Guidance on Waste Management during a shoreline pollution incident

operational guidelines

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MARINE ENVIRONMENT & RENEWABLE ENERGIES

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Guidance on Waste Management during a shoreline pollution incident

OPERATIONAL GUIDELINES

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Cover photo: Containers on the beach after the *MSC Napoli* incident.
Source: Courtesy of MCA

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Purpose of this guide

In the event of an accidental shoreline pollution incident, clean-up operations inevitably generate a variety of waste materials, sometimes in great quantities. The management of waste, up to and including its final disposal, and the complete restoration of all sites can cause major problems for responders.

The options chosen must be in accordance with the regulations in force and ensure traceability throughout the entire chain. Communication should be rapid, accurate and transparent.

It is essential to make appropriate decisions in the early stages in order to control and manage the situation and avoid hindering clean-up operations.

This facilitates the operations in progress and helps to reduce the duration, cost of the crisis and its impact on reputation.

The aim of this guide is to assist decision makers and operational responders in the initial stages of the emergency response by providing them with concise information on all aspects and phases of waste management following a maritime pollution incident.

This guidance focuses in certain areas on oily waste, but the principles should also be applied to the management of hazardous and noxious substances (HNS) and large quantities of non-polluting waste (e.g. timber/plastics) resulting from maritime incidents.

This guide is intended for responders and managers working within strategic and tactical response groups as well as operational responders on the ground.

Waste management is often the longest and most costly operation involved in clean-up after a major oil or HNS spill.

Table of contents

Structure

This guide is made up of four main sections:

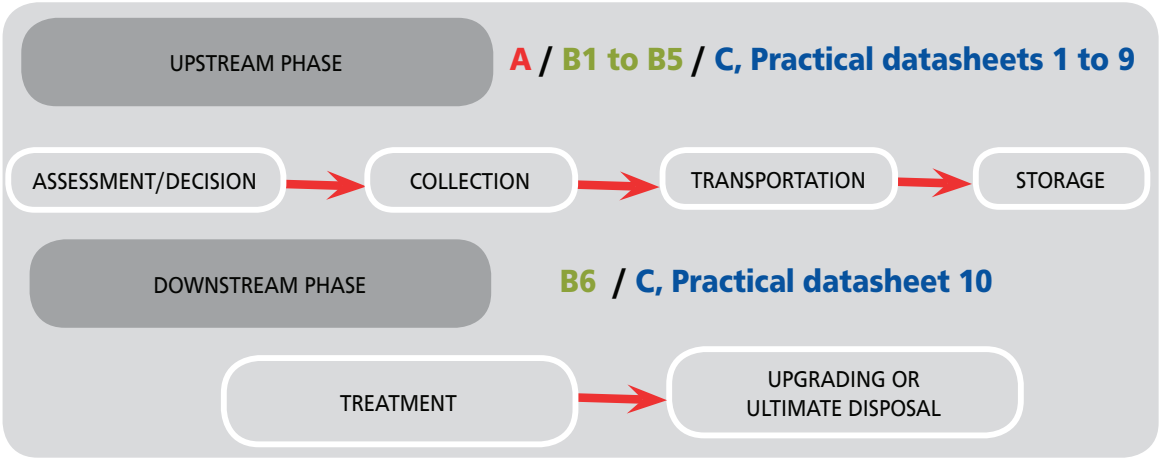
- Section A on the regulatory context.
- Sections B & C on waste management activities.
- Section D on feedback from past accidents.

A fifth section E gives some complementary information.

The two central sections B & C are designed according to the chronological order of operations which are divided into two main phases:

- Upstream phase.
- Downstream phase.

The upstream phase includes collection, transportation and storage while the downstream phase consists of pollutant treatment and ultimate disposal.



The upstream phase should take place at the same time as operations begin. It incorporates:

- Temporary storage facilities, in the immediate vicinity of the site and linked to the duration of the site.
- Intermediate storage facilities, serving several primary storage sites, set up a few hundred metres or even several kilometres from the clean-up sites (these intermediate storage sites are closed once operations on the clean-up sites have been completed).
- Final storage area(s), pooling all the separated polluted waste from one geographical area, which can last over a year depending on the performance of the downstream phase.
- Transportation between storage sites.

A weak link in this chain will reduce the response capacity of the whole process.

The implementation of the downstream phase can be deferred. This stage includes:

- Treatment processes, with different procedures suitable for different waste types.
- Disposal of treated waste.
- Restoration of sites dedicated to temporary, intermediate or final storage.

Regulatory context

International and European regulatory context

A1

Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989, entered into force in 1992 at an international level and on 7 February 1994 for the European Economic Community (EEC). Its overarching objective is to lay down rules to control, at an international level, transboundary movements of wastes hazardous to human health and the environment, and their disposal as well as to reduce the volume of such exchanges.

Waste Framework Directive

The revised EU Waste framework directive 2008/98/EC establishes a framework for the management of waste across the European Community. It also defines certain terms, such as 'waste', 'recovery' and 'disposal', to ensure that a uniform approach is taken across the EU. It requires Member States to:

- Give priority to waste prevention and encourage reuse and recovery of waste.
- Ensure that waste is recovered or disposed of without endangering human health and without using processes which could harm the environment.
- Prohibit the uncontrolled disposal of waste, ensure that waste management activities are permitted (unless specifically exempt).
- Establish an integrated and adequate network of disposal installations.
- Prepare waste management plans.
- Ensure that the cost of disposal is borne by the waste holder in accordance with the polluter pays principle.
- Ensure that waste carriers are registered.

Hazardous Waste Directive

Since the enforcement of the Hazardous Waste-Directive 91/689/EEC, recently replaced by the Directive 2008/98/EC (articles 17 - 20), environmental regulators in the member states are under a duty imposed by the respective administrations to take the necessary steps to mitigate or avert an emergency or grave danger. As members of any National Contingency Plan Waste Group, the regulator will have an important role in ensuring that all reasonably practical steps necessary or expedient are taken. This will include ensuring early removal, or in situ treatment or transfer of bulk oily waste into interim storage. In exercising these functions, records must be kept of those actions the regulator deems expedient.

European Waste Catalogue Codes

In preparation for disposal, the categories of wastes generated will need to be cross-referenced to the European Waste Catalogue (EWC). The actual reference will need to be identified once information is available on the waste type and how it has been produced.

UK regulatory context

The planning, design, construction, operation and eventual decommissioning of temporary and permanent facilities for the storage and processing of oily wastes must comply with UK national legislation and regulations. The handling of waste oil products is carefully controlled and enforced in England and Wales by the Environment Agency (EA), in Scotland by the Scottish Environment Protection Agency (SEPA), and in Northern Ireland by the Northern Ireland Environment Agency (NIEA).

The objective of the Regulators is to:

- Minimise the amounts of hazardous/special waste that are generated.
- Control and track the movement of hazardous/special waste, from the time of its collection to its final disposal, by means of a consignment note system.
- Institute licensing and inspection controls for waste carriers and transit site operators.
- Regulate industrial processes and waste handling sites (including landfills and storage facilities) through the Integrated Pollution Prevention Control (IPPC) regime.

The regulatory framework embraces the vast majority of actions and activities relating to the management and processing of oil spill waste and it is therefore essential that those involved in the decision-making process are aware of the relevant legislation and consult and liaise constantly with the relevant regulator's representatives.

The Waste Framework Directive was initially implemented in the UK through the following national legislation:

- The Environmental Protection Act 1990.
- The Control of Pollution (Amendment) Act 1989.
- The Waste Management Licensing Regulations 1994 (as amended).
- The Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991.

The legislation requires that anyone who treats, keeps, deposits or disposes of waste needs an environmental permit (England and Wales) or a waste management licence (Scotland and Northern Ireland), unless exempt or excluded, which is issued by the Environment Agency (England and Wales), SEPA (Scotland) or the NIEA (Northern Ireland). Environmental permits and waste management licences include conditions relating to operations at the site and the controlling bodies monitor activities to ensure compliance with the licence conditions. A key objective of the licensing system is to ensure that waste is recovered or disposed of without endangering human health and without using processes or methods which harm the environment.

Environmental permits are issued in line with the Environmental Permitting (England and Wales) Regulations 2010, whilst waste management licences are issued in line with the Waste Management Licensing (Scotland) Regulations 1996 and the Waste Management Licensing Regulations (Northern Ireland) 2003.

It is also an offence to transport controlled waste unless registered with the EA, SEPA or NIEA. Registered carriers are authorised persons for the purposes of the Duty of Care Regulations. Similarly, the holder of a waste management licence is also an authorised person.

National response structure

A3

The Maritime and Coastguard Agency National Contingency Plan for Maritime Pollution from Shipping and Offshore Installations describes the response arrangements in the United Kingdom. This is supplemented by Maritime and Coastguard Agency Scientific Technical and Operational (STOp) Notices.

Local authorities have no specific statutory duty to plan, or carry out, shoreline clean-up, but have the power to do so. Maritime local authorities and the Northern Ireland Environment Agency fulfil their responsibilities by working in partnership with other agencies to reduce, control or mitigate the effects of coastal oil or chemical pollution. Unless a specialist contractor is appointed by the ship-owner/company, clean–up such as in the case of the *MSC Napoli*, the Local Authority will be responsible for the clean-up of the shoreline and operations will be managed through the Shoreline Response Centre (SRC).

To meet their obligations, local authorities should also identify and select suitable waste storage sites within their area, and make plans for the construction and management of these sites, should they be required. It is strongly recommended that maritime local authorities give priority to the preparation of contingency plans to manage the impacts of a marine oil or HNS spill, including the processing of the waste arising.

During the response to a maritime pollution incident, a waste management group will be set up and led by the Local Authority. Its role is to manage and direct waste operations in close consultation with the regulator. Refer to the STOp notices on waste management for further information.

The group has the following key tasks as identified in the National Contingency Plan:

- Development of a waste disposal strategy.
- Advising on waste minimisation and segregation.
- Preparing a plan for temporary storage of collected waste both from the shoreline and at sea.
- Provision of technical advice on the location and format of temporary storage and treatment areas and disposal options for the waste.
- Ensuring that all waste regulations are followed by the technical team and fully understood by the forward control centres and beach masters.
- Ensuring waste is transported by registered carriers and in compliance with the Hazardous Waste Regulations.
- Management of the final disposal options and identification of sites for waste.

Claims and compensation

The cost of waste treatment often represents a large portion of the overall cost of the response operations (up to 50%). Some International Conventions, related to oil spill compensation, are relevant and may apply to waste treatment. A compensation regime for spills of persistent oil originating from tankers (bunker oil or cargo oil) was originally established in 1978 and is now based on:

- The 1992 International Convention on Civil Liability for Oil Pollution Damage (1992 Civil Liability Convention).
- The 1992 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1992 Fund Convention).
- A Protocol to the 1992 Fund Convention, adopted in 2003, which established a Supplementary Fund.

The IOPC Fund Claims Manual indicates that

"Clean-up operations frequently result in considerable quantities of oil and oil debris being collected. Reasonable costs for storing and disposing of the collected material are accepted. If the claimant has received any extra income following the sale of the recovered oil, these proceeds would normally be deducted from any compensation to be paid.
(...)
Presentation of claims
It is essential that claims for the costs of clean-up are submitted with supporting documentation showing how the expenses for the operations are linked with the actions taken. [...]
Specific information should be itemised as follows: [...] Cost of temporary storage (if applicable) and of final disposal of recovered oil and oily material, including quantities disposed, unit cost and method of calculating the claimed rate."

(Source: International Oil Pollution Compensation Fund, 2008. Claims Manual)

This three-level compensation regime can cover expenses related to oil spill waste treatment operations (as well as the cost incurred by the temporary and intermediate storage, transport and handling of the oil and oily waste) if the incurred costs are "reasonable", i.e. covering technically well-suited and cost-effective solutions.
In the rare cases involving persistent oil spills from tankers in which the compensation limit is exceeded, further claims may be made against parties involved.

Note. The 1992 Civil Liability Convention outlines the "channelling" of liability, stating that claims can only be made against the registered owner of the tanker concerned and prohibits claims against the servants or agents of the owner, members of the crew, the pilot, the charterer, manager or operator of the ship, or any person carrying out salvage operations or preventive measures. The owner is entitled to take recourse action against third parties who are not similarly protected, e.g. the shipper of the goods, in accordance with national laws.

A spill of non-persistent oil falls outside the above-mentioned international compensation regime, though incidents of this kind are less damaging to the environment and do not generally lead to claims, unlike spills of persistent oil. In this case, domestic laws will apply.

For European countries, the Waste Directive could provide a remedy against the ship-owner as well as the charterer and shipper, in the absence of domestic laws to the contrary.

In case of oil spills of heavy bunker fuel from non-tankers, the International Convention on Civil Liability for Bunker Oil Pollution Damage (entered into force on 21 November 2008) can apply. The strict liability under this Convention extends beyond the registered owner to the bareboat charterer, manager and operator of the ship.

This Convention requires the registered owner of ships greater than 1,000 GT to hold insurance or other financial security.

For all other oil spills (from tank farms, bunkering installations, exploration or production installations, storage facilities...), the national laws will apply. Claims are usually made to the "producer" of the waste, i.e. the polluter, and will be settled on a case-by-case basis.

HNS convention *(Source ITOPF)*

The International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS Convention) was adopted by the IMO in May 1996. It aims to ensure adequate, prompt and effective compensation for damage that may result from shipping accidents involving hazardous and noxious substances.

The Convention entitles claimants to compensation for loss or damage to persons, property and the environment caused by incidents involving cargoes of oil, gases and chemicals, plus other substances which are hazardous in packaged form. Pollution damage caused by persistent oils already covered by the CLC and Fund Convention is excluded, as is damage caused by radioactive materials and coal.

