in port (ILO, 1996);
- Safety and Health in Ports (ILO, 2005);
- Guidelines on occupational safety and health management systems (ILO-OSH, 2001);
- Guidelines for implementing the occupational safety and health provisions of the Maritime Labour Convention, 2006 (ILO, 2015);
- Guidance on fatigue mitigation and management (IMO, 2001);
- Safety and health awareness for oil spill clean-up workers (Booklet) (OSHA and NIEHS, 2010);
- Emergency services: A literature review on occupational safety and health risks (EU-OSHA, 2010);
- OHSAS 18001, Occupational health and safety management;
- Oil Spill Responder Health and Safety Guide (IPIECA, 2012);
- Safety Date Sheets: Petroleum Industry Practices (API, 2009);
- From ship to shore: Reforming the NCP to improve protections for oil spill clean-up workers (Center for Progressive Reform (CPR) white paper, 2010);
- International Safety Guide for Oil Tankers and Terminals (ISGOTT, 6th Edition, 2020);
- Workshop on the Recovery of Heavy Oil: European Means of Response and Health Risks for Operational Staff (THW / CCME, 2007);
- On-shore and off-shore PPE selection matrix for oil spill exposures (NRT, September 2021);
- On-Shore and Off-Shore PPE Selection Matrix for Oil Spill Exposures (nrt.org);
- Summary report on the occupational health and safety of responders during marine pollution response at sea (CTG MPPR report, 2007);

10.2 DETAILS ON OIL SPILL RESPONSE WORKING ENVIRONMENTS

10.2.1 WORK ON-BOARD DEDICATED OIL SPILL RESPONSE VESSELS

Special requirements apply when working on-board vessels. International conventions, like those under the IMO, as well as national legislation, regulate these requirements. Response personnel at sea must therefore follow the vessel's safety instructions. The captain of the vessel has the overall responsibility regarding safety, and he / she must ensure that operations carried out are well organized and described in operating instructions. The captain is also responsible for performing risk assessments of the specific operations in which the vessel participates. Response personnel on-board the vessel must familiarize themselves with the hazards associated with the response operations and take an active part in performing risk assessments as well as implementing risk reducing measures to prevent accidents and harm to health and life. Response personnel are obligated to wear the required PPE on-board the vessel.

When the vessel engages in operations involving other vessels, which may be the case for most oil spill response operations, special attention must be given to the risk assessment. These operations can be for example towing of booms in formation, oil recovery from another vessel's boom or craning operations between ships. These operations require vessels to operate alongside each other and impose a risk for harm to personnel on deck as well as for material damages of the vessels.

Operations on-board vessels with oil recovery systems can include for example:

- Employing booms at sea for collecting oil;
- Spraying dispersants from the vessel on the oil spill;
- Skimming of oil;
- Preparation for oil recovery onto the vessel;
- Termination of oil recovery onto the vessel;
- Storage of collected material / pollutant on the vessel or an oil barge;
- Transport and delivery of collected oil to waste disposal facilities;
- Cleaning and maintenance of equipment or the deck;
- Repairs or replacement of components of the oil spill equipment.

As the practical experience of past oil spills has shown (see images on next page), large-scale contamination of decks and superstructures with oil will usually occur on board during oil spill response operations. Due to this, the separation of working zones on board the vessel depending on different contamination levels (e.g. red, yellow and green zones) aimed at avoiding secondary contamination on board the vessel is crucial. The risk of accidents due to slipping on oily decks, etc. will increase significantly in connection with the ship's movement. This must be considered during the risk assessment and in the relevant safety measures.

Oil on deck of NEUWERK during PRESTIGE oil spill response operation, Pictures: CCME

With regard to PPE, air measurements and thresholds, hygiene and decontamination, as well as the organisation of personnel deployment, the guidance of this manual applies analogously for work on board vessels as for land / on-shore operations. This means that these are also to be implemented on board, taking into account any special characteristics on the vessel (e.g., citadel operation, etc.).

KEY MESSAGE

OIL AND THE RISKS EMANATING FROM IT ARE THE SAME EVERYWHERE – WHETHER ON LAND OR AT SEA [6].

10.2.2 WORK ON-BOARD NON-DEDICATED OIL SPILL RESPONSE VESSELS OR VESSELS OF OPPORTUNITY

In the response to oil spill incidents, some countries use smaller vessels (so called vessels of opportunity), e.g., fishing boats, working catamarans or tugs, to participate in oil recovery operations. These vessels can be a great asset in oil spill operations, if used in a safe manner, as they are not vessels dedicated for oil spill response operations. The vessels can assist with towing booms or as oil recovery vessels after applying skimmers on-board or using their storage tanks as oil recovery containers. Other vessels can operate as logistics vessels transporting equipment or personnel, as access to oiled shorelines sometimes may be impossible from land.

These smaller vessels do not engage in oil spill operations daily and therefor their knowledge of and experience with oil recovery equipment and oil spill response methods can be somewhat limited. They might have safety instructions related to other operations, like trawling for fish or executing diving surveys. In addition, the crew on-board these vessels might have less safety training than crew on-board larger vessels, due to other legislative national requirements.

Precautions and extra care are needed when engaging these vessels into an oil spill response operation, as they will require training in both health and safety regarding the oil spill in addition to operating oil spill equipment like booms or skimmers in a safe way. When engaged in oil spill response, the captain on such vessels is obliged to follow the same safety rules and regulations regarding oil recovery operations applicable for larger vessels and has the overall responsibility for the personnel on the vessel.

Two vessels engaging in towing of a boom during their yearly exercise. The vessels are on contract with The Norwegian Coastal Administration. Bodø, 2019. Picture: Kjersti Dale, NCA.

Here are some elements that need consideration when engaging smaller vessels or vessels of opportunity for oil recovery operations:

- Repairs or replacement of components of the oil spill equipment.
- National legislative regulations;
- Certificates (e.g. cranes, towing, passengers, etc.);
- Vessels operational restraints (e.g. number of crew members, hull depth, decks' capacity, cranes capacity, towing capacity, etc.);
- Vessels' safety management and quality systems;
- Risk assessments;
- Training and certification;
- Proper mission command;
- Organisation and communication lines;
- Availability of the required safety equipment and PPE (e.g., life jackets, life rafts, spill suits, etc.);
- Safety regarding handling of oil spill equipment;
- Safety regarding health hazards related to the oil spill.

Example of Norway

The Norwegian Coastal Administration (NCA) engages such smaller vessels on a 4-year contract, and they are obligated to attend yearly training.

This training includes:

- Health and safety regarding exposure to oil and chemicals;
- Physical and chemical properties of different oils;
- Health and safety requirements including risk assessments, job safety analysis [11, 12] and reporting of adverse events;
- Practical training in:
  - Deploying and towing oil recovery booms;
  - Operating skimmers;
  - Applying oil recovery containers;
- Establishing red, yellow and green zones on their vessel;
- The usage and need of PPE;
- Organisation of the oil spill operation;
- Communication and reporting lines.

All personnel on the vessel must attend the training, to take part into an oil spill operation.

Smaller vessels engaging in oil spill clean-up operations. Yearly exercise in Bodø 2019. Picture: Kjersti Dale, NCA.

10.2.3 WORKING ON THE SHORELINE (DIFFERENT TYPES OF BEACHES AND SHORELINE ENVIRONMENTS)

In a large oil spill incident, oil reaching the shoreline is not always evitable. The oil-water-debris mixture that reaches the shoreline can be much larger in quantity and affect a wider geographical area compared to the initial oil spill at sea. Shoreline oil spill cleaning operations can go on for a long period, are time-consuming and labour intensive, and require a large logistics apparatus including a larger number of oil-spill response personnel and equipment. Different types of beaches or shorelines may also be affected by the same oil spill. There are also large variations in climate and geology of the coastline, making the need for local adjustments in response necessary. The cleaning operations can also take place in inaccessible areas and the shoreline oil spill clean-up methods and techniques used are usually manual, and therefore ergonomically challenging for those contributing to the clean-up operations, which may also involve volunteers.

In Southern Europe for example, hot weather conditions may provide challenging working conditions for response personnel. The usage of PPE can create unbearable working conditions due to heat and long working periods in the sun, which can result in dehydration and sunstroke. This requires special attention to mitigate adverse health effects (see Annex 10.14) [19, 20]. In addition, high temperatures cause more evaporation of volatile organic components in the oil, which can result in both short term and long-term adverse health effects (e.g. headache, dizziness or cancer).

Shoreline cleaning at Glyfada Beach in Greece after the Agia Zoni II oil spill in 2017. Picture: Hilde Dolva, NCA.

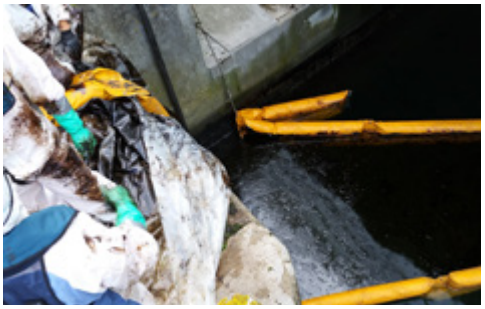
In Artic areas or in Northern Europe, cold weather conditions and long dark periods in the winter give another set of challenging working conditions for response personnel, and the type of necessary PPE is quite different to that of warmer climates. The risk of hypothermia for response personnel is high and the long distances between clean-up sites can cause delays in emergency response operations. The long dark periods in winter also provide a short operational window for the clean up. Additionally, frequent poor weather conditions with strong winds and high waves make shoreline cleaning very challenging. Changing weather conditions also challenge the planning of clean-up operations and the need to always have a “plan B due to weather” for the response plan is highly recommended.

From a winter training course in northern Norway. Here the boom is attached with an ice screw to the ice. Personnel on the ice has a survival suit and safety line in case the ice breaks. Picture: Tor-Åge Thomassen, NCA.

In terms of different types of coastlines, shoreline oil spill clean-up techniques required on a sandy beach vary a lot from those required on beaches with pebbles or rocky beaches, and the health and safety risks imposed on response personnel vary likewise. Some areas have a coastline consisting of islands and rural land areas, only accessible by boat. This makes personnel control and communication difficult and requires good planning for adverse events and personnel evacuation in case of injuries. Whilst other areas have long sandy beaches, making shoreline clean-up operations ergonomically monotonous.

Shoreline clean-up operation from the Full city incident in Norway, 2009. Picture: NCA

Oil spill response in harbours or industrial areas poses a lot of other hazards and risks like falling from great heights, cramped workspaces, traffic, storing and loading activities, etc. On the other hand, these areas are usually easily accessible, even with heavy machinery, and offer a lot of opportunities for logistical support.

Oil spill response in harbour area. Pictures: CCME.

The incident command is generally responsible for conducting risk assessments and implementing risk-reducing measures to ensure the safety of all response personnel involved in the operation. The incident command must plan the shoreline cleaning operation and make sure it is executed in a safe manner. In addition, the incident command must provide adequate information regarding the possible hazards and adverse health effects the response personnel are exposed to for that particular operation, considering the location, weather, time of the year, logistical support, etc.