The HNS Convention is modelled on the CLC and Fund Convention. Thus, the shipowner (and his P&I insurer) is strictly liable to pay the first tier of compensation whereas the second tier comes from a fund levied on cargo receivers in all Contracting States on a post-event basis.

Ship-owner liability ranges from 10 million Special Drawing Rights (SDR) (about US$ 16 million) for ships up to 2,000 GT, rising linearly through SDR 82 million (about US$ 128 million) for ships of 50,000 GT, to a maximum of SDR 100 million (about US$ 156 million) for ships over 100,000 GT. It is compulsory for all ships over 200 GT to have insurance to cover the relevant amount.

An HNS Fund provides compensation up to a total of SDR 250 million (US$ 390 million), inclusive of shipowner liability but irrespective of ship size. The HNS Fund will comprise four separate accounts for oil, LPG, LNG and a general account for other HNS substances such as bulk solids and chemicals. Each separate account will meet claims attributable to the relevant cargo without cross subsidisation and will be funded in proportion to total receipts of relevant cargoes in Contributing States.

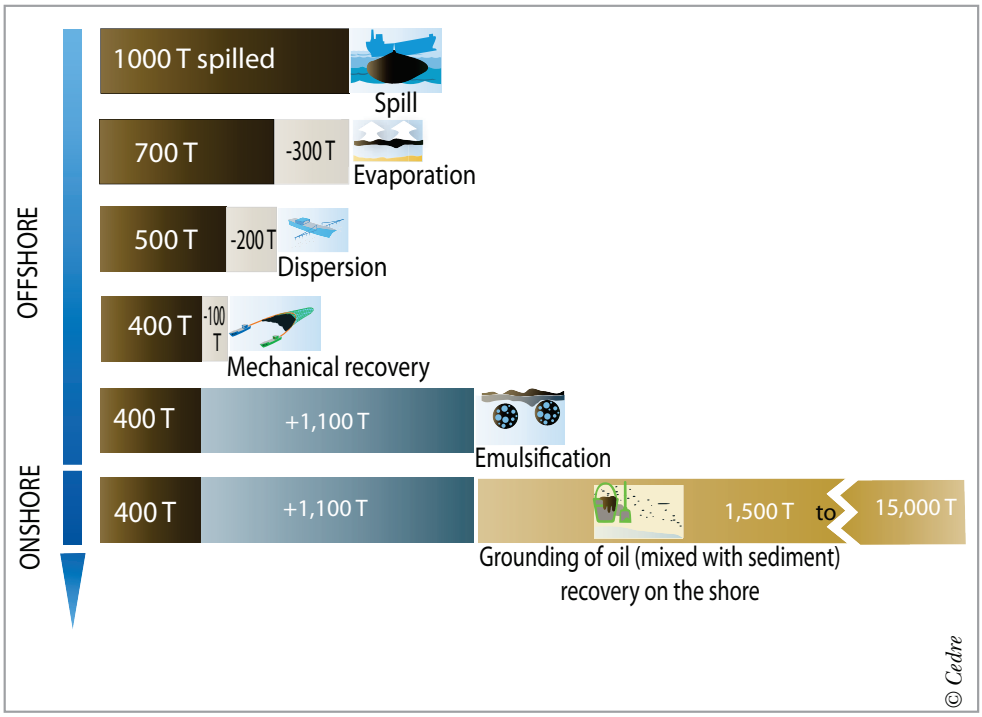
The HNS Convention will enter into force 18 months after ratification by 12 flag States, including four States each representing 2 million GT and Port States importing an annual aggregate of 40 million tonnes of chemicals and other solid bulk materials which are hazardous in packaged form. Despite being adopted in 1996, the HNS Convention had, by July 2009, only 14 ratifications and is some way from meeting the level of ratification that would trigger its entry into force.

In 2009 the IMO Legal Committee approved a draft Protocol to the HNS Convention, designed to address the practical problems that have prevented many States from ratifying the original Convention. Among the obstacles has been the requirement for States to report the quantities of HNS received to IMO, which has proved difficult, in part, due to the sheer range and diversity of hazardous and noxious substances that will be governed by the HNS Convention. The Protocol aims to address this problem as well as others thought to be acting as barriers to ratification of the Convention. The Protocol was adopted at a diplomatic conference convened in April 2010.

Waste management strategy

Aims

During a shoreline pollution incident, clean-up operations generate large quantities of different types of waste.



Oil spill mass balance

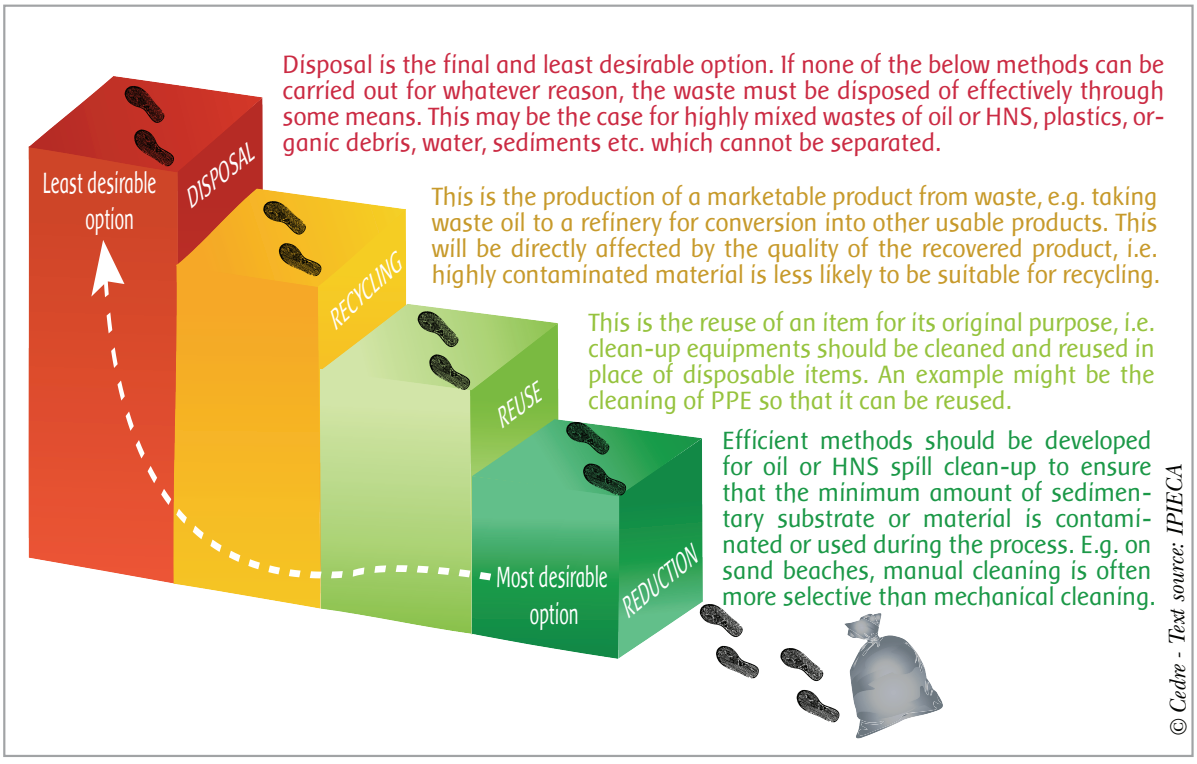
Also, in the selection of treatment methods, there are conflicts between cost and the best practicable environmental option. Each type of waste requires a different treatment based on:

- Quantity, composition, type of pollutant.
- Location of the spill.
- Socio-economic & environmental factors.
- Resources available.
- Regulations and permitting.
- Disposal & treatment facilities.

It is therefore essential to develop a robust strategy to deal with waste. The agreed waste management strategy must complement the clean-up strategy and ensure continuity and efficiency of operations from clean-up to disposal or re-use.
Waste minimisation, recycling, recovery and treatment to reduce the hazardous nature of the waste will be the principles that guide the development of the strategy. It is paramount that the strategy is integrated within the overall response and is not developed in isolation.
The aim of this section is to assist decision-makers with this process.

The 'Waste Hierarchy'

A useful model when dealing with a waste stream originating from any source is the 'waste hierarchy'. This concept uses principles of waste reduction, reuse and recycling to minimise the amount of ultimate waste produced, thus reducing environmental and economic costs and ensuring that regulatory and legislative requirements are met. It provides a tool for structuring a waste management strategy and can be used as a model for all operations. In the past, most spills have involved crude oil or refined products, so the diagram hereafter is based on oil.



The 'waste hierarchy' or waste management steps

The waste hierarchy provides a useful tool for structuring an efficient waste management action plan and for summarising the step by step principles to develop a strategy.

Waste management key points

The checklist below, which is a very basic guideline, outlines the main technical steps of waste management operations. These steps may need to be taken before the spill, when the contingency plans are being prepared.

Each action mentioned hereafter is described in the current section and/or section C as practical datasheets.

B3

Waste management checklist

Actions

Practical datasheet n°

PREPAREDNESS

- Have up-to-date contingency plans

STRATEGY

- Arrange to survey polluted sites and evaluate situation
- Estimate likely waste quantities and infrastructure required to support waste management strategy. Monitor and review in agreement with regulators
- Ensure consistency with the clean-up strategy & provide advice to minimise waste production
- Categorise waste
- Identify the capacity of the waste industry, storage requirements and treatments options, with associated costs
- Consider the environment and the health of public and responders

RESPONSE

- Organise a shoreline clean-up worksite 1
- Fill in daily worksite record sheets & ensure record keeping 2
- Clean-up polluted shoreline 3
- Keep waste to a minimum and be selective. Segregate waste at the point of production to facilitate the assessment of the Best Practicable Environmental Option for each waste 4
- Decontaminate personnel and equipment to prevent secondary pollution 5

WASTE MANAGEMENT: Organise feeding of waste processing stream to avoid overflow and stand-still

- Temporary storage sites 6
- Moving hazardous waste and tracking documentation
- Ensure transparency and traceability of processes 7
- Intermediate waste storage sites 8
- Long term waste storage sites 9
- Recycle or upgrade as much treated waste as possible: waste treatment options 10
- Promptly restore all sites involved

Origin and category of waste collected

Various types of waste may be encountered on the shoreline:

- Oil spill waste.
- Hazardous and Noxious Substances (HNS): chemicals in bulk or in containers.
- Products transported in bulk (oil, grain, coal, wood...).
- Litter and debris (plastics, metals...).
- In addition, solid or liquid waste may be mixed with various kinds of sediment, flora, fauna, marine and floating debris or flotsam.

Accidental shoreline pollution: emulsified heavy fuel oil from Prestige (Spain, 2002) washed ashore (left), containers from MSC Napoli (UK, 2007) stranded on a beach (middle), timber from Ice Prince (UK, 2008) (right)

It is important to categorise waste to assist in the process of storage, segregation, treatment and disposal. Seven waste categories (illustrated in the table and pictures hereafter) are proposed according to their composition, each corresponding to distinct management and treatment processes.

Category	% oil or HNS	% water (free)	Mineral matter	Organic matter	Comments
Liquids	> 10 %	0 % to 90 %	< 10 %	< 10 %	Remove as much water as possible by settling
Pastes and solids (sand...)	> 10 %	10 % to 20 %	> 10 %	< 10 %	Define threshold according to pollutant
Polluted pebbles and stones	> 10 %	1 %	> 80 %	< 10 %	Choice criterion: degree of surface polluted
Polluted sorbents	> 5 %	< 10 %	< 10 %	< 5 %	Bulk, mops, pillows, sheets...
Polluted seaweed	> 5 %	< 20 %	< 20 %	> 80 %	Biodegradable substance → Olfactory disturbance
Polluted solid waste	> 5 %	< 10 %	< 10%	variable	Including gloves, boots, overalls...
Polluted fauna	> 5 %	< 15 %	< 10 %	> 70 %	All birds and mammal corpses should be counted before disposal. Some of them may be kept for necropsies and scientific studies

NB: the percentages, given in weight, simply provide an indication of the relative values.

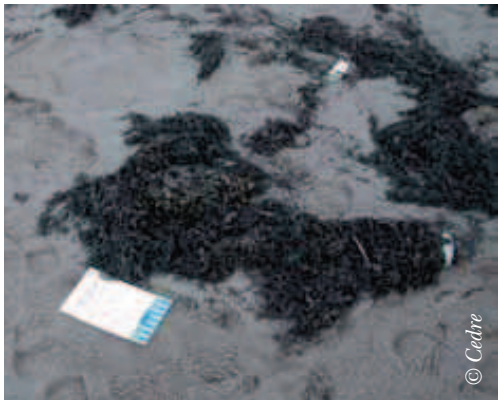
Examples of different types of waste

→ Liquids

→ Pastes & solids (sand...)

→ Polluted pebbles & stones

→ Polluted sorbents



→ Mixed polluted seaweed

→ Polluted solids

→ Polluted fauna

→ Containers

Waste management steps: upstream phase

Waste collection and clean-up strategies

Waste evolves over time, in terms of quality, quantity and pollutant content, depending on: the type of pollutant, the weather conditions at sea, the type of foreshore and substrate, but also according to the response techniques implemented.

The table below summarises the effect on the waste stream and the type of waste generated at sea and on the shore depending on the recovery techniques used.

Clean-up technique		Effect on waste stream	Type of waste generated
At sea response operations 	Recovery devices, e.g. booms and skimmers, are deployed from ships or small craft to recover oil from the sea surface. Suitably sized storage systems may be needed which, in the case of highly viscous or waxy oils, will require heating elements. Transfer systems and reception facilities will also be needed to sustain operations over the long term.	Recovery operations will potentially give rise to a large quantity of waste oil and water for treatment. The volume of the storage systems must be consistent with the recovery capacity of the skimmers. Viscous and waxy oils will entrain debris and can create large volumes of waste and present severe handling difficulties. Liquid waste recovered generally has a high pollutant or emulsion content, which may vary with the extent of water settling.	◗ Recovered oil or HNS ◗ Polluted water ◗ Water-in-oil or HNS emulsion ◗ Polluted equipment/ vessels ◗ Polluted PPE ◗ Polluted sorbents ◗ Polluted flotsam ◗ Animal carcasses
Shoreline clean-up 	Operations are generally carried out in two phases: initial clean-up to remove the bulk of the pollutant and prevent remobilisation; final clean-up to allow normal shoreline activities to be resumed. Pollutant is recovered either using mechanical or manual means. From a waste management perspective, manual recovery is the preferred method because it minimises the amount of waste generated. The shoreline type, and how accessible it is, will dictate the types of strategies used which, in turn, will determine the amount of waste recovered.	Recovery operations will potentially give rise to a large quantity of waste oil or HNS and water for treatment. The volume of the storage systems must be consistent with the recovery capacity of the skimmers. Viscous and waxy substances will entrain debris and can create large volumes of waste and present severe handling difficulties. Liquid waste recovered generally has a high pollutant or emulsion content, which may vary with the extent of water settling.	◗ Polluted beach material: • Sand, mud… • Cobbles, stones… ◗ Polluted vegetation ◗ Polluted sorbents ◗ Polluted equipment/ PPE ◗ Recovered oil ◗ Polluted water ◗ Polluted flotsam/ jetsam ◗ Animal carcasses ◗ Vehicles ◗ Containers, drums... ◗ HNS ◗ Inert and mixed wastes

Text source: IPIECA

More information: practical datasheet n°3

Minimisation

Historical data shows that oil spills impacting the shoreline can in extreme cases produce up to 30 times as much waste as the volume originally spilt. It is therefore essential to reduce the amount of waste, thus limiting the difficulty of dealing with the quantity of waste generated in a very short period, and mitigating environmental and economic impacts.

Waste minimisation must be a permanent objective during clean-up operations and in situ handling. Emphasis should be put on methodical management of clean-up sites to avoid spreading and secondary contamination of unaffected sites, and also on choosing recycling/reuse options for oiled equipment.

Basic rules for minimisation

- Restrict waste production: develop plan, implement and review it.
- Assess situation through use of SCAT survey teams to agree on and select appropriate and selective clean-up techniques.
- Liaise with regulators.
- Raise staff awareness and provide training.
- Prioritise in situ washing techniques over the removal of oiled sediment.
- Prevent additional contamination:
  - Avoid spreading and burying.
  - Prevent soil contamination by using liners under drums, tanks and inside storage pits.
  - Control and protect access to the clean-up sites using linings and/or geotextiles.
- Sort/classify waste as early as possible according to composition.
- Ensure a permanent control of operations to comply with minimisation strategy.

Left: Lightly polluted stones and pebbles unnecessarily removed from the shoreline.
Right: In-situ sand flushing.

Avoid removing lightly polluted sand/pebbles.
Prioritise in-situ clean-up techniques.

Left: big bags, sorbents and various waste in bulk spilling onto the ground.
Right: use of wringable and reusable mop sorbents to recover pollutant on water surface.

Avoid additional contamination by using the adequate equipment.
Re-use equipment as far as possible.

More information: practical datasheet n°4

Segregation

Given that waste will not be "pure" but already mixed with a varied quantities of other materials, the need for proper waste segregation must be emphasised as early as possible on the worksites by appropriate management of waste collection and temporary storage.

Waste segregation on site, up to individual waste streams, has to be adapted according to the:

- Volume and type of oil, inert, or HNS spilt.
- Amount of waste expected.
- Final treatment and disposal options available as previously identified.

Then, segregation into categories will have to correspond to the processing streams selected. Sorting waste at the source will also help to save time and money related to pre-treatment. Commonly, contaminated materials are sorted into:

- Liquid.
- Solid.
- Non-biodegradable (oiled plastics, contaminated clean-up equipment...).
- and biodegradable (oiled seaweed, fauna) categories.

A maximum of seven categories can be considered if many process streams are available (see B4).

Basic rules for segregation:

- Use different containers for different types of waste.
- Identify and label containers clearly to prevent them from being mixed up during the rest of the management process.
- Raise staff awareness regarding the importance of sorting waste and about the related consequences and costs of poor waste segregation.

Storage area with buckets, bins and wheely bins

Skips for segregated waste storage

Temporary storage sites

Because oil or HNS spills can occur in isolated locations on the coast and large volumes of waste may be generated, it may be difficult to transport waste directly to a disposal or treatment site. Temporary storage sites are therefore required as:

- A buffer zone between worksite and process streams (transfer to intermediate long term storage sites, or, if possible, directly to treatment facility).
- An emergency storage area for the immediate deposit of the waste.
- A key location for sorting, labelling and quantifying the types and volumes of waste collected.
- And, wherever possible, a pre-treatment area so as to reduce volumes to be transported.

The size, number and location of such storage sites will depend on the amount and nature of material collected, on the clean-up techniques used and on the number of worksites.

Therefore, it is difficult to pre-designate areas for emergency storage on worksites. Such an issue may be addressed as the need arises. Thus, the following rules must be followed:

Basic rules

- Pre-establish criteria for site selection (choose a flat, accessible piece of land, near the worksite, where least harm will be caused to the site).
- Check existing plans for identified sites.
- Avoid contaminating the subsoil and surrounding areas.
- Sort and quantify waste by category.
- Restrict leaching by rain water.
- Ensure rapid treatment and disposal processes on site.
- Organise rapid waste transfer/removal.
- Close the storage site as soon as clean-up operations are completed.
- Clean and restore the storage site.

Left: bags mixed with other waste stored directly on the ground without any geotextile or plastic sheeting.
Right: correctly protected beach access.

Do not deposit packaged waste in unprotected areas. Ensure the temporary storage sites and access routes are protected.

Left: inadequate primary storage for drums and big bags.
Right: adequate temporary storage for drums and liquid waste.

Prevent additional contamination by using suitable equipment.

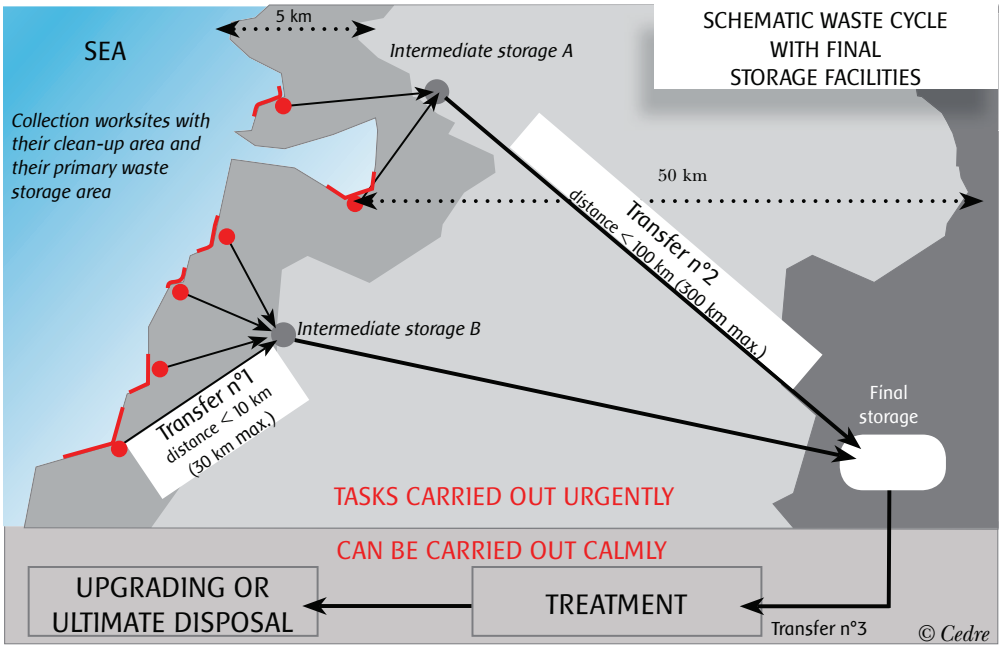
More information: practical datasheet n° 6

Moving hazardous waste & tracking documentation

The following diagram shows:

- The entire waste cycle which begins with collection from clean-up worksites to treatment facilities or final storage sites.
- Each specific transfer of waste, specifying the proposed maximum distance to travel.
- A buffer zone between worksite and process streams (intermediate/long term storage sites, or, if possible, directly to treatment facility).

Transport should be undertaken by registered waste carriers in accordance with legislation. Guidance must be sought from the regulators and agreed in the waste management group.



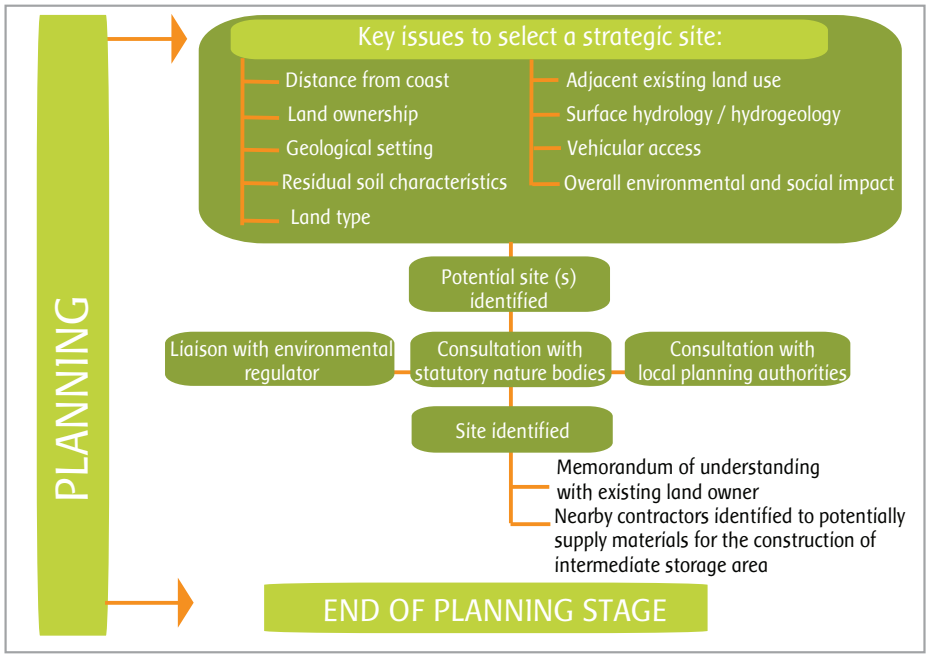
Basic rules

- Oily waste is considered hazardous but other waste may not be.
- Package and clearly label waste in accordance with regulations.
- Use appropriate vehicles to transport waste (e.g. vacuum trucks for liquid waste).
- Comply with safety instructions.
- Provide advice on suitable routes and implement a traffic scheme to mitigate the risks and inconvenience.
- Make sure that traffic restrictions comply with conditions and limitations for traffic movement.
- Keep processes as short as possible.
- Avoid spreading pollution caused by leaking from inappropriate transportation means or by not decontaminating truck wheels.
- Ensure traceability by appropriate control measures when leaving storage sites and upon arrival at treatment or disposal sites.

More information: practical datasheet n° 7

Intermediate storage site

Potential sites that may be used for the intermediate storage of HNS or oil-polluted waste should, ideally, be pre-identified by Local Authorities during the contingency planning stage, and incorporated into the regional or national contingency plan. The areas suitable for intermediate (or long term) storage should be mapped prior to treatment, in the form of a data layer within a GIS, making it possible to combine different elements relative to: the environment, accessibility, proximity of the coast and built-up areas, protection of property, surface water and groundwater, the area's flooding risk...



Basic rules

Before the response

- Seek assistance and approval from Local Planning Authorities in identifying sites.
- Identify the site during the planning stage and make the best use of available local resources: large car parks, waste disposal facilities, industrial/brownfield or harbour sites.
- Choose a location near the clean-up sites that heavy vehicles can access, minimising inconvenience to local residents.
- Bear in mind the distances between these facilities and primary storage sites so as to keep transportation times and costs down.
- Make technical and/or financial arrangements with existing land owner of site identified.

During the intervention

- Commence planning and preparing for intermediate storage site requirements at the start of the emergency based on the scale of the incident and estimated waste generated. Review requirements and capacities throughout incident.
- Register site with environmental regulators.
- Avoid spreading pollution caused by leaking from inappropriate transportation means or by not decontaminating truck wheels.
- Ensure traceability by appropriate control measures when leaving storage sites and upon arrival at treatment or disposal sites.
- Consider and minimise risks of nuisance from sites: noise, dust, odour, fumes...

More information: practical datasheet n° 8

Long term storage

Intermediate storage is not recommended for long periods (from an environmental point of view). Rather, long term storage sites should be set up when required, i.e.:

- The total volume of waste exceeds the just-in-time treatment capability in the country.
- Installations must be adapted (or built) to the required (pre-)treatment techniques depending on the type of waste and treatment chosen.
- Negotiating contracts for the treatment (or export) of waste may be a lengthy task.

Choosing an appropriate storage facility in terms of size (several hectares with simultaneous use of several pits enabling selective storage right from the outset) and its occupation for a period of up to several years will involve planning/regulatory procedures and consultation which are incompatible with an emergency situation. It is therefore necessary to pre-select sites before a spill occurs, as part of contingency planning. The selection method will consist in listing potential sites and matching them with feasibility criteria, in the same way as with intermediate storage sites but with stricter requirements and on a larger scale.