Response personnel must also engage in conducting risk assessments, use the correct PPE properly and follow the applicable work procedures, as per the instructions and guidance provided. The response personnel are obligated to seek information regarding the shoreline cleaning operation provided by the incident command.

Here are some OSH elements that need consideration during shoreline cleaning operations:

- Safety regarding health hazards related to the oil spill.
- Organising the site;
- Appointing managers on-site;
- Logistics (e.g., equipment, PPE, accommodation, food, etc.);
- Personnel (e.g., hiring, insurance, health check-up, etc.);
- Training and instructions;
- On-site risk assessments;
- PPE;
- Defining red, yellow and green zones;
- Personnel identification, registration and control;
- Evacuation plan;
- Emergency preparedness and response in case of injury;

- Communication plan;
- Waste management plan;
- Transportation of personnel;
- Reporting of adverse events;
- Documentation and record-keeping;
- Working time and shift management;
- Decontamination and general hygiene;
- Air monitoring of hazardous substances.

Regarding spontaneous non-trained volunteers in shoreline response operations, please see Annex 10.3 below for more information.

10.3 SPONTANEOUS NON-TRAINED VOLUNTEERS

Volunteers[2] will frequently offer their services either to assist, as part of the clean-up team or with wildlife response – especially when nature reserves or tourist areas are effected [21, 22]. Volunteers are often inexperienced and untrained in spill response activity. This resource can be a valuable asset. On the other hand, volunteers can become a liability if not controlled and provided with sufficient training concerning safety and given proper welfare arrangements. For this reason, safe use of volunteers needs careful thought and planning. The management is responsible for volunteers [6].

Example legal background in Germany [4]:

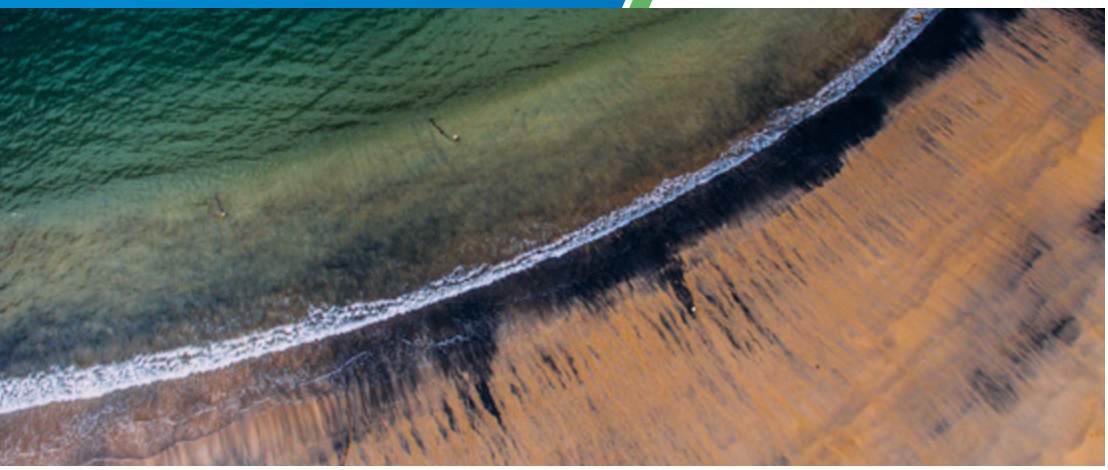
With regard to legal status, volunteers are so-called administrative assistants, meaning that they are the delegates of the public hazard control administration and that the public liability privilege (including liability for external damage) is also transferred to them. It does not depend on a direct commission, but already the direct acquiescence of their activity is considered as a tacit order. Volunteers are subject to the social security code of the statutory accident insurance and are entitled to reimbursement of property damage. The employment relationship and thus the protection of the volunteers begins with the assignment at the place of employment and ends with the end of the assignment [23, 24].

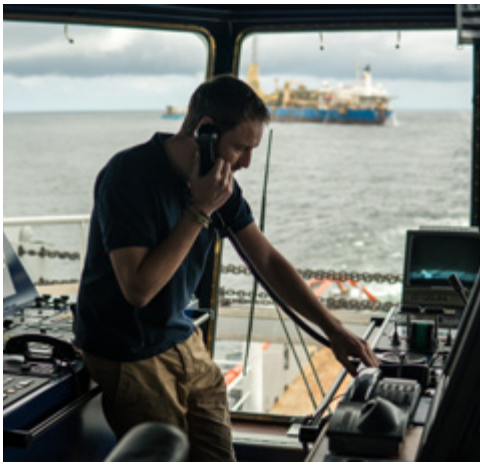
Volunteers should in principle integrate themselves into the existing structures at the response site, but are always bound to the instructions of the management, which includes briefing and training. In the event of infringements, they can be considered as disturbers and, for example, referred to the place of action (measures from the regulatory law). On the other hand, it should be noted that the closer the guidance of the volunteers, the more their status is comparable to responders and the greater the employer responsibility. If they are not closely managed, employers' responsibility is limited, for example. in terms of qualification for an activity on the mere questioning and in cases where the unfitness is obvious and objectively recognizable. However, the definition or limitation of working hours has now become established as the minimum measure of occupational safety and health regarding volunteers.

As spontaneous helpers are usually localized and do not follow units or organizations, OSH responsibility lies with the local authority (municipality).

In principle, volunteers who are employed should have reached the age of 18 and have not yet reached the age of 60.

[2] Spontaneous, non-organized volunteers, in some cases including NGOs, excluding organisations integrated in public response systems with trained voluntary responders (e.g. voluntary fire brigade, civil defence).





In some countries, involving volunteers in response activities is prohibited unless they can demonstrate that they have undertaken formal safety training. In other countries, it has proved impossible to prevent the public from becoming involved, and certain countries positively encourage such assistance. Whichever philosophical approach prevails, the key is to ensure safety, adequate communication and, where possible, control of the effort.

The use of volunteers in a response activity should be in such a way that their safety is assured.

Wherever possible, volunteers should be used in activities that avoid or minimize direct contact with the oil. A specific training program should be provided, identifying the risk and hazards, and how to avoid injury. Volunteers should also be provided with appropriate PPE and integrated into the overall command structure to ensure that they have the benefit of safety information briefings.

In order to identify fundamentally possible tasks and activities of volunteers, extensive studies and practical trials were carried out, resulting in various national and international standards and guidelines [6, 25, 26, 27, 28, 29, 30].

The following tasks and activities for spontaneous helpers are conceivable:

Task area	Task
General support	• Securing incident sites • Control barriers • Pointing direction • Instruct vehicles • Pilot / local expert • Assign parking spaces • Set-up signs • Set-up screens • Support work • Guard access
Shoreline clean-up	• Collect non-contaminated waste • Removal of non-contaminated flotsam • Disposal of non-contaminated waste • Sandbag filling
Logistics and supply	• Distribute clothes / PPE • Distribute consumables • Providing material • Prepare resources • Disposal of leftovers • Wash the dishes • Beverage dispensing • Unloading transports • Cleaning catering area • Transportation • Distribute food • Prepare meals • Laundry

Task area (cont.)	Task (cont.)
Accommodation	• Set up beds • Set up fire extinguishers • Hang up lamps • Safety checks • Security checks • Set up trash cans • Redistribute garbage bags • Music • Game master • Set up chairs • Set up tables • Set up tents
Administration	• Information desk • Visitor registration • Record keeping / assisting with documentation • Interpreter • Create informational material • Distribute informational material • Intercultural consultation
Dealing with wildlife (only if properly trained and experienced)	• Beach patrol and reporting of wildlife inside and outside of the non-contaminated area • Capture and transport of wild animals in the non-contaminated area • Participation in the initial care and rehabilitation of contaminated wildlife

Table 4 Possible tasks for volunteers [29, 30, 26]

Volunteers are to be registered in compliance with the data protection regulations, provided with and if necessary, equipped with the necessary safety equipment [4]. On the subject of registration, which does not automatically mean integration into the operational structures, the German project "Coordination of unbound on-site volunteers to prevent damage" (KUBAS) has developed an IT system to support both the operational management and the volunteers [31].

Management of volunteers can be difficult as they might focus on either their own local environment or their own specific issues. To get the best out of a volunteer workforce a volunteer coordinator can be included as part of the response management team. The volunteer coordinator should be responsible for managing and overseeing all aspects of volunteer participation, including recruitment, induction, training and assignment [6].

A volunteer coordinator would:

- Coordinate with the response organization to determine where volunteers are needed;
- Identify the local skills that are available and that can be usefully employed;
- Identify any necessary skills and training needs;
- Verify minimum training required, as necessary, with safety manager or units requesting volunteers (if special skill is required);
- Activate, as necessary, standby contractors for supplementary training needs;
- Coordinate nearby or on-site training as part of the deployment process;
- Identify and secure other equipment, materials and supplies;
- Provide induction safety training for volunteers;
- Activate pre-registered volunteers if needed;
- Assess, train and assign volunteers to specific tasks;
- Coordinate with the logistics section for volunteer housing and meal arrangements; and
- Assist volunteers with other special needs.

A very important point in the use of volunteers is the timely provision of information and appropriate communication [32].

10.4 AIR MEASUREMENT DURING OIL SPILL RESPONSE

Harmful, flammable and / or oxygen-displacing volatile substances can be released from spilled oil. To protect the responders and to prevent fires or explosions, the air has to thoroughly monitored to detect these substances and to determine their concentration. Based on thresholds and recommendations, an assessment can be made and the correct protective measures can be applied.