Basic rules

Before the response

- Request assistance from government departments to locate suitable sites.
- Choose the site during the planning stage.
- Plan adjustments to the site based on large volumes and a long timeframe.

During the response

- Commence planning and preparing for long term storage sites requirements at the start of the emergency based on the scale of the incident and estimated waste generated. Review requirements and capacities throughout incident.
- Register site with environmental regulators
- Quantify, characterise and sort waste into categories.
- Look into waste treatment processes and final disposal schemes.
- Manage the site and monitor inputs and outputs continuously.
- Ensure onsite security and traceability.
- Organise waste disposal and removal of oiled materials.
- Clean and rehabilitate the site as soon as the job is done.

Long term storage site

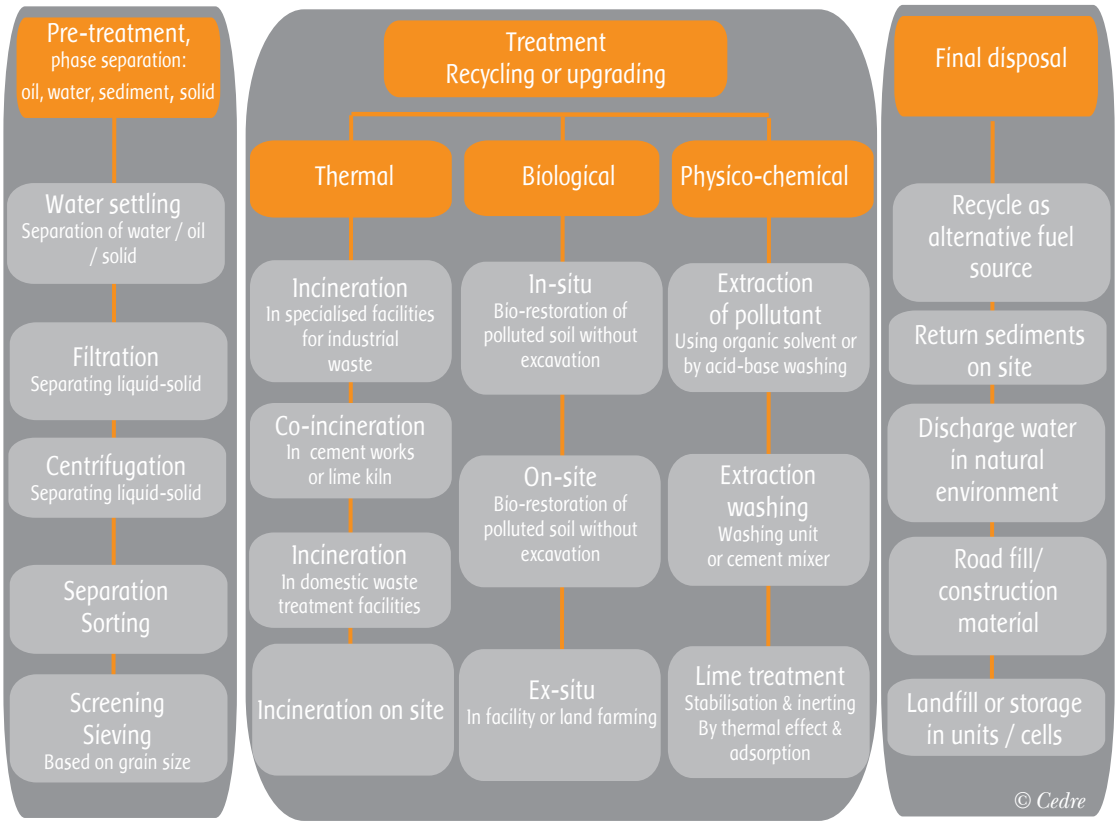
More information: practical datasheet n° 9

Pre-treatment, treatment and disposal: downstream phase

General issues

All major spills involve a particular type of oil, HNS or solid waste, which will undergo weathering, and be recovered at sea or at various shoreline locations, thus producing different types of waste. To manage this waste, various types of treatment may be implemented. The objective of any response is ultimately to treat, recycle or dispose of the waste in the most economically efficient and environmentally and socially acceptable manner.

The figure below outlines the main types of treatment and pre-treatment for spill waste.



It is the responsibility of national authorities to define the pre-treatment suited to the treatment facility chosen since each treatment facility is specific and each country has its own rules and regulations.

More information: practical datasheet n°10

Pre-treatment

One of the main objectives of pre-treatment is the **separation of the different phases** (oil or HNS/water/solids) of the waste recovered.
The pre-treatment option can be implemented at the treatment facility or on the intermediate/long term storage site.
The choice of the pre-treatment required will be ascertained during the pollution:

- Once the treatment options have been confirmed.
- Depending on the nature of the spill waste recovered.
- According to the "quality" of the waste segregation at the source on site.

The requirements for pre-treatment should be assessed taking into account the entry criteria of the identified facility, e.g.:

- Restriction related to the nature of the waste (presence of toxic compounds) which will limit the daily volume of waste manageable by the plant. In this case, spill waste will have to be mixed with the normal waste managed by the plant, in the appropriate proportions for the equipment.
- Limitation of water or salt content. For instance, a cement kiln will only use recovered oil as a fuel source if the oil is fresh, non-emulsified, does not contain water, or salt...
- Approval of waste without any pre-treatment which is the case of some specialised landfills.

Where large amounts of waste need treating, the (pre-)treatment techniques should be tested before implementing a full scale waste (pre-) treatment system:

- Treatment techniques can be tested in the laboratory.
- Pilot (pre-)treatment facilities may also be implemented for small scale testing.

The results of these tests should enable authorities to confirm the technical feasibility of the treatment option, and should also confirm the environmental performance of the treatment. An analysis of the waste prior to any treatment is required.

Treatment

Specific facilities have often to be adapted or built to implement (pre-)treatment. One of the main difficulties is choosing the best suited scale for the facility, i.e. finding a reasonable balance between capital expenditures and running costs, compared to the total volume of waste to be (pre-)treated.

The choice of treatment method is closely linked to the type of waste and the possibilities of upgrading or ultimate disposal for the waste in question. This requires:

- Conducting an accurate assessment of the different waste: type, quantity, characteristics (nature, grain size, pollutant content, water content...).
- Choosing a suitable course of action for each type of waste, according to the level of cleaning required for upgrading or ultimate disposal.
- Identifying local resources and facilities (location, distance and ease of access of specialised plants).
- Assessing reception capacities and treatment rate.
- Estimating cost of treatment, up to and including final disposal.
- Considering environmental regulations.

Final disposal

Some treatments result in the total destruction of the spill waste (e.g. co-incineration in cement kiln; in such a case, the quality of the fumes generated must be monitored). Otherwise, waste treatment often results in the production of an ultimate material that has to be disposed of.

Possible final disposal options comprise:

- Recycling as an alternative fuel source (power plant, refinery, cement works...) or raw material.
- Discharging water into the natural environment.
- Returning sediments on site
- Using treated material for road fill/ construction.
- Storing at landfill sites or special units/ cells.

As for the treatment options, the entry criteria for each final disposal option have to be ascertained, particularly the environmental and technical regulations that apply to the re-use of material and return of treated sediment and water to the environment.

Furthermore, the point at which clean-up stops or treated contaminated waste water or sediments can be returned to the originating site will be decided on a case by case basis by the responding authority in agreement with the environmental regulator and the environment group.

In addition, the point at which waste ceases to be waste following a treatment process will also be decided by the environmental regulator.

Example: treated materials that may be used for road fill and/or construction must:

- Have geotechnical properties suited to their use e.g.:
  - Limited risk of liquefaction in case of seismic stress or in presence of vibrations.
  - Adequate specific gravity of the treated sediment.
- Comply with the relevant regulations regarding these materials (although a special authorisation or derogation may be issued).

Practical datasheets

The following datasheets dedicated to responders contain general recommendations in terms of worksite organisation, clean-up techniques, waste minimisation, storage, transportation and treatment.

Each spill that occurs and impacts the shoreline remains a specific case. Therefore, it is strongly advised to mobilise technical advisers on site to adapt such general guidelines.

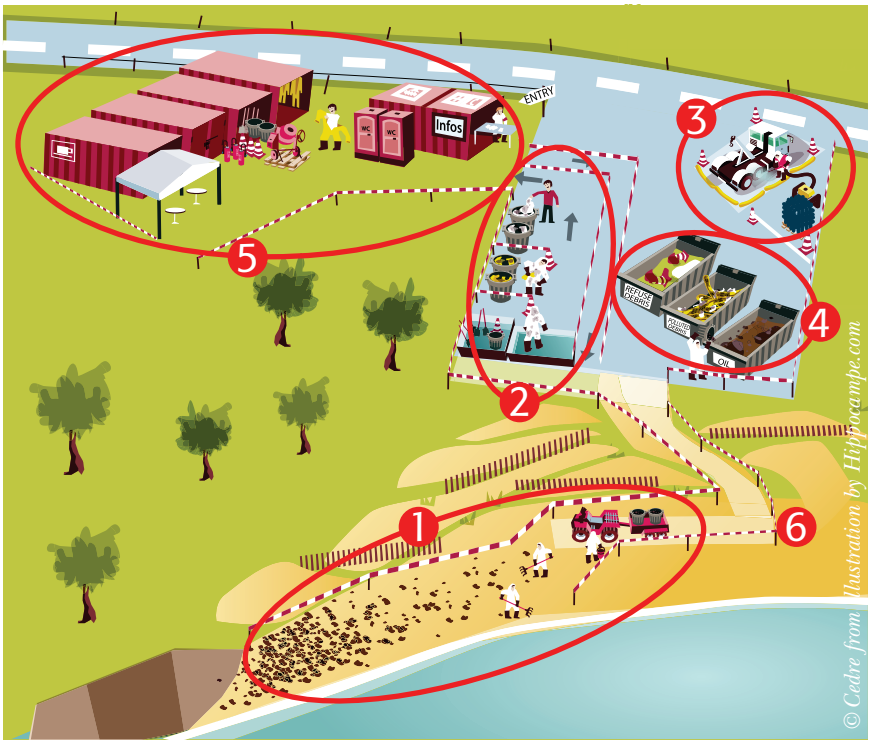
- Datasheet 1: Organising a clean-up worksite
- Datasheet 2: Worksite record keeping
- Datasheet 3: Cleaning up polluted shorelines
- Datasheet 4: Minimising waste during recovery
- Datasheet 5: Decontaminating personnel and equipment
- Datasheet 6: Temporary waste storage
- Datasheet 7: Moving hazardous waste & tracking documentation
- Datasheet 8: Intermediate waste storage
- Datasheet 9: Long term waste storage
- Datasheet 10: Waste treatment options

Organising a clean-up worksite

Objectives

- Before any response operations start on the shore, it is essential to organise worksites in advance and in particular to prepare access routes, temporary storage sites and decontamination areas to prevent transfer of the pollution and damage to the site.
- Each worksite should be supervised by a clearly identified manager ("beachmaster") who ensures the safe and efficient progress of operations in close liaison with the Command Centre/ Shoreline Response Centre.

Organise the worksite



1. Secured and cordoned off response area with appropriate signage.
2. Decontamination area for responders and equipment.
3. Decontamination area for trucks and other vehicles.
4. Waste segregation and storage area on a non-sensitive site, accessible to trucks and heavy vehicles.
5. Worksite management area such as a container, portakabin, municipal building. The area should be connected to an electric power supply and water network and include office space, a briefing room, a first aid kit, communication means, administrative and record keeping materials (worksite record sheets, order forms, staff attendance sheets...), changing rooms, toilets, showers and a welfare area.
6. Marked off access and traffic system around, in and out of the site.

Worksite management

Pedestrian access route for responders

- ✓ Always maintain safe working conditions.
- ✓ Provide sufficient quantities of PPE, tools and clean-up products (sorbents, solvents...) adapted to the type of pollutant. Seek advice on PPE and Health & Safety from the Shoreline Response Centre.
- ✓ Protect the ground with a geotextile membrane when working on sensitive sites.
- ✓ Define a simple and efficient traffic system (from public road to worksite and on the worksite). Mark off vehicle routes and control access at all times.
- ✓ Channel pedestrian traffic and prevent public access to sites. Report any issues to the command/Shoreline Response Centre.
- ✓ Provide sufficient and appropriate storage based on type, category and quantity of waste.
- ✓ Ensure operations are not held up at any stage by putting in place efficient management processes, setting up regular briefings and maintaining close liaison with the command centre.

- ✓ Don't leave the site unsecured during the day or night. Access to the response areas shall be strictly limited to the workers directly involved in clean-up.
- ✓ Don't allow too many workers on response sites at the same time.
- ✓ Don't organise traffic lanes on soft soil liable to suffer damage.

- ✓ Assess progress of operations including use of resources and equipment and report any issues to the command centre to adjust the clean-up strategy.
- ✓ Evaluate daily waste production/storage capabilities to assist planning and review of the overall waste strategy by the command centre.
- ✓ Consider organising primary waste storage areas with an entrance for workers on one side and trucks for waste transfer on the other.
- ✓ Provide a large enough primary storage waste area to enable some waste handling and sorting and so as not to bottleneck recovery operations.

Worksites may remain active for several weeks. Provisional installations and protections must last for the required duration. It is therefore important to assess the likely duration of work from the onset and set up your site accordingly.

Worksite record keeping

Objectives

- ☐ To report daily on clean-up operations and the quantity of waste generated from each worksite to the command/Shoreline Response Centre.
- ☐ To ensure that transportation, intermediate storage and waste processing facilities are able to handle overall waste generated throughout the area impacted by the spill.
- ☐ To monitor progress (based on statistics) and guide decisions on the adjustment of resources (human and technical) allocated and required.
- ☐ To establish robust data management and record keeping procedures, essential to the preparation of subsequent legal and financial claims.