The following table provides a recommendation for the substance to be monitored, suitable detection and measurement methods as well as the thresholds applying for emergency personnel working in the red / hot zone:

							PR	CAT	IR	EC	PID	LAB
Explosion Risk	10 20	Vol.%	LEL	20 40	Vol.%	UEL		X	X			
Oxygen	17	Vol.%	-	23	Vol.%	-	X			X		
Hydrogen sulphide	5	ppm	OEL	20	ppm	AEGL2 (4h)	X			X		
Benzene	0.6	ppm	OEL	20	ppm	AEGL2 (4h)	X				X	
Toluene	50	ppm	OEL	310	ppm	AEGL2 (4h)	X				X	
Xylenes	100	ppm	OEL	500	ppm	AEGL2 (4h)	X				X	
Volatile organic compounds	300	ppm	TLV-TWA	1.000	ppm	AEGL2 (4h)	X				X	
Mercury	0.02	mg/m³	OEL	0.67	mg/m³	AEGL2 (4h)	X					X
Specific activity	Nuclid-specefic	Bq/g	RPL	Nuclid-specefic	Bq/g	RPL						X

Table 5 Air measurement during oil spill response [4]

LEL = Lower Explosive Limit, UEL = Upper Explosive Limit, OEL = Occupational Exposure Limit, TLV-TWA = Threshold Limit Value - Time Weighted Average, AEGL2 (4h) = Acute Exposure Guideline Level 2 for 4 hours, RPL = Radiation Protection Law, ppm = parts per million, mg/m³ = milligram per cubic meter, Bq/g = Becquerel per gram, CAT = catalytic sensor, IR = infrared sensor, EC = electrochemical sensor, PID = photo ionisation detector, Lab = laboratory

10.5 MAIN HEALTH AND SAFETY RISKS FOR WORKERS IN GENERAL

1.	Mechanical hazard	
1.1	Unprotected moving machine part	• Moving machine parts, drives, tools, workpieces etc. with joints, impact points, pinch points, shearing points, stitch points, cutting points, winding points, trapping points, pull-in points • Dimensions, shape and location of the parts • Kinetic energy, acting forces and speed of the parts • Presence in the hazardous area
1.2	Parts with dangerous surfaces	• Dimension, shape and surface shape, e.g. Corners, edges, points, edges, roughness • Kinetic energy, acting forces and speed of the parts • Possible contacts • Lack of visibility • Handling
1.3	Moving means of transport, work equipment or traffic	• Traffic and operational safety or use of means of transport, mobile work equipment • Design of transport routes • Location and securing of the cargo • Transport aids, e.g. Slings, load securing devices, containers
1.4	Uncontrolled moving parts	• Tilting parts, pendulum parts, overturning parts, e.g. by shifting gravity centre • Rolling parts, sliding parts • Falling, loosening, bursting and flying parts • Balance position, stability, gliding ability • Acting forces • Securing the parts

1.5	Tripping, slipping, falling, twisting	• Slipping through
		  * Surfaces with dirt, ice, dust, snow, water, loose coverings (carpets, sheets, grates)
		  * Insufficient sliding friction resistance of coverings, steps and step edges
		  * Treads with inclination / incline (ramps, etc.)
		• Tripping, twisting, misstepping
		  * Unevenness such as gradations, slopes, floor coverings
		  * Unsuitable shape and size of the tread surface
		  * Too low load capacity of the tread

1.6	Fall	• Height difference between stand and adjacent surfaces, e.g. when working on roofs, ladders, work platforms • Presence of crashing edges or openings • Load capacity of the object • Stability of the object

2.	Electrical hazard	

2.1	Dangerous body flow / arcs	• Touching live voltage leading parts
		• Touching conductive parts that can accept voltage in the event of a fault
		• Inadmissible approach to live parts over 1 kV
		• Insulation breakthroughs by:
		  * Acts, in particular switching operations under load
		  * Bridges
		  * Overvoltages
		  * Aging, pollution, climatic conditions

2.2	Electrostatic charges	• Insulation breakthroughs by touching a charged part or approach to a charged part

3.	Hazardous Substances	
3.1	Impact of hazardous substances on skin and mucous membranes (eyes)	• Harmful substances • Skin-resorptive substances • Skin-sensitizing substances • Damp workstations • Standardized work procedures • Hazard group “skin”, duration of action, effective area
3.2	Inhalation of hazardous substances (gases, vapours, mists, dusts, smoke)	• Classified substances with and without occupational exposure limits, other hazardous properties • Standardized work procedures • Hazard group, quantity group, releasing group
3.3	Ingestion of hazardous substances (solids, liquids)	• Lack of hygiene • Standardized work procedures
3.4	Physico-chemical hazards	• Fire hazards • Explosion hazards • Uncontrolled chemical reactions

4.	Biological hazard	
4.1	Infection hazard due to pathogenic microorganisms	• Targeted activities with characterized biological agents, e.g. in the context of the use for biotechnological purposes • Non-targeted activities: Presence of suitable living conditions with regard to moisture, heat and substances that can serve as nutrients: * Typical smell (e.g. musty, putrid) * Turbidity of liquids * Visible growth of materials

4.2	Toxic effect / sensitization by microorganisms	• In particular, in the case of aerosol formation, in addition to the risk of infection, the toxic and sensitizing effects of the biological agents must additionally be taken into account in the assessment. • These effects have no influence on the assignment to a protection level, but may require further protective measures.
4.3	Genetically modified organisms	• Possible allergic reactions.

5.	Fire and explosion hazard	
5.1	Fire hazard due to solids, liquids, gases	• Flammable substances (solids, liquids, gases) • Oxidizing agent (atmospheric oxygen) • Ignition sources • Fire spread • Fire performance / heat radiation • Smoke release / smoke propagation • Smoke toxicity
5.2	Explosive atmosphere	• Explosive mixture • Gases, liquids, dusts • Characteristics and substance data • Ignition sources • Zones • Emission-reducing measures
5.3	Explosives and pyrotechnic articles	• Explosives and pyrotechnic articles • Ignition sources • Shock wave propagation • Thermal radiation • Slivers, throw pieces • Fire inflammation, smoke toxicity

5.4	Thermal / physical ignition sources	• Open fire • Hot surfaces • Arcs • Radiation

6.	Special physical effects	
6.1	Noise (from 80 dB (A))	• Emissions from noise sources, e.g., equipment, power sources, traffic (sound power level, sound pressure level) • Sound propagation (e.g., outdoors, in workspaces) • Noise emission at workplaces (assessment level, maximum peak sound pressure level)
6.2	Ultrasound	• Ultrasound • Infrasound
6.3	Whole-body vibration	• Daily exposure, highest value of the RMS value of the frequency weighted accelerations in the three orthogonal directions, e.g. mobile work equipment, stationary machinery, vehicles
6.4	Hand-arm vibration	• Daily exposure, square root of the sum of the squares of the frequency weighted RMS values of the acceleration in the three orthogonal directions, e.g. rotating tools, impact tools or impact tools
6.5	Non-ionizing radiation	• UV radiation (e.g. for curing, disinfecting, LB welding, discharge lamps) • Visible radiation (e.g. artificial lighting) • Infrared radiation (e.g. heat radiator) • Laser radiation (coherent optical radiation) • Frequency, wavelength, exposure duration, operating mode (continuous or pulsed)
6.6	Ionizing radiation	• X-ray • Wave radiation • Particle radiation

6.7	Fields (electric, magnetic, electromagnetic)	• High frequency waves and fields (e.g. microwaves, radio equipment) • Low frequency fields (e.g. 50 Hz electrical installations) • Static fields (e.g. MRT) • EMF parameters: frequency, wavelength, electric and magnetic field strength, power flux density, contact current, specific absorption rate, exposure regime • Influencing pacemakers and other body aids possible
6.8	Under / over pressure	• Ambient pressure fluctuations of more than 0.1 bar vacuum • Ambient pressure less than 0.73 bar, e.g. vacuum chambers • Altitudes from 2,500 m above sea level overpressure • Ambient pressure of more than 0.1 bar, e.g. diving
6.9	Hot or cold media / surfaces	• Hot media / surfaces • Surface temperature, e.g. of annealing furnaces, metal melts, superheated steam pipes • Combustion threshold * Contact time * Thermal inertia * Cold media / surfaces * Surface temperature, e.g. of dry ice, refrigerant, * Frozen Food * Thresholds for cold damage (pain, deafness, frostbite) * Contact time * Thermal inertia

7.	Working environment conditions	
7.1	Inadequate movement areas at the workplace, arrangement of the workplace	• Structural equipment, stored equipment or natural vegetation can restrict movement spaces and thus restrict the safe use of work equipment and hazardous substances as well as escape routes.
7.2	Inadequate break and sanitary facilities	• Mental stress (lack of recovery time) and hygiene-related hazards can lead to mental health problems.
7.3	Insufficient traffic / escape routes, safety marking	• Path length, width of way, height of way • Lighting • Recognisability • Walkability
7.4	Climate (cold, heat, ventilation, sun)	• Climate variables (air temperature, humidity, air velocity, heat radiation) • Working power sales • Clothing • Exposure time
7.5	Lighting	• Illuminance • Luminance distribution • Glare • Light direction, shadiness • Light colour, colour rendering
7.6	Lack of oxygen	• Smothering * Lack of oxygen concentration * Displacement or consumption of oxygen • Drowning * Falling into waters or basins and containers with liquids * Water temperature, fall height, flow velocity

8.	Physical load / work severity	
8.1	Heavy dynamic work (lifting, carrying, pulling, pushing)	• Load weight, load way, truck • Posture • Movement speed • Frequency, duration • Execution conditions
8.2	One-sided dynamic work (high repetition frequency of similar movements)	• Frequency, duration • Posture, hand-arm position • Execution conditions
8.3	Static work (forced postures, postural constancy)	• Posture, type of movement, taking into account body measurements, working height, range of movement, gripping area, legroom, visual space • Frequency, duration

9.	Perception and manageability	
9.1	Taking up of information	• Language and formulation comprehension • Amount of knowledge transfer • Visibility or audibility of information • Distinctness of information • Understanding signs, symbols and pictograms • Meaningfulness between the design of the means of information and the content of the information • Presence and visibility of information that indicates critical situations
9.2	Scope of perception	• Unfavourable establishment of gripping areas, • Viewing and listening areas • Handling of software
9.3	Difficult to handle work equipment	• Vehicle and machine lifts • Confined work spaces • Handling of hardware • PPE

10.	Other hazards / exposure to	
10.1	People	• Robbery • Harassment • Insult • Violence in the workplace
10.2	Animals	• Attacks • Bites • Stings • Allergic reactions • Poisoning • Infections
10.3	Plants	• Allergic reactions • Hay fever • Poisoning
10.4	Unsuitable personal protective equipment (PPE)	• Absence of the protective effect due to incorrect selection (e.g. Life jacket with not enough buoyancy), inadequate fit, incorrect use or defect of the PPE itself • Restriction of movement

11.	Hazard due to organizational deficiencies	
11.1	Workflow, working hours	• Completeness of the task • Room for manoeuvre • Variability (variety) • Information / Information • Responsibility • Qualification • Emotional demands • Working hours • Workflow - work intensity • Workflow - Faults / Interruptions • Communication - Cooperation
11.2	Qualification	• Unskilled personnel • New tasks and equipment
11.3	Instruction / Training / Information	• Lack of briefings • Unfamiliar work • Untrained use of PPE
11.4	Responsibility	• Unclear responsibilities • Unclear chain of command
11.5	Occupational Safety and Health Organization	• Unclear responsibilities • Lack of experts / advisors • No common safety concepts

10.6 COMMAND PROCESS

The “command process” is a target orientated process of thinking and acting that is continuously repeated, ensuring decisions are prepared and carried out. It is divided into the three steps “assessment”, “planning” and “commanding”. Usually, the incident commander cannot meet the objectives of these three steps by running through the command process only once. Only a permanent and continuous process assures the ongoing control of the results and the effectiveness of the response and an appropriate modified planning and decision steps [34, 35].

10.6.1 ASSESSMENT

Assessing the situation consists of initial reconnaissance / survey and the control / monitoring of implemented measures and is followed by an assessment of this situation.