How to achieve the objectives

- ✓ Provide all site managers (beachmasters) with standard forms to be used across the area impacted by the pollution, throughout the operation.
- ✓ Establish communication arrangements with the command/Shoreline Response Centre.
- ✓ Develop a database or GIS system capable of handling the information contained in the forms.

Forms

An example of a generic daily worksite report form which can be adapted to the incident is provided overleaf. More detailed forms will need to be developed to record:

- Plant and machinery: hire companies, daily length of use with start and finish time, registration of vehicles, names of operators, invoice reference...
- Equipment: personal protective equipment and any other equipment used on site including subsistence.
- Staff time: start and finish time, work undertaken, hourly rate...
- Log of events, accident reporting, Health & Safety risk assessment.

- ✓ Don't use different forms on different sites.
- ✓ Don't change the form during clean-up operations unless it is necessary and justified. Any change-over must be organised on the same day throughout the area impacted.

- ✓ Put in place robust record keeping on site and at the command/Shoreline Response Centre.
- ✓ Ensure that the forms contain all the data required by the command/Shoreline Response Centre and are signed off by the beachmaster. As a minimum, the form should include quantities for each category of waste.
- ✓ Check with IOPC and insurers that the form fits claims criteria.
- ✓ Record all equipment used on site, photograph damage and justify replacement of equipment or requests for further resources.

ONE SHEET PER WORKSITE AND PER DAY

SITE: AREA:

DATE: Start time: Finish time:

Completed by: ..... Contact details: .....

To be sent every evening to: .....fax: ..... email: .....

TECHNIQUES (1) or ACTIVITY	PERSONNEL			EQUIPMENT				WASTE GENERATED		COMMENTS
	ORIGINE(2)	NUMBER	EXPECTED FOR NEXT DAY	ORIGINE(2)	TYPE(3)	QUANTITY	EXPECTED FOR NEXT DAY	NATURE (4)	QUANTITY (m^3 or unit)	INCIDENTS, BREAKDOWN, TEAM CHANGES

TECHNIQUES (1)	ORIGIN (2)		EQUIPMENT TYPE (3)			NATURE OF POLLUTANT (4)
1. Manual collection 2. Mechanical techniques (e.g. mechanical sand screening) 3. High pressure washing 4. Low pressure techniques 5. Other*	**Equipment*** 1. Local Authority / County Council/ Municipality 2. Nearby municipalities 3. Fire brigade 4. Stockpiles 5. Civil protection 6. Army 7. Private* 8. Other*	**Personnel*** Same as equipment + 9. Local fire brigade 10. Nearby fire brigades 11. Volunteers 12. Other*	**Heavy Machinery** H1. Earthmoving equipment (e.g. power shovel, scraper) H2. Farm machinery (e.g. tractor, trailer, tanker) H3. Water supply means H4. Nautical means H5. Tyrolean traverse H6. Other*	**Specialised equipment** S1. Booms S2. Skimmers S3. Sediment screeners S4. High pressure washers S5. Impact hoses S6. Transfer pumps S7. Suction pumps S8. Hoses S9. Storage: Tanks S10. Storage: Containers S11. Storage: Big bags S12. Other*	**Disposable products** D1. Geotextile D2. Sorbents D3. Washing agent D4. Film forming agent D5. Over packages D6. Disposable suits D7. Boots D8. Gloves D9. Goggles D10. Hard hats D11. Other*	1. Liquids 2. Pastes & solids (sand...) 3. Polluted pebbles and stones 4. Polluted sorbents 5. Polluted seaweed 6. Polluted solids 7. Polluted fauna 8. Other*
**Please specify:*						

Cleaning up polluted shorelines

Objectives

If time and resources allow, a pre-litter clean-up should be organised, at beaches likely to be contaminated, to minimise the amount of waste being generated.

Clean-up usually takes place in three phases:

Phase 1: Emergency phase - Initial recovery

Recover the bulk of the pollutant and oiled materials (sediment, litter, seaweed...) to:

- ☐ Limit the spread of the pollution by preventing remobilisation of pollutant.
- ☐ Minimise the environmental impact by reducing the time spent by the pollutant on the shoreline.

Phase 2: Project phase - Final clean-up

Remove moderate contamination (i.e. not bulk) and stranded oil/materials. These operations can involve sophisticated techniques to remove residual pollution: pollutant trapped in riprap, residual microtarballs on amenity beach...

Phase 3: Final phase - Site restoration

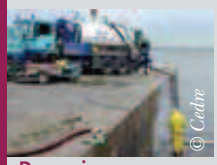
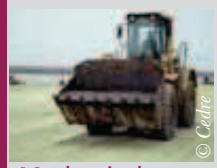
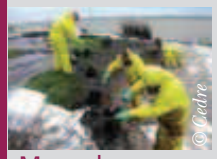
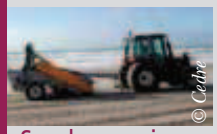
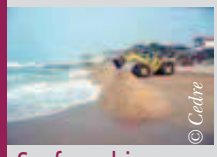
When clean-up operations are completed, the site must be restored to its original state: fill in trenches, remove stakes and barrier tape, restore storage areas and access points.

All actions have to be deemed to be of net environmental benefit.

Selective manual clean-up operations

Mechanical clean-up of riprap

datasheet 3

	Clean-up techniques	Type of substrate	Type of pollutant	Type of waste generated	Selectivity	Comments
First and rough recovery	 Pumping	Any shoreline / water surface	All liquid or semi-liquid floating pollutants	• Oily water • Liquid or semi-liquid pollutant • Polluted sorbents	++ (with oleophilic skimmers) + (with weir skimmers or suction head)	• Bulk sorbent can be used with vacuum pumping • Volume of water up to 10 times volume of spilt pollutant
	 Mechanical recovery	Gravel and sandy beach	All pasty or solid and thick pollutants	• Pasty to solid pollutant potentially mixed with sediment • Debris • Liquid possibly	+	• Can be used to assist during manual recovery • Not recommended in case of scattered or light pollution • Segregation not feasible • Collection quality and environmental impacts depend on operator skills and machinery adjustments
	 Manual recovery	All types of substrate	All pasty or solid and thick pollutants	• Pasty to solid pollutant mixed with little amount of sediment	+++	• Easy way to segregate waste • Collection quality relying on responders' skills • Personnel and equipment consuming
	 Sand screening	Sandy beach	All pasty or solid and thick pollutants	• Pasty to solid pollutant mixed with sediment • Debris	++/+++	• Collection quality as well as impacts on environment depend on operator skills and machinery adjustments
Pollutant remobilisation and concentration	 Flushing	Pebbles, rocky shoreline, riprap	All types of pollutant sticking to substrate	• Liquid and emulsified pollutant • Polluted sorbents	++ Depending on the efficiency of effluents recovery disposal	• Can be used together with flooding technique • Mobilises pollutant • To be combined with effluent recovery (booming, pumping, sorbing, netting)
	 Underwater agitation	Any type under water surface	All types of sinking pollutant	• Polluted sorbents or nets • Liquid pollutant • Booms to be cleaned up		• Frees trapped or sunken pollutant • To be combined with pollutant recovery at the water surface (booming, pumping, sorbing, netting)
Final clean-up	 Surf washing	Pebble, gravel and sand beaches	All types of pollutant particles which can be naturally dispersed in the water column	• Polluted nets or sorbents	++ Depending on the efficiency of effluents recovery disposal	• Reduce sediment removal • To be combined with pollutant recovery at the water surface (pumping, sorbing, netting) • To practice upon technical advisers recommendations
	 High pressure washing	Rocky shoreline and man-made structures Pebbles, rocks and boulders	All types of pollutant sticking to hard substrate	• Polluted sorbents or nets • Polluted effluent		• To be combined with pollutant recovery at the water surface (booming, pumping, sorbing, netting)
	 Do nothing	Marshland, mudflat	Pollutants whose biodegradation rate is in adequacy with such a strategy	• No waste	/	• Long to very long self clean-up time • To carry out upon experts' technical advice • Ensure follow-up studies

The clean-up requirements and methods have to be clearly assessed and defined before and during the operations and are decided at the command/Shoreline Response Centre.
The selection and implementation of clean-up techniques depend on:

- ☐ Shoreline type.
- ☐ Nature and extent of pollution.
- ☐ Environmental sensitivity of sites.
- ☐ Operational considerations: resource availability, access, time to restore sites.
- ☐ Degree of clean-up required.

- ✓ Don't perform any additional clean-up beyond specific brief given by command/ Shoreline Response Centre for that site.
- ✓ Don't "overcollect" sediments, increasing the quantity of waste to deal with later on.
- ✓ Don't use techniques that may cause secondary pollution and migration of the pollutant (washing techniques for instance) without an appropriate effluent recovery system.
- ✓ Don't use techniques that lead to pollutant burial.
- ✓ Don't use insufficiently trained operators who will be less selective during clean-up, whether mechanical or manual.

Risks of pollutant splashing

- ✓ Use mechanical recovery techniques **only** if they are selective enough.
- ✓ Minimise the quantities of waste generated by clean-up actions.
- ✓ Select techniques which separate pollutant from sediments on site (on-site pebble cleaning, flushing, flooding, underwater agitation,...) and thus reduce the quantity of waste to be collected, stored, transported and processed.
- ✓ Brief staff daily before work starts to ensure they comply **with instructions** and after work to report any issues.

Mechanical selective sand screening

Pollution by HNS/Containers

In case of pollution by containers, drums...:

- Secure the area and keep the population at a safe distance.
- Seek specialist advice.
- Identify the substance contained using the standardised labels and determine the actual condition of the package (leaking or not).
- Send only properly trained and protected responders near to the packages to proceed to overpacking, recovery, treatment...

- ✓ All washed up drums or containers should be considered as potentially hazardous.
- ✓ Unless it has formally been recognised as harmless, handling of the container or drum should be left to the emergency services who are equipped, trained and practiced in doing so.
- ✓ Remain upwind of the drum or container.
- ✓ Do not attempt to handle it.
- ✓ Observe from a distance (binoculars) any symbols enabling it to be identified.

Exercise involving over-packing a hazardous stranded drum

Minimising waste during recovery

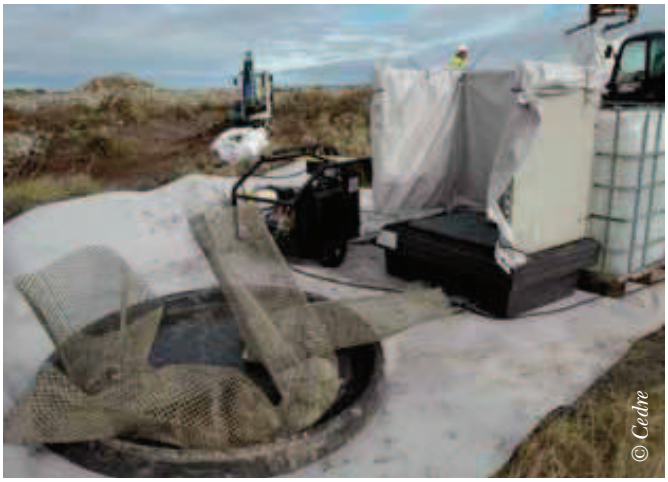
Objectives

- ☐ To minimise the total amount of waste generated, collected, stored and treated.
- ☐ To reduce the ultimate volume of waste for final disposal.
- ☐ To minimise the overall cost of response and maximise the potential for cost recovery.

Actions

- ✓ Remove seaweed and debris before any pollutant washes up on the shore to prevent their contamination.
- ✓ Contain and recover pollution as closely as possible to its source in order to enable collection of waste with the highest concentration of pollutant.
- ✓ Prioritise manual recovery as a clean-up option to minimise the amount of waste generated.
- ✓ Choose clean-up techniques that separate the pollutant from sediment:
  - Flush buried polluted sediments (in fine to coarse sand). Use an impact hose to inject water and air into the sand to remobilise the pollutant trapped and recover at surface with sorbent, net or skimmer.
  - Sieve sand manually for tar balls (non sticky) with large screeners or small self-propelled screeners.
  - Wash pebbles in a cement/concrete mixer or using a high pressure washer within a makeshift installation set up on site.
    An example of this is a sort of "booth" with a perforated metal base and three lateral sides covered with geotextile to contain the spray of oil. The washing effluents are collected using pumping or sorbents placed in a recovery device set up under the washing booth.

Flushing enables highly selective recovery of buried pollutant without taking too much sediment



Washing pebbles on site in a booth

- Surfwashing (pebbles, shingle or sand) consists in moving the polluted sediments into the surf zone using loaders. The wave energy remobilises and separates oil and sediment. The oil is recovered along the high tide mark or on the water using skimmers or sorbents (see right hand picture below).
- Separate/wash off contaminants to enable reuse or recycling of containers and their contents.
- Set up settling system for oily waste water: storage tanks should be equipped with a valve at the bottom to drain off the water.

✓ Segregate waste at start into categories and avoid (re)mixing with other materials.

✓ Cover storage facilities on site to prevent uncontrolled run-off and overflow due to rain water.

✓ Recycle/reuse equipment: tools and PPE should be wiped daily with rags, rinsed and dried.

Manual recovery of viscous pollutant and tar balls with shovels

Implementation of netting to trap pollutant at high tide

✓ Don't "overcollect" sediments.
✓ Don't allow uncontrolled use of disposable items (PPE, sorbents,...) as some can be washed and reused.
✓ Don't generate secondary contamination through spreading of pollution by workers, vehicles and equipment to unpolluted areas due to inappropriate worksite management.