Reconnaissance / survey is the first phase of the command process and it is the basis for the following decisions. It consists of the collection and preparation of available information concerning the nature and size of the incident, the damage situation, as well as the urgency and the possibility of controlling the existing dangers, risks and impacts of damage.

Control / monitoring is the verification of the decision that have been implemented and therefore the comparison of the implemented measures with the intentions of the commander / command structure.

10.6.2 PLANNING

Planning is the systematic assessment of information and facts and the consequential development of incident related measures. Planning consists of both evaluation and the determination of measures.

Evaluation is the process of mentally weighing in which way the emergency management can be accomplished to maximum efficiency using the available means, taking into account the influence of locality, time and weather. It needs to be founded on an evaluation of all available information as an outcome of the assessment of the situation. By weighing the advantages and disadvantages of different possibilities, the decision how to best control the incident can be prepared.

The determination of the plan establishes the process of action and is the result of the evaluation. It implements the plan of action and must take into account the measures to be implemented as well as the resources and equipment to be employed.

10.6.3 COMMANDING

The order / command is the instruction for response units to carry out measures to respond to the emergency . By issuing an order, the decision is put into action. The commander / command unit normally issues orders / commands in writing or verbally - in some cases by other means - using a certain scheme. The order / command must express the intention of the ordering person clearly and unambiguous. Having the command does not only imply the right but also the obligation to issue orders.

10.7 EXAMPLE GENERAL RISK ASSESSMENT SHORELINE POLLUTION RESPONSE (GERMANY)

Response activity: Basic activities of any kind

Preparation			Review on scene	
Date	-	-	Date	-
Name	-	-	Name	-
Signature	-	-	Signature	-

Explanation:

The hazard factors according to GB-00.01 were completely assessed.

Only the relevant hazard factors are listed below (column 2) and their risks assessed according to GB-00.02 (for example, the score B / 3 in column 3 gives a risk index RV = 9 in column 4).

Legend:

ArbMedVU Occupational medical examination

BA Operation instruction

PPE Personal protective equipment

RV Risk identification number of the hazard

RN Risk indicator after implementation of the measures

Description of procedure:

This risk assessment does not consider any special activities. In this risk assessment, the hazards are identified, risks are assessed and measures are proposed, which basically occur in any activity during pollution response operations on shores and beaches, such as, for example:

- Control measurements before work;
- Organization, responsibilities, responsibilities, , responders, emergency services;
- General guidelines for use of PPE;

- General guidelines such as for eating, drinking, smoking, hygiene;
- General guidelines for minimizing stress, such as break times, shift regulations;
- General guidelines for behaviour on shores and beaches.

It is therefore the basic risk assessment document, which has to be reviewed before every response operation and subordinated with the risk assessment for the specific concrete activities.

Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Mechanical hazards	**Uncontrolled moving parts** e.g. getting hit by falling objects on a cliff or by flying equipment	e.g. getting hit by falling objects on a cliff or by flying equipment	9	Mark or block hazardous areas above the area of application with warning signs. Secure equipment against falling over and flying around. The head of operations or the responsible supervisor decides on the use of further safeguards, such as a helmet.	2	-
	Stumble over lying objects **Slip** on slippery, wet surfaces	• Bruise • Strain, sprain • Dislocation • Laceration and cuts • Bone fracture (B / 2)	6	Use only trained responders: Move consciously - Never backtrack. Safety boots of category S5 (from lowest protection level 1 specified). Adapted shift and break times.	2	-

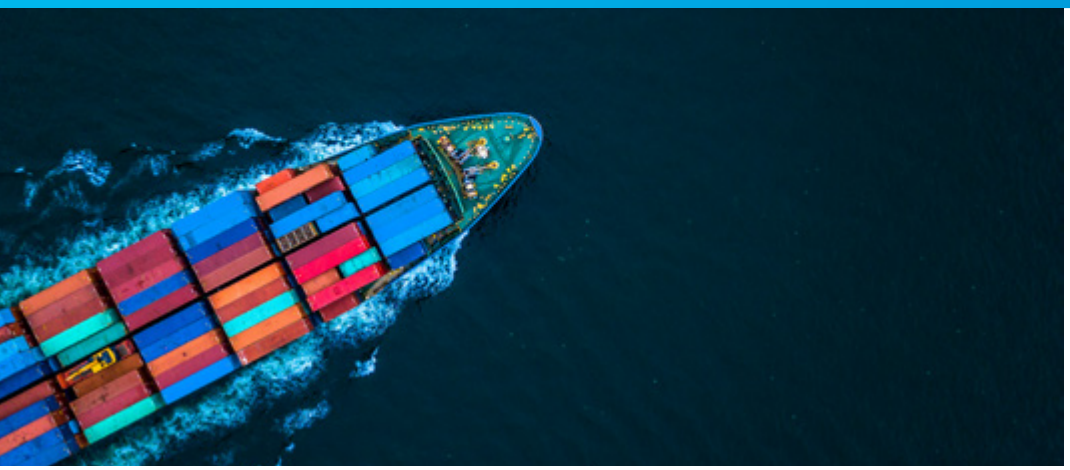
Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Mechanical hazards	**Fall and slip off** from high-altitude work-sites, e.g. from the quay wall or at embankment and cliff	• Bruise, • Strain, sprain • Dislocation • Laceration and cuts • Bone fracture (B / 3) • Drowning (A / 3)	8	Mark or block hazardous areas with warnings. The head of operations or the responsible supervisor decides on the use of further safeguards, such as alert posts and line protection of the responders.	2	-
	Falling into the same level oil storage	• Contamination • Suffocation (A / 3)	12	Mark or block hazardous areas with warnings. The head of operations or the responsible supervisor decides on the use of further safeguards, such as alert posts.	2	-
	Falling into the water e.g. when working on the shoreline, on the quay wall or on shore embankment	• Hypothermia due to soaking • Drowning (A / 3)	12	The head of operations or the responsible supervisor decides on the use of live jackets and further safeguards, such as line protection of the responders.	2	-

Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Hazardous substances	**Working in dangerous environment** without hazardous substance measurement and work release	• Death by poisoning and / or suffocation (A / 4) • Fatal injury in case of explosion (A / 4)	16	If hazardous substances are suspected, conduct control measurements before and continuous during work, e.g. by a CBRN squad of the fire department or by suitable third parties (obey thresholds). The work is only allowed: • If there is no risk of explosion and no easily ignitable atmosphere prevails and • If sufficient oxygen content is ensured and • If the concentration of respiratory poisons is known, the respiratory poisons are: absorbable by filters and • If self-contained breathing apparatus and gas-tight chemical protective suits are not required and a sudden change of these conditions is not expected. If these conditions suddenly and unexpectedly change, the work is stopped.	2	-

Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Hazardous substances	**Direct contact** with crude oil and oil products at work due to lack of protective equipment **Inhalation** of aerosols or volatile hydrocarbons (e.g., benzene, xylene, toluene, etc.)	• Irritation of the eyes, skin and respiratory tract (C / 3) • Brittle, chapped skin on repeated contact • Acute: (D / 2) + Headache, + Dizziness • Long term: (A / 1) + Genetic damage + Carcinogenic	6	Wear appropriate PPE (protection level 1): • Chemical protection suit category III, type 5, 6 (5 - protection against fixed, flying particles, 6 - Limited protection against liquid mist) • Particle filtering half mask FFP2 (fine dust mask) or half mask with gas filter ABEK (P2) • Safety goggles • Chemical protection gloves with cotton inner glove • Safety boots of category S5 Ensure correct size and correct fit of the PPE. Seal transition areas from protective suit to protective gloves with adhesive tape. The use of particle-filtering half-masks FFP2 (fine dust mask) or half-masks with gas filter ABEK (P2) is only allowed for responders with valid ArbMedVU G26.1. The chief of operations decides on the use of higher levels 2, 3 or 4 of the PSA protection level concept.	2	-

Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Hazardous substances	**Direct contact with crude oil** and oil products due to lack of work site hygiene	• Irritation of the eyes, skin and respiratory tract (C / 3) • Brittle, chapped skin on repeated contact	6	Step concept for decontamination: Define the black and white areas in cooperation with the fire department. Establishment and operation of the decontamination site by the fire brigade on the basis of the fire service regulations FwDV 500.	2	-
Explosion hazard	**Ignition of hydrocarbon / air mixtures**	• Body damage from explosion (A / 1)	4	Conduct control measurements before and continuous during work, e.g. by a CBRN squad of the fire department or by suitable third parties (obey thresholds). Only enter the work site after clearing. Pay attention to regulations on black and white areas.	0	-
Hazards by climate, weather, sea	**Cold stress**	• Weakening of the immune system • Hypothermia • Frostbite (B / 2)	6	Wear suitable protective clothing (lined work jumpsuits in the stock).	2	-
	Heat stress	• Feeling unwell • Dehydration • Heat stroke (C / 3)	6	Adapted shift and break times. Sufficient hydration.	2	-

Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Hazards by climate, weather, sea	**Weather** e.g. Limitation of visibility by sea fog, exposure to thunderstorms	• Accident at work with physical and health damage (B / 4)	12	Work only with sufficient visibility. Observation and assessment of the weather situation. If the weather changes, visit the nearest shore and decide on the progress of the work.	2	-
	Tide Work site (for example in the wadden or beach area on the North Sea) which is endangered by accumulating water	• Hypothermia due to soaking • Drowning (A / 3)	12	Note tide calendar. No individual work. Pay attention to hearing and sight. Avoid working in the dark. When working in the wadden area, mark the way back and carry a compass. Allow sufficient time to return - timely exit from the work site.	2	-
	Waves Falling of persons due to fast rising waves, caused by passing shipping, or weather conditions	• Bruise • Laceration and cuts • Bone fracture • Being killed (A / 2) • Hypothermia due to soaking (C / 4)	9	Avoidance of dangerous shore areas. Otherwise monitoring by safety posts (observation of the work site). Wear suitable protective clothing.	2	-
	Current Abortion of fallen persons	• Hypothermia due to soaking • Drowning (A / 3)	12	Avoidance of dangerous shore areas Otherwise line protection, wearing lifejackets	2	-
	Wind Flying around and falling over of equipment in a storm	• Bruise • Laceration and cuts • Bone fracture • Being killed (A / 2)	8	Secure the equipment. Leaving the work site in the event of a too strong storm, if safety can no longer be guaranteed.	2	-



Kiel Channel incident-December 2022-Pictures: CCME

Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Hazards due to lighting	**Glare / shadiness** Objects and warnings are overlooked and one stumbles	• Bruise, • Strain, sprain, • Dislocation • Laceration and cuts • Bone fracture (B / 3)	9	Avoidance of work in the dark. Provide glare-free lighting (no spotlights).	2	-
Hazards by information	**Limited understanding and perception of signals** e.g. by overlooking (emerging fog) or over-listening (wind, wave and engine sounds) of warnings	• Accident at work with physical and health damage (B / 2)	6	Sufficient management and supervision staff (1:10) - For the work of e.g. 150 people one needs 15 people with supervision and guidance function. Name the management and supervisory staff by name and make the assignment known. Ensure appropriate communication. No individual workplaces - watch out for sight and earshot. Avoid working in the dark.	2	-