✓ Try and contain the pollutant on impacted shores to avoid remobilisation of pollutant by the sea and pollution of clean sites.
✓ Be selective during clean-up.
✓ Ensure that the amount of waste is kept to a minimum.
✓ Sort waste on site into categories corresponding to processing streams.
✓ Process polluted material as close as possible to the worksite to ensure that the ratio 'volume of waste transported/distance' remains at a minimum.
✓ Ensure all workers adhere to worksite management rules.

Decontaminating personnel and equipment

Objectives

Before leaving the worksite, all personnel must be "decontaminated" in order to:

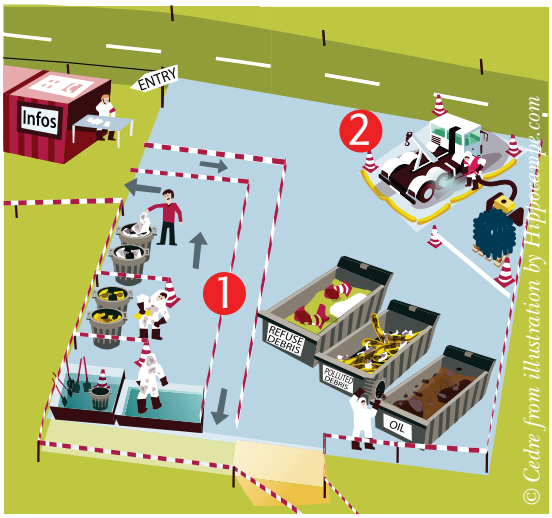
- ☐ Avoid spreading the pollution to surrounding clean or preserved areas.
- ☐ Provide a minimum amount of comfort to the workers after each work session and during breaks (transport, meals, ...), maintaining their efficiency.
- ☐ Prolong the life of response equipment, tools and PPE.

For HNS Pollution incidents, a decontamination unit may need to be installed for staff coming out of the 'hot zone'. The unit and staff may be sourced from either the emergency services or specialist contractors.

Layout

The decontamination area must be established between the dirty and clean areas of the worksite.

1. The personnel should follow a decontamination chain, going from dirtiest to cleanest, on a watertight platform where the washing effluents can be recovered.
2. Another decontamination area can be set up at a strategic location for vehicles and heavy machinery.



Actions

- ✓ Grade the ground and create a sand or earth dam to obtain a slightly sloping baseline with a small trench on the lowest side to recover effluents.
- ✓ Cordon off the decontamination area (use stakes and warning tape).
- ✓ Lay out watertight film (plastic sheeting).
- ✓ Install tanks for rough and intermediate cleaning.

Successive tanks for rough and intermediate cleaning

- ✓ Carry out rough cleaning in a first tank with water, mild washing agent and 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).
- ✓ Wipe personnel and equipment outside the tanks with cloths and sorbents.
- ✓ Recover effluents: settle, store or isolate depending on pollutant.

Safe, medium pressure washing

- ✓ Don't set up the decontamination area too far away from the response area to limit path contamination.
- ✓ 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. Where possible, use vegetable (cooking) oil and soap which are almost as effective.
- ✓ Don't use sorbents to decontaminate personnel without first undertaking rough and intermediate cleaning or this will generate unnecessary waste.

- ✓ Organise decontamination in three stages to minimise the use of disposable materials.
- ✓ Install a protective layer to prevent oil or HNS from penetrating into subsoil.

Basic equipment for a decontamination area:

- 1 flat or slightly sloping platform (> 30 m^2), plastic sheeting (or strips of geotextile if no slope exists or can be obtained) to cover the platform, stakes, fluorescent warning tape to identify the decontamination area and pathways.
- 1 tank (1 to 2 m^3) + harmless washing agent + cloths or sponges for rough wiping down.
- 1 hot water pressure washer (+ washing agent if necessary) to wash/rinse.
- masks (with filters) and safety goggles.
- rolls of sorbent for final wiping down.
- 2 open 200 litre barrels (or bins) for solid waste.

Extra equipment:

Small mobile pump and storage tank to recover washing effluents and a secure equipment storage area for tools and PPE.

Temporary waste storage

Objectives

A beach head or temporary storage site is:

- ☐ A small, short-lived emergency area for the immediate deposit of waste arising from clean-up before transfer to an intermediate or long term storage site, or to a treatment/disposal facility.
- ☐ A key location for segregating and quantifying the types and volumes of waste and undertaking on site pre-treatment to reduce volumes transported.

Site selection

1. Close proximity to clean-up sites.
2. Away from sensitive areas/habitats.
3. Out of reach of the sea, tides and waves.
4. Sufficient space for waste segregation.
5. Accessible to road network.
6. Away from residential areas.
7. Permission from site owner and/or local authority.
8. Approval from environmental regulators.

Setting up facilities

1. Protect soil and subsoil with watertight membranes or geotextile.
2. Lay fine gravel or sand at the base of the storage area to protect the membranes (depending on ground characteristics).
3. Organise access points and traffic.
4. Install sufficient appropriate containers to sort waste into different categories.
5. Protect from rainfall (tarpaulins, lids on containers) and integrate drainage of the area by run-off channels.
6. Reinforce unpaved tracks.

- ✓ Don't establish temporary storage on cliff edges, intertidal zones, submersible areas or soft and environmentally sensitive areas.
- ✓ Don't mix different categories of waste.

- ✓ Ensure measures are in place to segregate waste at the point of production to facilitate the assessment of the Best Practicable Environmental Option for each waste. For instance, waste could be segregated and labelled into seven categories (see B4).
- ✓ Raise awareness amongst responders of the importance of segregating waste and about the related consequences and costs of poor waste segregation.
- ✓ Track waste movements from the site to intermediate, or long term, storage sites or to the treatment or disposal facility (see practical datasheet n° 7).
- ✓ Secure the site to prevent unauthorised access and dumping from external sources.

Storage equipment

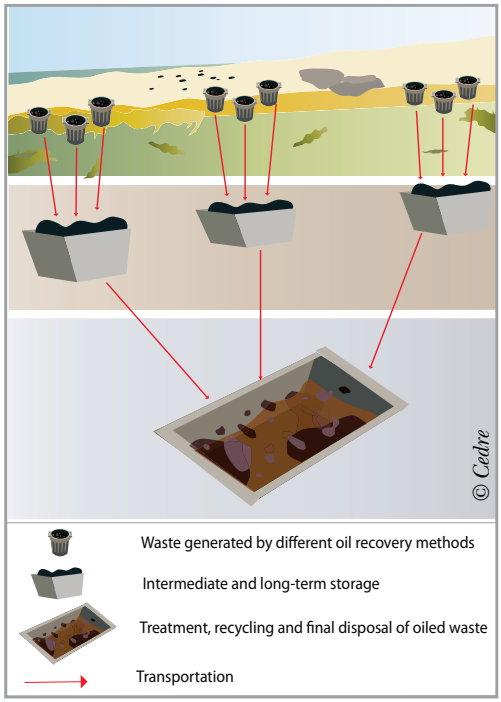
Equipment should be chosen and set up according to the site and pollutant characteristics (nature, viscosity, volume...). The table below presents the different possible storage methods.

	Type of container	Type of waste	Favourable sites	Implementation	Comments
	In bulk or inside **plastic bags** (100 L max) on watertight platform	Solids, debris	Platform on slight slope with a trench to recover leachates and run-off	Place bags on a tarpaulin to prevent them from being punctured	Beach head storage only (daily transfer mandatory)
	**Buckets** (10 L), **bins** (30 to 100 L), **wheely bins** or containers (150 L to 1 m³)	Pastes, solids	All types of sites	Place buckets or bins on a platform covered with a tarpaulin	Wheely bins and containers have a lid which is useful against rain
	**Big bags** (0.5 to 2 m³)	Pastes, solids	All types of sites	Can be lined with a plastic sheet to make it more oiltight	Can be crane-lifted, air-lifted, reused
	**Skips** (10 to 30 m³)	Solids, debris	All types of sites	Protect the ground using geotextile + tarpaulin. Protect inside the skip with a tarpaulin	Can be crane-lifted
	**Watertight pit** (50 to 200 m³; depth < 3 m)	Liquids and pastes	Loose ground	Dig a pit and protect inside using plastic membranes and geotextile to avoid punctures	Significant impact on the environment
	**Self-supporting flexible tanks** (1 to 40 m³)	Liquids	Flat surface	Ground cover provides extra protection on rough or sharp ground	Enables initial settling. Available in fire stations and spill response stockpiles
	**Flexible containers with metal structure** (10 to 100 m³)	Liquids	Flat surface	Ground cover provides extra protection on rough or sharp ground	Specialised equipment available from response stockpiles. Some models allow draining via a bottom valve

In case of pollution by HNS or lost containers, seek specialist advice and ensure reactive substances are kept isolated

Moving hazardous waste & tracking documentation

Objectives



Overview of waste transportation

- ☐ Waste must be moved and transferred from the worksite to storage sites then treatment/ disposal facilities to ensure continuity of operations.
- ☐ When waste is moved, it must be accompanied by a written description of the waste and this must be done in a manner that does not allow the waste to leak and does not create a safety hazard.
- ☐ Tracking documentation is also essential for cost recovery from polluters.

Actions

Before waste is moved off site:

- ✓ Assess its characteristics and whether it is hazardous.
- ✓ Consider potential for liabilities in respect of the carriage of dangerous goods and waste legislation.
- ✓ Ensure the waste management group has issued guidance for all waste streams taking into account European Waste Catalogue codes.
- ✓ Refer to environmental regulator and Health & Safety agency websites for details of procedures and regulatory steps. The information will include moving hazardous waste and the legal "duty of care".

Separate legislation will apply according to regions/countries.

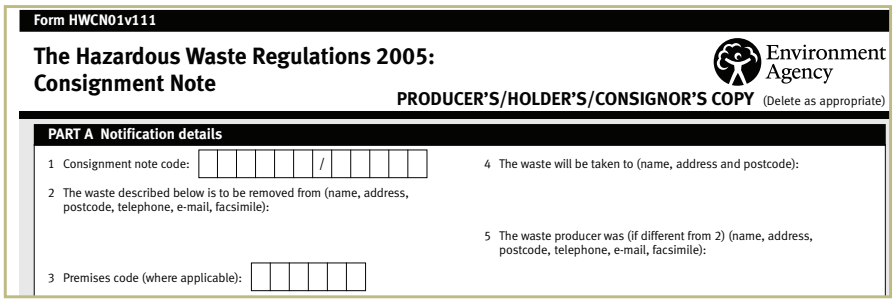
During transport:

- ✓ Contracts must be established with transportation companies that are registered waste carriers, have suitable equipment and specially trained drivers.
- ✓ Keep records. Consignment notes and/or duty of care transfer notes may be required.

Note that there are specialist waste companies which deal with waste from collection to treatment.

Example for England & Wales: The Environment Agency website and HSE website contains relevant information on the carriage of dangerous goods.

- **Consignment notes:** a guide to the hazardous waste regulations.
- **Hazardous Waste Consignment Note:** to be completed to accompany hazardous waste when moved from any premises, including premises exempt from registration and movements between premises belonging to the same company. This consignment note is required even if the holder of the waste does not change, which differs from duty-of-care transfer note requirements.
- A Continuation Sheet for Consignment.
- A Schedule of Carriers Form.
- A Waste Transfer Note (duty-of-care).
- A Record keeping guide.



Form HWCN01v111

The Hazardous Waste Regulations 2005: Consignment Note

Environment Agency

PRODUCER'S/HOLDER'S/CONSIGNOR'S COPY (Delete as appropriate)

PART A Notification details

1 Consignment note code: /

2 The waste described below is to be removed from (name, address, postcode, telephone, e-mail, facsimile):

3 Premises code (where applicable):

4 The waste will be taken to (name, address and postcode):

5 The waste producer was (if different from 2) (name, address, postcode, telephone, e-mail, facsimile):

Consignment note: for full document, refer to www.environment-agency.gov.uk/static/documents/Business/HWCN01v111_paper_final_April_2011.pdf

- ✓ Don't move waste if you do not understand its hazards and cannot ensure its security and proper destination.
- ✓ Don't contaminate roads and create safety hazards.
- ✓ Don't use the same road for truck traffic both ways. Where possible organise a loop circuit, so that trucks do not have to pass each other on narrow roads.
- ✓ Don't use unprotected skips, dump trucks, public work lorries and all other vehicles transporting waste.

Unprotected truck

- ✓ Comply with regulations related to transportation of hazardous waste.
- ✓ Organise transportation in order to minimise the impact on road safety and the environment.

Truck and skip protected with plastic liner

Intermediate waste storage

Objectives

- ☐ To set up a buffer site between temporary storage sites and treatment facilities (or long term storage sites) to manage fluctuating waste flows and/or possible saturation at these sites.
- ☐ To sort, manage, repackage and track waste as required before transferring to the long term storage/treatment facility.