Kiel Channel incident-December 2022-Pictures: CCME

Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Hazards by other factors	**No or insufficient qualification**	• Accident at work with physical and health damage (B / 4)	8	Work of trained emergency services only. Keep children and unauthorized persons away.	2	-
	No or insufficient safety briefing	• Accident at work with physical and health damage (B / 4)	9	Safety briefing before work. For briefing is used: + Operating instructions (BA-T-01.01)	2	-
	No or inadequate emergency and first aid planning	• Accident consequential damages • Death (A / 4)	6	Check the rescue chain before starting the operation and ensure it. Provision of rescue means, such as life jackets or rescue vehicles. Sufficiently trained first-responders and first-aid funds on site. Possibly water-side safeguard has to be planned, e.g. provided by water rescue service.	2	-

Hazard	Hazard source	Assessment	Rv	Measures	Rn	Effectiveness
What can happen?	How can it lead to that?	What are the effects?		What are we doing about it?		Does it work?
Hazards by other factors	**Lack of hygiene** due to inadequate regulations at the work site, especially to the black and white areas	Incorporation of hazardous substances (A / 4)	12	Eating, drinking, smoking in the black area is generally prohibited. Breaks, eating, drinking, smoking are only allowed in fixed areas in the white area. In oil spill response operations used items (for example, PPE) are usually no longer cleanable and must be disposed. Provide collection containers for disposal. Organize appropriate disposal according to regulations.	2	-
	Skin exposure e.g. by sweating in gloves	• Softening of the skin • Infection (C / 4) • Allergy	8	Schedule breaks and timely shift changes. Determine shifts and break times appropriate, so that it does not overload the responders. Provision and use of skin protection, skin cleansing and skin care preparations. Set up and announce skin protection plan (notice in sanitary rooms).	2	-
	Body burden By wearing protective clothing	• Feeling unwell • Dehydration • Heat stroke (C / 3)	6	Adapted shift and break times. Sufficient hydration.	2	-
	Body burden by wearing respirators	• Shortness of breath • High blood pressure • Heart attack (A / 2)	8	Only use staff with valid ArbMedVU G26.1. Limit wearing time of respiratory protection equipment. Adapted shift and break times.	2	-

Table 6: Example risk assessment [4]

10.8 EXAMPLE SHORT TERM RISK ASSESSMENT CHECKLIST (GERMANY)

Risk Assessment
Checklist

Technisches Hilfswerk

V4

Work site:			No.:
Date:	Time:	Name:	Signature:

(X) ↓	Hazards (German order)	Threat low	Threat medium	Threat high	Comment (e.g., actions, supplements, details,…)
	Fall *Fall edge, shaft, rock fall, …*				
	Breathing hazards *Oxygen deficiency, gases, CO_2, …*				
	Dispersal *Wind direction, outflow, leakage,…*				
	Radiation *Contamination, Incorporation ,…*				
	Anxiety reaction *Panic, threat, attack, …*				
	Fire *Combustion, scalding, smoke, …*				
	Biological substances *Mold, viruses, bacteria, waste, sewage, …*				
	Chemical substances *Dangerous goods / substances*				
	Breakthrough *Dyke, dam, landslide, …*				
	Explosion *Gas outlet, dusts, pressure vessels, …*				
	Collapse *Wall, building, shelf, ditch, …*				
	Illness / injury *Slipping, bumping, frostbite, heat stroke, …*				
	Electricity *defective insulation, photovoltaic, flooding, …*				
	Drowning *Risk of water, shaft, basin, ice cover, …*				
	Temperature / climate *UV exposure, heat, humidity, cold, …*				
	Precipitation *Rain, snow, black ice, …*				
	Wind *falling objects, rolled lumber, …*				
	Lightning *Thunderstorms, location, trees, …*				
	Visibility *Fog, smoke, darkness, ashes, …*				
	Unsecured traffic area *Road, rail, shipping, …*				
	Hazardous animals or plants *Contagion, attack, poison, allergy, …*				
	Stressful work *Death, injuries, suffering, helplessness, …*				

This list is not exhaustive!

low	Work without additional countermeasures feasible
medium	Call for increased caution and additional countermeasures
high	**No use without prior, appropriate countermeasures. Possibly abort work!**

The completed checklist should be stored appropriately, e.g. as an attachment to the mission diary.

10.9 EXAMPLE PREDEFINED PPE COMBINATIONS (GERMANY)

PPE levels for activities		chemical protection suit cat. III type 5, 6	chemical protection suit cat. III type 3 - 6	particle filtering half mask FFP2	half mask with filter ABEK1 P3	goggles	goggles with face protection	chemical protection gloves	chemical protection gloves easily	cut resistant gloves	general safety boot S5	chemical protection boots S5	cotton inner gloves	covert overall
level 1	general activities in the hot zone	X					X	X			X		X	X
level 2	trapping of oiled wildlife		X	X			X		X	X	X		X	X
level 3	activities with increased mechanical load and high-pressure cleaning		X	X			X	X			X		X	X
level 4	release of other liquid organic substances and crude oils		X		X	X		X				X	X	X

Example PPE levels for activities [4]

PPE modules for activities			chemical protection suit cat. III type 5, 6	chemical protection suit cat. III type 3 - 6	weatherproof suit two-piece	particle filtering half mask FFP2	half mask with filter ABEK1 P3	mouthguard	goggles	goggles with face protection	visor	chemical protection gloves	chemical protection gloves easily	cut resistant gloves	general safety boot S5	chemical protection boots S5	booties (+safety footwear S3)	cotton inner gloves	covert overall
general activities in the hot zone without immediate danger of direct contact with the pollutants														X		X		
general activities in the hot zone with contact with pollutants	other oils / oil products	in general	X					X	X	X		X			X			X	X
		particles / aerosols	X			X			X			X			X			X	X
		gases / vapors	X				X		X			X			X			X	X
	crude oils	in general		X				X	X	X		X				X		X	X
		particles / aerosols		X		X			X			X				X		X	X
		gases / vapors		X			X		X			X				X		X	X
general activities in the hot zone with increased mechanical load	other oils / oil products	in general		X				X	X	X		X			X			X	X
		particles / aerosols		X		X			X			X			X			X	X
		gases / vapors		X			X		X			X			X			X	X
	crude oils	in general		X				X	X	X		X				X		X	X
		particles / aerosols		X		X			X			X				X		X	X
		gases / vapors		X			X		X			X				X		X	X
high-pressure cleaning - handling of hand-guided liquid radiators	other oils / oil products	particles / aerosols		X		X			X	X		X			X			X	X
		gases / vapors		X			X		X		X	X			X			X	X
	crude oils	particles / aerosols		X		X			X	X		X				X		X	X
		gases / vapors		X			X		X		X	X				X		X	X
Collecting dead oily wildlife and living mobile wildlife	other oils / oil products	outside hoz zone	X		X					X			X	X	X		X	X	X
		particles / aerosols		X		X			X	X			X	X	X			X	X
		gases / vapors		X			X		X		X		X	X	X			X	X
	crude oils	outside hoz zone	X		X					X			X	X	X		X	X	X
		particles / aerosols		X		X			X	X			X	X		X		X	X
		gases / vapors		X			X		X		X		X	X		X		X	X
driving and control activities in closed vehicles / working machines		in general						N	N	N		N					N		
		particles / aerosols				X			X			N					N		
		gases / vapors					X		X			N					N		
monitoring and control activities at the separation site		in general						X	X	X					X		X		
		particles / aerosols				X			X						X		X		
		gases / vapors					X		X						X		X		
general activities in the warm zone of the decontamination station		in general	X					X	X	X		X			X			X	X
		particles / aerosols	X			X			X			X			X			X	X
		gases / vapors	X				X		X			X			X			X	X

Example PPE modules for activities [4]

Example combination of different PPE components. Pictures: CCME

This image shows an example of the combination of different PPE components.

10.10 EXAMPLE PREDEFINED PPE COMPONENTS

PPE	Class	Norm	Description
Chemical protective suit	Cat. III Type 5, 6	• DIN EN ISO 13982-1 • DIN EN 13034 • DIN EN 1149	• Partially breathable • Mechanical resistance: o Abrasion resistance o Flexural crack resistance 5 o Tear strength 2 o Puncture resistance 2 o Seam thickness 3 o Tensile strength 2
Chemical protective suit	Cat. III Type 3 - 6	• DIN EN 14605 • DIN EN ISO 13982-1 • DIN EN 13034 • DIN EN 1149	• Mechanical resistance: o Abrasion resistance 6 o Flexural crack resistance 6 o Ttear strength 2 o Puncture resistance 2 o Sseam thickness 3 o Tensile strength 3 • Chemical resistance: o Gasoline 6 o Toluene 5 o Diesel fuel 6
Rain suit two piece	-	-	-
Filtering face piece	FFP2	• DIN EN 149	• With exhalation valve
Half mask	-	• DIN EN 140	• Without inhalation valve discs • Connections for two filters
Filter for half mask	ABEK1 P2 or 3	• DIN EN 14387 • DIN EN 143	• Matching the half mask body • Combined particle and gas filter • With inhalation valve disc • With device for closing for tight fit control • Breathing resistance must be so low that the mask-filter combination is assigned to group 1 according to annex 3 of DGUV rule 112-190

PPE	Class	Norm	Description
Surgical mask	-	-	-
Safety goggles	2C-1.2 1 BT 3 BT	• DIN EN 166	• Scratch resistant • Anti-fog • Hhighly transparent frame • Ergonomic sealing lips • Variable nasal sealing lip • Indirect ventilation • Permanently high wearing comfort
Visor for safety goggles	BT	• DIN EN 166	• Scratch resistant • Anti-fog
Full face visor	2C-1.2 B-D 1 BT 9	• DIN EN 166	• Scratch resistant • Anti-fog • Very stable design • Adjustable headband and visor • Far from the face • To wear with half mask + filter
Chemical protective gloves		• DIN EN ISO 374-1 • DIN EN ISO 374-5 • DIN EN 388 • DIN EN 1149	• Material of nitrile • Long version • Material thickness at least 0.4 mm • AQL 0.65 o Mechanical resistance: o abrasion resistance 4 o cut resistance 1 o tear strength 0 o puncture force 1 • Chemical resistance: o Mineral oil 6 o Benzene gasoline 6 o N-heptane 6 o Xylenes 2 o Toluene 1 o Acetone 0

PPE	Class	Norm	Description
Chemical protective gloves (light)	-	• DIN EN ISO 374-1 • DIN EN ISO 374-5 • DIN EN 388	• Material of nitrile • Long version • Material thickness at least 0.16 mm • AQL 0.65 • Mechanical resistance: Abrasion resistance 3 o Cut resistance 0 o Tear strength 0 o Puncture force 1 • Chemical resistance: o Mineral oil o Diesel fuel o N-heptane
Cut prove gloves	-	• DIN EN 388	• Cut resistance 3 • Puncture force 3
Safety rubber boots	S5 CI	• DIN EN ISO 20345	• Oil and petrol resistant • Antistatic
Chemical protective boots	S5 P, CI, HRO, SRA, FO, E, A, F3A	• DIN EN ISO 20345 • DIN EN 943-1 • DIN EN 13832 • DIN EN 15090 • DIN EN 369 • NFPA 1991	• Chemical resistance (breakthrough time): o N-hexane› 480 min. o N-heptane› 480 min. o BTX› 180 min. o Acetone› 120 min.
Protective sock liner	-	-	• Long version • Oil resistant

PPE	Class	Norm	Description
Ear plugs	-	• DIN EN 352-2	• min. 35 dbA noise reduction
Ear muffs	-	• DIN EN 352-1	• min. 35 dbA noise reduction
Safety helmet	-	• DIN EN 397	-
Life vest	275 N	• DIN EN ISO 12402-2	-
High-visibility vest	2	• DIN EN ISO 20471	-
Underwear gloves	-	-	-
Underwear overall / undersuit	-	-	-
Thermal underwear	-	-	-

Table 7: Examples PPE components [4]

			
Chemical protective suit Cat. III Type 5, 6	Chemical protective suit Cat. III Type 3 - 6	Rain suit two-piec	Underwear overall / undersuit
			
Filtering face piece	Half mask	Filter for half mask	Surgical mask
			
Safety goggles	Visor for safety goggles	Full face visor	Chemical protective gloves
			
Chemical protective gloves (light)	Cut prove gloves	Safety rubber boots	Chemical protective boots
			
Protective sock liner	Ear plugs	Ear muffs	Safety helmet
			
Life jacket	High-visibility vest	Underwear gloves	Thermal underwear

Table 8 Example pictures PPE components [4]

10.11 EXAMPLE INSTRUCTIONS PPE REMOVAL (GERMANY)

Removal of PPE

The removal of the PPE takes place – possibly after decontamination – on the decontamination station and by at least one, optimally two other responders. They must at least be protected by Level 1 PPE.

In particular, strict separation of black and white areas as well as the avoidance of contamination spreading must be complied. The contaminated hand touches only the outside, the non-contaminated hand only the inside of the suit.

The contaminated protective equipment remains in the black area and is then sent for decontamination or disposal.

The specifications of the particular fire fighters regulations regarding decontamination must be complied.

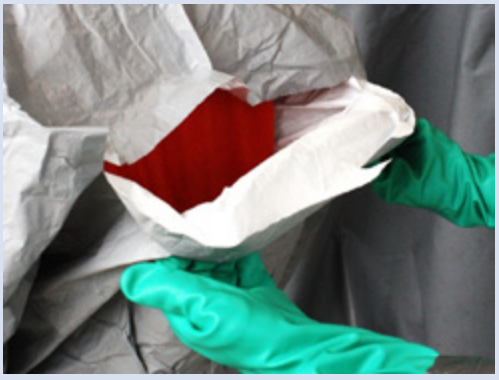
Follow the instruction steps to fulfil the task:

1 other PPE

If necessary, take off the protective helmet, life jacket, face mask, etc.

2 horizontal opening cut

On the back area of the chemical protection suit make a horizontal opening cut on the entire back width at the height of the shoulder blades. Turn cut edges outwards.



3 vertical opening cut

Expand horizontal opening through a vertical opening cut to the hood. Turn cut edges outwards.

4 hood

Take the protective suit, strip the hood forwards over safety goggles and respirator, turning the inside outward.

5 **Chemical protection suit**

Strip chemical protection suit forwards and downwards. Turn the inside outwards.

6 **chemical protection gloves**

Pull hands out of chemical protection gloves, turning them inwards as much as possible.

7 **safety / chemical protection boots**

Get off the boots and step into the white area or sit down.

8 **safety goggles**

Take off the safety goggles forwards and downwards without contact with the outside.

9 **respirator mask**

Take off the respirator mask forwards and downwards without contact with the outside.

10 **underwear**

Take off underwear.

Final note

Kiel Channel incident-December 2022-Pictures: CCME

10.12 EXAMPLE FORM RISK ASSESSMENT (NORWAY)

Risk assessment	**No.:**			**Date**
Name:	Org:		Signature:	
Work team:	Vessel/work area			
Work description:				
Equipment:				
Job Safety Analysis completed?	No	Yes	JSA NO.:	
Working situation / hazard	**What can go wrong?**		**What can we do to prevent this?**	**What can be done to reduce the consequences if an incident should occur?**
Weather and temperature				
Exposure to high waves/strong winds				
Steep ground				
Slippery surface, ice/snow/oil				
Unfamiliar ground				
Darkness/poor visibility				
Risk of explosion				
Emergency action in the event of an accident/fire				
Working with chemicals/ properties of oil				
Manual work/heavy lifting				
Hazardous conditions relating to entry and use of boat				
Bark blowing				

10.13 EXAMPLE CHECKLIST SAFETY PREPARATIONS (NORWAY)

Checklist – safety preparations (executed by task force leader, oil spill response leader, team leader)	Status	Comments
Procedures/checklists for the activity are known		Working procedures and checklists reviewed
Personnel completed training (HSE, working equipment)		Training in the use of equipment, protective equipment. HSE routines and instructions
Approved protective equipment available and ready for use		
Working method, special conditions for the use of additional protective equipment (e.g. bark blowing)		Bark – Use special protective equipment
Emergency action in the event of an accident/fire		Boat, local health service, first-aid equipment, fire safety equipment
Chemicals approved and labelled. HSE datasheet read and available		
Control of lifting equipment completed?		Certified and approved
Communications plan and communication equipment on site?		VHF/UHF, mobile phone, satellite telephone
Has a risk assessment been carried out?		
Has a JSA been carried out?		
Have personnel completed a safety briefing?		
Is first-aid equipment available?		
Should area(s) be cordoned off?		

10.14 EXAMPLE FLYER PROTECTING YOURSELF FROM HEAT STRESS

Protecting Yourself from
Heat Stress

Heat stress, from exertion or hot environments, places workers at risk for illnesses such as heat stroke, heat exhaustion, or heat cramps.

Heat Stroke

A condition that occurs when the body becomes unable to control its temperature, and can cause death or permanent disability.

Symptoms

- High body temperature
- Confusion
- Loss of coordination
- Hot, dry skin or profuse sweating
- Throbbing headache
- Seizures, coma

First Aid

- Request immediate medical assistance.
- Move the worker to a cool, shaded area.
- Remove excess clothing and apply cool water to their body.

Heat Exhaustion

The body's response to an excessive loss of water and salt, usually through sweating.

Symptoms

- Rapid heart beat
- Heavy sweating
- Extreme weakness or fatigue
- Dizziness
- Nausea, vomiting
- Irritability
- Fast, shallow breathing
- Slightly elevated body temperature

First Aid

- Rest in a cool area.
- Drink plenty of water or other cool beverages.
- Take a cool shower, bath, or sponge bath.

Heat Cramps

Affect workers who sweat a lot during strenuous activity. Sweating depletes the body's salt and moisture levels.

Symptoms

- Muscle cramps, pain, or spasms in the abdomen, arms or legs

First Aid

- Stop all activity, and sit in a cool place.
- Drink clear juice or a sports beverage, or drink water with food.
  - Avoid salt tablets.
- Do not return to strenuous work for a few hours after the cramps subside.
- Seek medical attention if you have the following: heart problems, are on a low-sodium diet, or if the cramps do not subside within one hour.

Protect Yourself

Avoid heavy exertion, extreme heat, sun exposure, and high humidity when possible. When these cannot be avoided, take the following preventative steps:

- Monitor your physical condition and that of your coworkers for signs or symptoms of heat illnesses.
- Wear light-colored, loose-fitting, breathable clothing such as cotton.
  - Avoid non-breathable synthetic clothing.
- Gradually build up to heavy work.
- Schedule heavy work during the coolest parts of day.
- Take more breaks when doing heavier work, and in high heat and humidity.
  - Take breaks in the shade or a cool area.
- Drink water frequently. Drink enough water that you never become thirsty.
- Be aware that protective clothing or personal protective equipment may increase the risk of heat-related illnesses.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health
www.cdc.gov/niosh/topics/outdoor/
DHHS (NIOSH) Publication No. 2010–114
Telephone: 1–800–CDC–INFO
TTY: 1–888–232–6348
E-mail: cdcinfo@cdc.gov
SAFER • HEALTHIER • PEOPLE™

10.15 EXAMPLE SITE SAFETY BRIEFING SHEET

Incident: _____ **Project Code:** _____

Site Name: _____ **Location/Map Ref.:** _____

Date: _____ **Time:** _____

Briefing Conducted by: _____

Topics Covered:

- Weather conditions ☐
- Injuries and illnesses ☐
- Corrective actions/precautions ☐
- First aid ☐
- Site emergency plan ☐
- Site hazards ☐
- Oil/chemical hazards ☐
- PPE to be worn ☐
- Decontamination procedures ☐
- Other topics (list below) ☐

Comments:

10.16 EXAMPLE SITE SAFETY SURVEY CHECKLIST

1. SITE:

2. DATE: **3. TIME:** **4. INCIDENT:**

5. PRODUCT(S): _____ (Attach MSDS)

6. Site Characterization (tick all relevant boxes):

6a. Area: ☐ Ocean ☐ Bay ☐ River ☐ Saltmarsh ☐ Mudflats
☐ Shoreline ☐ Sandy ☐ Rocky ☐ Cliffs ☐ Docks

6b. Use: ☐ Commercial ☐ Industrial ☐ Farming ☐ Public ☐ Government
☐ Recreational ☐ Residential ☐ Other

7. Weather: ☐ Ice/frost ☐ Snow ☐ Rain ☐ Wind ☐ Sun

Temperature _____

8. Site Hazards:

☐ Bird handling
☐ Boat safety
☐ Chemical hazards (to skin)
☐ Cold
☐ Drum handling
☐ Electrical hazards
☐ Endemic diseases
☐ Equipment operations
☐ Fatigue
☐ Fire, explosion, in-situ burn
☐ Fumes, vapours, gases
☐ Heat
☐ Helicopter operations
☐ Humidity
☐ Insects/animals
☐ Lifting
☐ Manual handling
☐ Motor vehicles
☐ Noise
☐ Overhead/buried utilities
☐ Pumps and hoses
☐ Slips, trips and falls
☐ Steam and hot water
☐ Tides
☐ Trenches, excavations
☐ UV radiation
☐ Visibility
☐ Weather
☐ Work near water
☐ Other (specify overleaf)

9. Air Monitoring:

☐ O_2 ☐ LEL ☐ Benzene ☐ H_2S ☐ Other (specify overleaf)