Key factors for site selection

Type of site	Artificially-formed depressions, such as disused quarries, car parks, disused pits, can be developed as suitable temporary storage areas.
Duration	A few weeks to a few months with site rehabilitation as soon as shoreline clean-up is finished.
Surfaces and volumes	1,500 to 3,000 m^2 with a few trenches (100 to 200 m^3), plus storage facility for large waste objects, bags, barrels, tanks (depending on recovered quantities).
Distance	Between 5 to 30 km from the shoreline clean-up worksites.
Accessibility, particular modifications	Access and traffic systems able to allow traffic of heavy duty lorries. Creation of decontamination area for machinery, weighing scales, trench for tyre washing.
Legal and planning constraints	Plan on occupying the site for several months, even years (sufficient period of time for the site to be part of the response plan), compliance with local planning regulations.
Topographical constraints	Land must be flat or slightly sloping to create a level platform (for settling tanks...), provide the appropriate rainwater run-off facilities.
Hydro-geological constraints	Subsoil should preferably be impermeable, surfaces must be made watertight and water management is vital. Storage sites should not be located on wetlands, water supply catchments, areas at risk of flooding, tidal plains or major natural drainage paths.
Environmental constraints	Keep as far away as possible from residential areas (at least 100 m), avoid protected and sensitive areas (dunes, vegetation). A buffer separation zone should be established.
Management and maintenance	Supervise transfers (waste sorting, quantity estimation, lorry count, safety regulations and traffic system).
Supervision	Cordon off the area and if access cannot be completely prohibited provide supervision.

Basic rules for setting up facilities

- Design the site so as to separate the different categories and types of waste. Separate waste with high and low pollutant content.
- Protect soil and substrata with thick polyethylene membrane plus geotextile and a fine gravel bed to prevent punctures.
- Organise drainage and divert run-off.
- Set up an oil recovery system by skimming or pumping.
- Implement a one way traffic system for machinery to facilitate operations and keep collision risk to a minimum; signpost access roads and control entry to avoid polluting clean areas.
- Organise a decontamination area for machinery and lorries.

8 datasheet

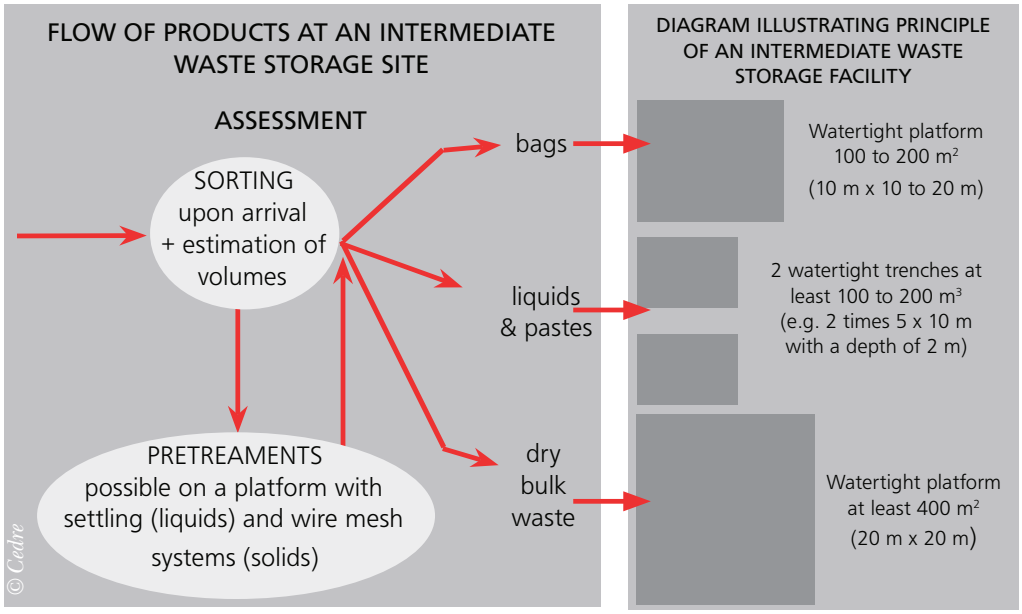


Diagram of inbound waste streams and separate storage areas.

Site management must comprise:

- Permanent technical supervision of operations (quality and quantity control of incoming materials, pollutant content analysis, logbook to report all movements and incidents).
- Maintenance and surveillance of the facility (health and safety regulations, appropriate PPE, clear marking of the different areas, traffic regulation).
- Water management to avoid spreading the pollution (run-off, seepage on or off site) into the environment through the establishment of drainage channels and stormwater tanks.
- Waste transfer to a treatment plant or final storage facility to avoid saturation.
- Restoration of site to original state once all waste has been transferred.
- Excellent administration and record keeping and liaison with command centre.

✓ Don't set up site in areas with a slope gradient of over 5 percent.
✓ Don't set up an intermediate storage site in regions with permeable topography or close to large water springs.

✓ Seek specialist advice (hydrogeologist) to identify sites which fulfil selection criteria.
✓ Ensure waste storage sites comply with regulations.
✓ Monitor environmental & health impacts (nuisance from lorries, air quality for instance).

***Intermediate storage sites:** 1) pastes and liquid waste in a pit 2) solid waste in skips 3) unacceptable mixture of solid, paste and liquid waste in the same pit.*

8 datasheet

Long term waste storage

Objectives

- ☐ To store waste for one or several year(s) in a secured and environmentally suitable location.
- ☐ To supply waste to treatment facilities in proportion with their treatment capability.
- ☐ To further sort the waste where required (once treatment options are finalised).

Key factors for site selection

Duration	A few months to a few years.
Surfaces and volumes	20,000 to 100,000 m², with segregated storage areas of 1,000 to 10,000 m³, plus a sorting, pre-treatment, stabilisation and deposit area for some types of waste.
Distance	Strategic location between collection or intermediate storage sites.
Access	Organise access for 30 to 40 T heavy duty lorries (arrivals, departures, load-bearing capacity and width of roads), weighting scales, trench for tyre washing.
Regulatory & Planning Constraints	Seek planning and regulatory consent. Occupation of land for 10 years should be included in the response plan.
Topographical constraints	Possibility of carrying out terrace earthworks and grading at various levels with access points and collection of rainwater.
Hydro-geological constraints	Land must be watertight (use a specialised company to check on soil quality or carry out necessary site preparation work): natural or manmade clay or geomembrane (1 pit ready to use, others in reserve).
Environmental constraints	Compatibility with protected areas, buffer distance of at least 100 m from nearest houses downwind.
Management and maintenance	Supervise movements (waste sorting, quantity estimation, lorry count, safety regulations and traffic system). Set up administration system.
Security	Secure & cordon the area off (permanent fence) and ensure permanent surveillance.

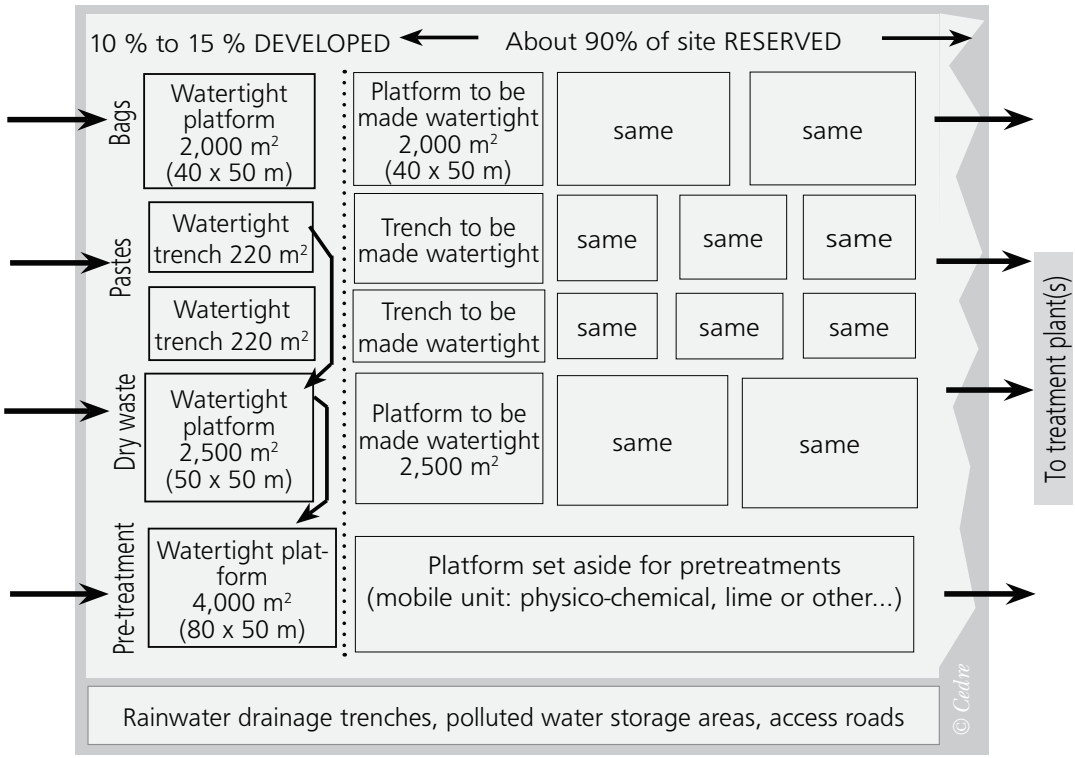
Basic rules for setting up facilities

In addition to the rules listed for intermediate storage, consider the following:

- A dedicated unpacking area (e.g. waste delivered in big bags).
- Fully watertight lined pits.
- A drainage and water recovery system with water treatment plant.
- Regular checks using piezometers placed downstream of the site (and one piezometer positioned upstream for control) to ensure that the water management scheme is working correctly.
- Covered storage facilities.
- Venting system to prevent gas accumulations.

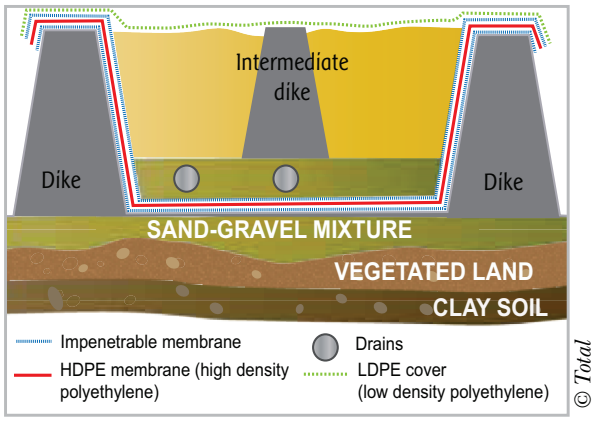
The following picture illustrates the principle of a long term waste storage site: bags, liquids, pastes, dry bulk have their own separate watertight area.

The existing storage site can be extended if space allows.



Site management

- Set up permanent technical supervision of arrivals and departures including reception facilities manned and secured on a 24/7 basis.
- Control quality and quantity of incoming materials, analyse pollutant content.
- Keep a daily record book of all arrivals, departures, operations and incidents.
- Organise road traffic to facilitate on-site movements and reduce accident risks.
- Identify and label trenches/platforms.
- Direct and supervise unloading.
- Inspect and maintain the facility (safety rules, supervision, cleanliness).
- Ensure that there is continuous capacity to meet anticipated demand for each category.
- Restore site at the end.



Cross section of final waste storage facilities for the Erika pollution (venting devices not represented). Donges, Loire Atlantique, France

More information: Practical Datasheet n°8 for Do's and Don'ts

Waste treatment options

Objectives

- ☐ To identify the most suitable treatment and disposal options for the waste generated according to the volume and nature of the polluted materials, and taking into account the relevant environmental, technical, financial and legal issues.
- ☐ To reduce the volume and hazardous nature of waste in order to facilitate re-use, recycling and/or final disposal.

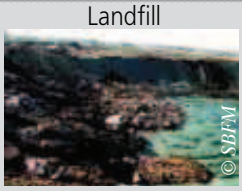
Actions

- ✓ Consider all possible treatment options according to the nature of the waste:
  - Study treatment options (listed in the table below).
  - Classify waste (i.e. relative content of water, mineral and organic matter).
- ✓ Identify facilities and their capacities.
- ✓ Recommend best suited and most cost effective solutions.
- ✓ Research and contract accredited companies, suitably equipped to treat waste (incineration plants specific to hazardous waste, cement works, physico-chemical treatment plants...). Note that there are also companies which deal with waste from collection to treatment.

For more information, please refer to *Cedre* or IPIECA guidelines dedicated to waste management.