10. Personal Protective Equipment:

☐ Foot protection
☐ Impervious suits
☐ Ear protection
☐ Other
☐ Coveralls
☐ Eye protection
☐ Respirators
☐ Head protection
☐ Personal flotation
☐ Hand protection

11. Site Facilities Required:

☐ Sanitation ☐ First Aid ☐ Decontamination

12. Emergency Plan Requirements:

☐ Alarm system ☐ Evacuation plan

13. Contact Details Required:

☐ Fire ☐ Doctor ☐ Ambulance ☐ Police ☐ Hospital ☐ Other (specify overleaf)

14. Date Plan Completed: _____ **15. Plan Completed by:** _____

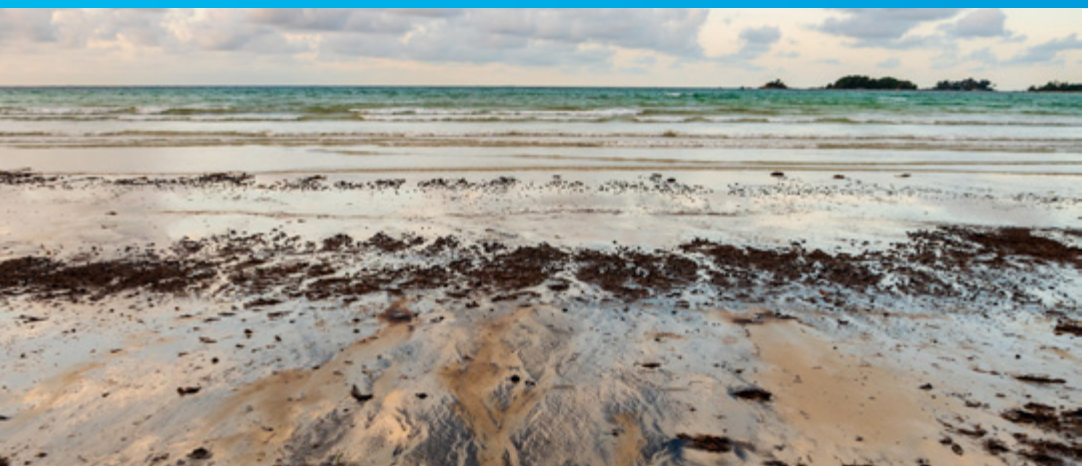
Continued overleaf ...

Site Name:
Location/Map Reference:

Include work zones, first-aid locations, primary and secondary escape routes, assembly points, staging area and command post locations. Also include notes to entries marked 'Other' on the previous page.

10.17 EXAMPLE VERIFIED ADVERSE FACTORS (VAF) & GOOD PRACTICES (GP) REPORT (PORTUGAL)

VERIFIED ADVERSE FACTORS (VAF) & GOOD PRACTICES (GP) REPORT				
	ACCIDENT:☐ LOCAL:☐ DATE:			
TECHNICAL WRITER PERSONAL DATA				
NAME:			ORGANIZATION:	
FUNCTION / OCCUPATION:				
EMAIL:			PHONE NUMBER:	
TYPE OF REPORT (X)	VAF:		GP:	
DESCRIPTION				
REVIEW / ANALYSIS				
RECOMENDATION				
VALIDATION FROM TECHNICAL WRITER				
SIGNATORE:			DATE:	
APPROVAL AND DISTRIBUTION				
TECHNICAL VALIDATOR ID				
NAME:			ORGANIZATION:	
EMAIL:			PHONE NUMBER:	
DISTRIBUTION (X)	INTERNAL:		EUROPEAN ORGANIZATIONS:	
NATIONAL ORGANIZATION:		ORG. NAME:		
SIGNATORE:			DATE:	



10.18 EXAMPLE VERIFIED ADVERSE FACTORS (VAF) & GOOD PRACTICES (GP) CONTROL (PORTUGAL)

VERIFIED ADVERSE FACTORS (VAF) & GOOD PRACTICES (GP) CONTROL

ACCIDENT:
LOCAL:
DATE:

AREA	TYPE OF REPORT	DATE	VAF/GP NR	DESCRIPTION OF THE FAV / GP	REVIEW / ANALYSIS OF THE FAV/GP	RECOM NR	RECOMMENDATION (RECOM)	TECHNICAL WRITER ID	TECHNICAL VALIDATOR ID	IMPLEMENTATION OF THE RECOM	DIVULGATION	CONTROL

10.19 PROTOCOLS OF ANALYSIS FOR GENERAL PROFILE AND EXPOSURE PROFILES FOR DUST / CHEMICALS AND BIOLOGICAL AGENTS

In the regular health surveillance of workers exposed to chemical or biological agents, complementary health exam must be requested. Although some of these complementary exams must be part of the overall assessment of the worker's health (Protocol A, Figure 7), they must be included together with those specific for workers exposed to chemical or biological agents (Protocol B and C, Figure 7) [36, 37, 38].

The occupational doctor, responsible for monitoring the health of the exposed worker, may also request other complementary health tests. These should be carried out whenever they are considered important for the characterization of the worker's health status and the relationship with the clean-up activity, in particular if it becomes apparent that there was exposure to specific agents other than hydrocarbons.

Protocol A General	Protocol B Exposure to Dust / Chemicals	Protocol C Exposure to Biological Agents
• Blood count • Creatinine • Blood glucose • Total cholesterol • Triglycerides • Urine II • ECG	• Chest X-ray • Spirometry • TGO; TGP GGT analysis	• Initially: Ag, Ag Hbs, Ac Hbs Titled, Ac HVC, HIV • Periodically: TGO, TGP, GGT

Figure 7: Protocol of analysis [36, 37, 38]

10.20 FOUR BASIC EMERGENCY ACTIONS TO BE IMPLEMENTED (AS A MINIMUM) BY PERSONNEL NOT PROPERLY TRAINED OR EQUIPPED FOR RESPONDING TO INCIDENTS CONCERNING CHEMICALS OTHER THAN OIL

Personnel not properly trained or equipped for responding to incidents concerning chemicals other than oil should implement as a minimum the following four basic emergency actions:

Step 1) Recognise hazards

For the safe handling of hazards originating from substances other than oil, it is necessary to recognise the possible presence of such dangerous substances and goods. The dangers emanating from them must be identified, so that the necessary operational and protective measures can be derived.

Such hazardous substances are virtually omnipresent, so that their occurrence or their release is to be expected always and everywhere. For example, during oil spill response on the shoreline one has to expect in some areas alluvial chemical warfare agents or ammunition in some regions.

The release of hazardous substances poses acute dangers for emergency responders, those involved in the incident and uninvolved third parties. It is therefore necessary for all responders to be alert of any unusual items in the operation area or signs of (possible) releases, such as:

- Steam, fog, smoke (possibly coloured);
- A strange smell, stench (not necessarily unpleasant!);
- Clusters of human and / or animal diseases;
- Irritation to the eyes and skin;
- Atypical change in the flora and fauna;
- Destroyed or damaged containers.

The responders should be constantly aware of their surroundings and when they become aware of something unusual, then they need to respond rapidly to reduce risks to themsleves and other responders.

In addition to recognising the release of hazardous substances, it is important to identify the presence of any packaged, transported, stored, floating, or beached dangerous substances. Once identified, measures can be put into place to prevent them from being released and safeguards can be put in place if there is a possible or an actual release. Most dangerous goods are labelled in accordance with the relevant legal requirements.

This labelling clearly informs the transporter, responder, user and third parties about the hazards posed by the dangerous substances and goods. It also, where appropriate, provides information for the correct protective mechanisms needed to protect responders.

In this context, the responder, the OSH Manager and the response operation must pay attention to:

- Markings and container specifics;
- warning signs, danger labels, danger symbols on the container;
- UN number;
- Container shape, container colours for compressed gas containers;
- Specifics of transport packaging / released substances;
- Transport documents (bill of lading, written instructions).

Despite the legal requirements for the labelling of dangerous substances and goods, it should always be expected that the content and labelling may not correspond with the substance in the package or that there is no labelling at all. For example, it is possible that labels may have been lost by accident. Therefore, a lack of labelling according to dangerous substances or dangerous goods laws does not mean that no dangerous substances or goods are present, so it is very important that any substances or containers found are approached with caution.

Finally, the presence of hazardous substances can also be identified by using appropriate detection, measuring and analysis equipment.

The results of the investigation undertaken under this first step, as well as information on the further course of action should be passed on without delay to the leadership of the response and the responders.

Step 2) Close off area and evacuate danger zone

To prevent responders approaching the hazard source or a hazardous object, a danger area (hot zone) and a close-off area (cold zone) should be formed around it. Regarding the possible propagation of contamination, the meteorological and topographical conditions should be considered to identify any potential contamination area (for example, wind, see Figure 3).

The following distances from the hazard source or hazardous object should be observed:

- Danger area / hot and warm zones: shortest distance to be defined at national level, depending on the situation (e.g. in Germany, it is approx. 50m).
- Close-off area / cold zone: shortest distance to be defined at national level, depending on the situation (e.g. in Germany, it is approx. 100m).

The danger area / hot and warm zones may only be accessed by emergency personnel in suitable PPE and with suitable equipment. This area is specially defined, marked and secured. It should be ensured, through appropriate measures by the responsible authorities, that unauthorized persons do not enter the danger area / hot and warm zones. In this area smoking, eating and drinking are strictly prohibited.

Immediately around the danger area / hot and warm zones is the close-off area / cold zone. This area serves as a deployment and movement area for emergency services responding to the hazardous material. By identifying and marking this area, these units will receive the necessary freedom to prepare their response and move freely. This also means that the restricted area (hot and cold zones) should only be entered by those emergency and support personnel that are absolutely necessary for the response.

When determining the limits of these zones, the physical state of the hazardous material and the wind conditions must be considered. Areas with a suspected contamination are to be included in the danger area / hot zone.

Step 3) Perform first-aid rescue and lifesaving measures

If an emergency rescue / life saving operation from the danger area / hot and warm zone becomes necessary, it may be necessary to accept an increased risk to any rescue personnel. The person in charge of the rescue operation, can make the decision that the rescue personnel can proceed without complete PPE. However, they should at least be equipped with self-contained breathing apparatus (SCBA) and should only proceed where intervention will not cause the risk of further loss of life or serious injury to the responders.

This does not apply to areas where ammunition or chemical warfare agents, extremely hazardous biological agents or nuclear fuels are present. These areas may not be entered under any circumstances without the presence of a competent person and with proper PPE, not even if it is performed to save human lives.

Step 4) Request Specialized Response Units or Teams

For further operational measures, appropriate specialized response units / teams, usually fire brigades, and a specialist consultant should be requested immediately via the public coordination centre or the command structure.

10.21 EXAMPLE POCKET CARD ACCOMODATION (GERMANY)

Accomodation 1

Object	Dimension	Weight	Space for camp beds	Space for tables and benches
Tent SG 12 S	4,08 m x 3,34 m = 13,6 m²	48 kg	4 camp beds	
Tent SG 18 S	4,08 m x 4,34 m = 17,7 m²	55 kg	6 camp beds	
Tent SG 20	4,74 m x 5,00 m = 23,7 m²	68 kg	6 camp beds	
Tent SG 30	5,64 m x 6,00 m = 35,0 m²	92 kg	10 camp beds	6 sets* = 48 Plätze * per set 8 seats
Tent SG 40	5,64 m x 8,00 m = 45,0 m²	116 kg	12 camp beds	8 sets* = 64 seats * prer set 8 seats
Tent SG 50	5,64 m x 10,0 m = 56,4 m²	133 kg	14 camp beds	12 sets* = 96 seats * per set 8 seats
camp bed	2m x 0,5 m 2 m x 0,45m	10 kg wood 7,5 kg alu		
table & benches	Table: 0,50 m x 2,20 m 2 benches a: 0,25 m x 2,20 m	48 kg		8 seats / set

Space required for setting up tents

SG 300
Dimension of tent: 5,64 x 6 m = 35 m²
Space required: 5,9 x 6,2 m = ~37 m²

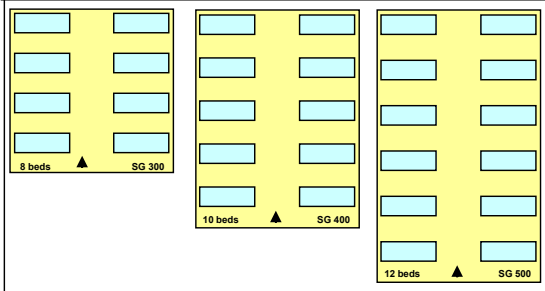
SG 400
Dimension of tent: 5,64 x 8 m = 45 m²
Space required: 5,9 x 8,2 m = ~48 m²

SG 500
Dimension of tent: 5,64 x 10 m = 56,4 m²
Space required: 5,9 x 10,2 m = ~60 m²

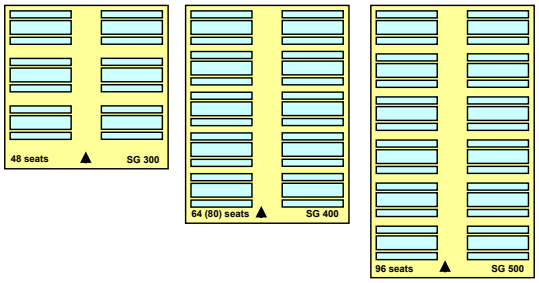
❶

Accomodation 1

Tent for accomodation (number of possible camp beds)



Tent for catering / brakes (number of possible tables and benches)



❷

Pocket card Accommodation 1 (Germany)

Accomodation 2

Accomodation of responders (number and type of tents required)

Responders	Number and type of tents
8	1 x SG 300
16	2 x SG 300
28	1 x SG 500, 2 x SG 300
34	2 x SG 500, 1 x SG 400
52	2 x SG 500, 1 x SG 400, 1 x SG 300
56	3 x SG 500, 2 x SG 400
60	5 x SG 500
68	5 x SG 500, 1 x SG 300
90	5 x SG 500, 3 x SG 400
88	6 x SG 500, 2 x SG 300
96	6 x SG 500, 3 x SG 300
102	7 x SG 500, 1 x SG 400, 1 x SG 300
112	8 x SG 500, 2 x SG 300
120	8 x SG 500, 3 x SG 300
132	8 x SG 500, 2 x SG 400, 2 x SG 300
136	8 x SG 500, 4 x SG 400
146	8 x SG 500, 5 x SG 400
154	8 x SG 500, 5 x SG 400, 1 x SG 300
152	8 x SG 500, 5 x SG 400, 2 x SG 300
170	8 x SG 500, 5 x SG 400, 3 x SG 300
178	8 x SG 500, 5 x SG 400, 4 x SG 300
186	8 x SG 500, 5 x SG 400, 5 x SG 300
194	8 x SG 500, 5 x SG 400, 6 x SG 300
202	8 x SG 500, 5 x SG 400, 7 x SG 300
210	8 x SG 500, 5 x SG 400, 8 x SG 300

❶

Accomodation 2

Tents for catering and brakes (number and type of tents required)

Responders	Number and type of tents
10	1 x SG 300
20	1 x SG 300
30	1 x SG 300
40	1 x SG 300
50	1 x SG 400
60	1 x SG 400
70	1 x SG 400
80	1 x SG 400
90	1 x SG 500
100	1 x SG 500
110	1 x SG 500, 1 x SG 300
120	1 x SG 500, 1 x SG 300
130	1 x SG 500, 1 x SG 300
140	1 x SG 500, 1 x SG 300
150	1 x SG 500, 1 x SG 400
160	1 x SG 500, 1 x SG 400
170	1 x SG 500, 1 x SG 400, 1 x SG 300
180	1 x SG 500, 1 x SG 400, 1 x SG 300
190	1 x SG 500, 1 x SG 400, 1 x SG 300
200	1 x SG 500, 1 x SG 400, 1 x SG 300
210	1 x SG 500, 1 x SG 400, 1 x SG 300
220	1 x SG 500, 1 x SG 400, 1 x SG 300
230	1 x SG 500, 1 x SG 400, 2 x SG 300
240	1 x SG 500, 1 x SG 400, 2 x SG 300
250	1 x SG 500, 1 x SG 400, 2 x SG 300

❷

Pocket card Accommodation 2 (Germany)

Planning figures for sanitary facilities

Planning figures	bis 250 Pers.	bis 500 Pers.	bis 750 Pers.	bis 1000 Pers.
Dixi / toilet seats	ca. 8 - *16	ca. 16 - *32	ca. 24 - *48	ca. 32 - *64
Urinals / gully	ca. 8 / 5 lfd. m	ca. 16 / 10 lfd. m	ca. 24 / 15 lfd. m	ca. 32 / 20 lfd. m
Toilet seats / hand drying*	*For existing toilet seats / urinals, x hand wash basins with the possibility of drying hands have to be provided			
	ca. 3 - *6	ca. 6 - *12	ca. 9 - *18	ca. 12 - *24
Washing places	ca. 16 - *32	ca. 32 - *64	ca. 48 - *96	ca. 54 - *108
Showers	ca. 8 - *16	ca. 16 - *32	ca. 24 - *48	ca. 32 - *64

See remarks and notes on the back of this card
*** Planning figures for rush**

sanitary facilities

Note:
It is assumed that the percentage of female responders is low. The numbers change as the percentage of women increases..

Separate showers and toilets have to be provided for female responders .

For reasons of hygiene, separate toilets must be provided for the catering staff and paramedics deployed!

For hygiene reasons, only disposable towels and liquid soap are allowed.

sanitary facilities

(cont.) Pocket card Accommodation 2 (Germany)

10.22 FICHE DECONTAMINATION OF PERSONNEL (CEDRE)

logistical activities

DECONTAMINATION OF PERSONNEL

PRINCIPLE

Before leaving the worksite, response personnel must be 'decontaminated' to:

- ✓ avoid spreading the pollution to surrounding unpolluted areas
- ✓ ensure at least a minimum amount of comfort after each work session (transport, meals...)
- ✓ maintain the efficiency of responders.

The principle is to have the personnel follow a cleaning chain, going from dirtiest to cleanest, on a watertight platform where the washing effluents can be recovered.

- ✓ Carry out rough cleaning in a first tank with water and a non-toxic agent scrubbing with cloths
- ✓ Undertake intermediate cleaning, with a medium pressure washer using warm water and then rinse. Temperature and pressure must be adjusted to obtain a good cleaning effect without causing harm to the personnel (50 bars / < 50°C maximum)
- ✓ Wipe personnel and equipment outside the tanks with cloths and sorbents
- ✓ Collect washing effluents and send them to a storage site
- ✓ Where possible, use vegetable (cooking) oil and soap to clean skin.

- ✓ Don't set up the decontamination area too far away from the response area so as to limit path contamination
- ✓ Don't begin to wash down operators without testing the pressure and temperature of the hose
- ✓ Don't use solvents such as white spirit, gasoline or diesel fuel, or abrasive substances to clean PPE or skin as they are dangerous to health
- ✓ Don't use sorbents to decontaminate personnel without first undertaking rough and intermediate cleaning or this will generate unnecessary waste.

PREPARATION

The storage area for equipment and machinery must meet certain criteria:

- ✓ close proximity to the cleanup site
- ✓ easy access
- ✓ a flat area with enough space away from environmentally-sensitive areas.

- ✓ Choose a relatively flat surface near the worksite
- ✓ Arrange the ground so as to have a slightly sloping surface with a small trench on the lowest side to recover the effluents
- ✓ Lay out the watertight film (or if you are using strips of geotextile, position them so that they overlap either perpendicular to the slope or in the direction of the slope to prevent any infiltration into the ground)
- ✓ Cordon off the decontamination area.

EQUIPMENT

Basic equipment:

- ✓ Plastic liners (or strips of geotextile) to cover the platform
- ✓ Stakes and fluorescent tape to identify the decontamination area
- ✓ 1 tank (1 to 2 m^3) and non-toxic washing agent + cloths or sponges for rough wiping down
- ✓ Cooking oil and soap (for hands)
- ✓ 1 hot water pressure washer to wash/rinse
- ✓ Rolls of sorbent (industrial format) for final wiping down
- ✓ 2 open 200 litre barrels (or bins) for solid waste.

Extra equipment:

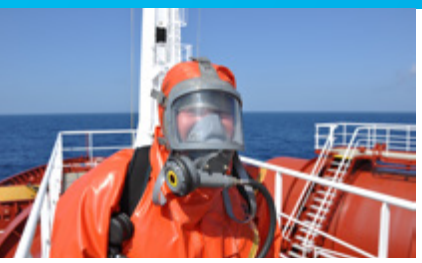
- ✓ Pump and storage tank for recovered washing effluents
- ✓ A hut to store tools and PPE onsite according to the worksite.

PPE: Overalls, oilskins, boots, gloves, head gear, goggles, and masks. Users are exposed to a lot of dirt, containing potentially toxic particles (spray).

Decontamination area

Cedre
www.cedre.fr

Decontamination of personnel fiche (Cedre)




ABOUT THE EUROPEAN MARITIME SAFETY AGENCY

The European Maritime Safety Agency is one of the European Union's decentralised agencies. Based in Lisbon, the Agency's mission is to ensure a high level of maritime safety, maritime security, prevention of and response to pollution from ships, as well as response to marine pollution from oil and gas installations. The overall purpose is to promote a safe, clean and economically viable maritime sector in the EU.

emsa.europa.eu

Get in touch for more information

European Maritime Safety Agency
Praça Europa 4
Cais do Sodré
1249–206 Lisboa
Portugal

Tel +351 21 1209 200 / Fax +351 21 1209 210
emsa.europa.eu / Twitter@EMSA_Lisbon