Main general waste treatment options

Treatment	Techniques	Type of waste/Comments
Re-processing 	Pollutant recovered with a low water and debris content is reprocessed (refinery, recycling plant)	• Liquid pollutant • High salt content of oil is unacceptable (corrosion) in refining process
Oil or HNS/water/sediment separation 	• Separation of oil or HNS/water/sediment by: settling, centrifugation, filtration, use of de-emulsifier, heating	• Heavily polluted liquid/semi-solid (dry solid content max 15%) • Sediment and water may need further treatment before release • Oil may be blended and processed in a refinery

Treatment	Techniques	Type of waste/Comments
Sediment washing 	• Polluted pebbles and sand may be moved to the surf zone (surfwashing) • Polluted pebbles, boulders may be washed in-situ in a booth to drain off polluted water • Washing may be conducted with suitable solvent and water in cleaning equipment (concrete mixer...)	• Polluted pebbles, boulders, sand • During surfwashing, pollutant is collected on sea surface by net • Polluted waste water needs treatment • It may be difficult to define when sediment is free of pollutant or solvent to return it to the beach
Stabilisation 	• Solidification/stabilisation by mixing quicklime (calcium oxide) on worksite or in specialised units, redox reaction decreases solubility of soluble compounds and releases sufficient heat to ignite lightest compounds	• Paste, solid, polluted sand and debris • Quicklime reacts vigorously with water releasing heat • Leaching risk reduced • Waste transformed in granular solid mixture can be sent to long term storage
Bioremediation  	• Bioremediation consists of accelerating the natural, microbial break-down of oil or HNS ex- or in-situ • Biostimulation constitutes oxygen or nitrate enhancement of polluted sediment • Landfarming involves spreading the polluted sediment and mixing with soil • Bio-pile: idem as above techniques when implemented in specific area and controlled conditions on excavated sediments	• Lightly polluted sand, gravel, mud (generally 5% oil content) • Biostimulation is inefficient in tidal areas • Biodegradability of each oil type needs to be assessed by carrying out analysis (high asphalten and resin content oil degrades slowly and incompletely) • Biogas and leachate must be managed adequately (risk of ground water contamination)
Thermal treatments 	• Destruction of waste by burning (oxidation): - In an industrial incinerator at high temperature (850 to 1,200 °C) - Small quantities may be admitted to a domestic waste incinerator	• Oil or HNS, polluted sand, solid waste. (taking care of incineration by-product) • Up to 99% reduction of volume, ash must be disposed of correctly • Able to handle waste with hazardous substances • Atmospheric release of toxic chemicals must be controlled, is subject to atmospheric legislation • Generally able to deal with limited quantities
		
	• Co-incineration in cement kiln as fuel source (liquid) or alternative raw material (polluted sand). Substitution rate to be defined	• Some cement facilities have adaptations to receive polluted waste but may have restrictive entry criteria • Air emission limits to be checked
	• Thermal desorption aims to separate contaminant from sediment at low temperature (250 to 450°C) or medium temperature (450 to 560°C), oil/HNS and water are evaporated • Mobile treatment units	• Lightly polluted sediment • Low temperature thermal desorption, effective for volatile compounds (diesel), medium temperature for heavy compounds (PAH evaporated hydrocarbons or HNS need to be treated to trap or destroy organic constituents)
Landfill 	• Storage in controlled authorised hazardous landfill • Waste composition must comply with entry criteria depending on class of landfill	• Polluted sediment and solid waste • Will not eliminate the waste • Subject to stringent long term monitoring and pollution control to avoid leaching of toxic compounds

Feedback datasheets

Sea Empress

Circumstances

- Date: 15/02/1996
- Location: Milford Haven passage (United Kingdom)
- Cause: Grounding
- Areas affected: 200 km of coast-line

The Sea Empress aground in Milford Haven

Response organisation

All response operations were coordinated by the Joint Response Centre (JRC) on land and by the Marine Pollution Control Unit (MPCU) at sea. Oil Spill Response Limited (OSRL) was responsible for pre-positioning stocks in Milford Haven.

Type of waste

According to estimations (quantity spilt assessed around 73,000 t of crude oil):

- 30 to 35% evaporated.
- 10 to 15% dispersed naturally.
- 13% was dispersed by the action of chemical dispersants applied.
- 12% was recovered at sea as liquid waste.
- 15% was recovered on the shoreline as liquid waste.
- 15% was recovered on the shoreline as solid waste.

The oil spill waste was composed of:

- 8,500 tonnes of emulsion recovered at sea, containing some 4,000 tonnes of oil.
- 11,000 tonnes of solid waste collected during shoreline clean-up operations.

Collection techniques

- At sea: Two strategies were used: chemical dispersion by plane, and containment and recovery by ship.
- On the shore: More than 500 people and over 2000 metres of boom were mobilised on thirty clean-up sites. Protective booms were installed in rivers and marshes at an opening in the Bay of Milford Haven, and in harbours.

Collection techniques (cont.)

Oiled shingle or cobble was dug out and initially taken to a transfer and storage depot then aggregated loads were moved to a landfill site or to a washing station. Bulk oil on sand was scraped into pits or trenches using vehicles fitted with rubber scraper blades, manual scrapers or "squeegees" and recovered using tractors/vacuum trailer units or gully suckers. Sea or fresh water flushing was implemented. Trenches were dug parallel to the sea edge to catch the oil and water mixture, and the oil was pumped out of the trench from the surface into vacuum tankers. To maximise the quantities of oil transported (and minimise the transport of water) the tanks would be left for a while to settle, and the water drained off. An unusual feature of this incident was that the recovered oil could be sent to an oil refinery close to the spill site.

- Lightering operations: Once refloating, the tanker was towed to Herbrandston Jetty, a disused oil wharf in the former Esso refinery in Milford Haven. Four lightering operations, involving two small tankers, recovered 60,000 tonnes of crude oil then transferred to the Texaco refinery.

Transportation

Liquid waste recovered at sea was taken by sea to Milford Haven and transferred to the Texaco refinery.
Liquid waste recovered from the beaches was transported by road tanker to the nearest of the three refineries in Milford Haven.

Storage

- A temporary storage pit for almost 3,000 tonnes of oiled material from Pendine Sands was constructed in the dunes behind the beach.
- Temporary storage sites were set up at Thornton yard and at the Texaco refinery so that solid waste destined for landfill sites could be consolidated before being transported.
- A shed at Pembroke Dock was also hired in which 4,000 tonnes of oiled beach materials were stored over a period of 6 months.

Treatment methods

In total about 20,000 tonnes of liquid waste were processed. The solid beach materials posed a greater problem not least because in total some 10,800 tonnes were recovered, consisting of oiled sand, several hundred cubic metres of sorbent booms, plastic bags, oiled personal protective equipment and large quantities of oiled seaweed.

Of this, approximately 3,500 tonnes were sent to a landfill site at Merthyr Tydfil about 160 km away. Some 200 tonnes were stabilised in asphalt. 7,800 tonnes of oiled beach materials were taken to the Texaco refinery site where they were treated by land farming. This involves spreading the waste over a controlled land site and allowing bacterial action to convert it into less harmful components, a process similar to bioremediation which was being tested at Bullwell Bay.

Source of documentation

CEDRE. *Sea Empress* [online].
Available at: www.cedre.fr/en/spill/sea_emp/sea_empress.php
- MARINE POLLUTION CONTROL UNIT (MCPU). *Milford Haven 15 February 1996: the Sea Empress incident*. Southampton: Coast Guard Agency, 1996. 129 p.

Erika

Circumstances

- Date: 12/12/1999
- Location: Bay of Biscay (France)
- Cause: severe weather conditions, damage to ship
- Quantity spilt: About 20,000 tonnes of oil
- Areas affected: Over 400 km of coastline

The Erika spill : manual recovery

Response organisation

The Polmar Sea Plan was implemented by the French Atlantic Maritime Prefect who coordinated the response at sea. The Biscaye Plan, a bi-lateral agreement for mutual assistance between France and Spain, was also activated.
In total, five French departments implemented their Polmar Land Plan. Response on land was then coordinated by the French authorities.

Type of waste

In total about 200,000 tonnes of waste were collected on shore, composed of:

- 10 % emulsified fuel oil.
- 80 % sand.
- and also seaweed and various oiled materials (wood, plastic...).

At sea, 1,200 tonnes of emulsified oil were recovered.

Collection techniques

- At sea: Since the heavy fuel oil could not be dispersed, the only response option at sea was containment and recovery.
- On the shoreline: Initial clean-up operations were organised on beaches, rocks and breakers as soon as the slicks reached the shore. More than 5,000 professionals and volunteers worked on the shoreline. Because of the fuel's high viscosity, manual clean-up proved to be the only start-up solution in many areas. Rocks were further washed with high pressure washers and the effluents recovered on sorbent booms. Sand screeners proved extremely useful to recover patties of oil deposited on sandy beaches.
- Different types of techniques were selectively implemented, for instance:
  - The recovery of splashes using mop nets.
  - The alternate use, on beaches, of tilling and harrowing.
  - Surfwashing.

Transportation

On land transportation was carried out by trucks. The rate of transfers between the storage and temporary storage was:

- More than 100 trucks per day, one month after the accident.
- And fell to 50 per day after two months.

2 Erika

Storage

Beach head storage sites were set up on upper beach zones as soon as clean-up operations began. The waste was first stored at approximately 40 intermediate waste storage sites, along the oiled shore and close to the clean-up sites. After a few weeks, these sites were dismantled and waste was transferred towards four long term storage sites set up in the region of Basse-Loire, while waiting for a decision for the treatment and final disposal.
Finally, the polluter, Total, was placed in charge of waste disposal:

- A main final storage site in Donges refinery, with a capacity of 55,000 tonnes.
- An 18,000 tonne storage capacity, in Frossay, southern Loire.
- Two other final storage sites set up by the Donges refinery: Arceau 1 (capacity: 70,000 tonnes), Arceau 2 (57,000 tonnes).

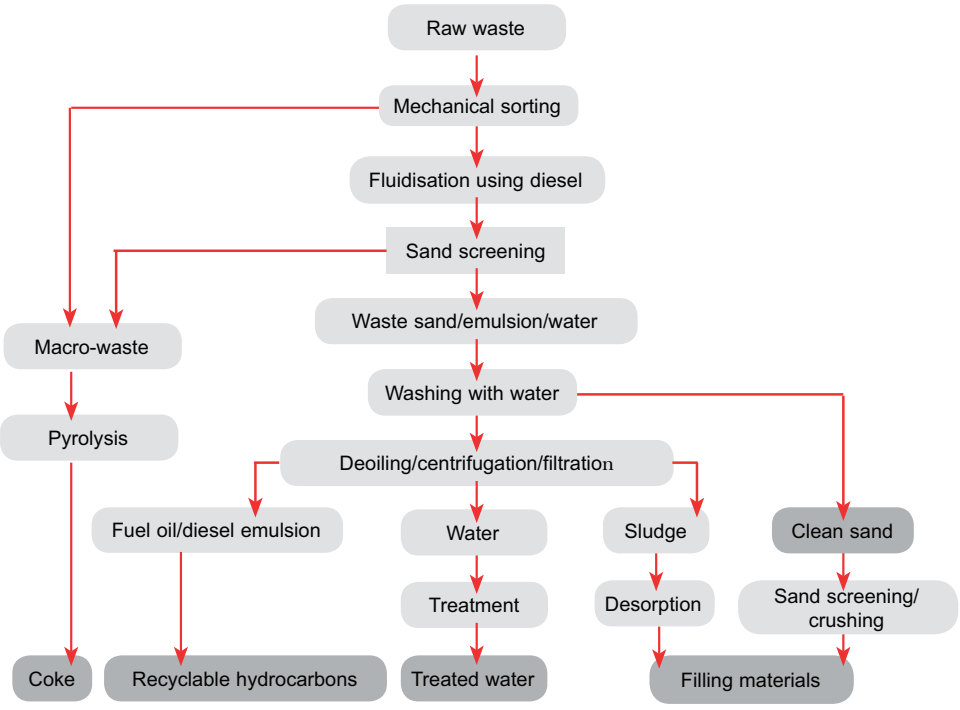
Such sites were classified as "industrial installations" and were monitored by the Agency in charge of industry.

Treatment methods

Eight months after the incident, the French authorities transferred the responsibility of oil spill waste final disposal and treatment to Total, in accordance with regulations related to the protection of the environment, and aiming at ensuring complete waste tracking. Total took over the management of four long term storage sites and implemented a specific waste treatment plant, close to the Total refinery in Donges.
Waste treatment began in Donges in April 2001. The waste treatment plant was classified as an industrial installation and closely monitored by the French Agency in charge of industry.
Objectives were assigned to Total regarding the treatment of the sand, the tracking of washed sand and of washing effluents. For instance, the criteria defined to allow the use of washed sand for Public Works were as follows:

- Maximum hydrocarbon content: 2,500 mg/kg.
- Use of a maximum quantity of 500 tonnes per site, outside of any sensitive areas.

To ensure transparency and inform the public, a local monitoring and information commission was set up and meetings were regularly organised.
The waste treatment was completed in May 2004. A total of 267,158 tonnes of waste was treated.



Source of documentation - *CEDRE. Erika* [online].
Available at: www.cedre.fr/en/spill/erika/erika.php

Prestige

Circumstances

- Date: 13/11/2002
- Location: Off Cape Finisterre, Galicia (Spain)
- Cause: Damage to ship
- Quantity spilt: About 64,000 tonnes of oil
- Areas affected: 2,000 km of coastline

The Prestige: manual recovery assisted by public works machinery

Response organisation

- At sea: From 14th November, the Biscaye Plan, a Franco-Spanish response plan available in the case of an accident in the Atlantic Ocean, was triggered. Co-ordination of the national and international response at sea was ensured by SASEMAR in the Spanish area of responsibility and by the '*Préfecture maritime de l'Atlantique*' when slicks entered into the French area of responsibility.

- On land: In Spain, the response was ensured by SASEMAR and Tragsa (Spanish company contracted by the Ministry of the Environment), with support from volunteers, and OSRL (Oil Spill Response) contracted by SASEMAR. In France, all the departments of the Atlantic coast, whether they triggered their Polmar Plan or not, were prepared to face pollution. Overall co-ordination was managed by the Defence Zone Prefects. Decentralized services of the Ministry of public works (Departmental Equipment Agency, Maritime Service and Maritime Affairs) took an active part in the implementation of the response means. Response was ensured by firemen, the army, private companies...

Type of waste

Total amount of waste recovered: 168,131 tonnes

- Recovered at sea: 52,512 tonnes of contaminated materials
- Retrieved on land: 115,619 tonnes of polluted materials (90,149 t in Spain)

Collection techniques

- At sea: Since the heavy fuel oil could not be dispersed, the only response option at sea was containment and recovery. Sea professionals (in France and Spain) were deeply involved in "second line" response.
- On land: Depending on the environment, different techniques were implemented:
  - Manual collection.
  - Mechanical operations (screeners, rollers) used on sandy beaches.
  - Deployment of protection devices (booms, nets...).
  - Surfwashing.

Transportation

On land, transportation was mainly carried out by trucks. However, many difficult access sites required the evacuation by helicopter or nautical means of waste packed in big bags.
In Spain, as many impacted sites were difficult to access, an extensive road-building programme was undertaken to facilitate operations.
In France, given the frequency and volumes of pollutant washed up and recovered in the Aquitaine area, waste storage, transport and disposal were organised using a just-in-time strategy.

Storage

In France, the polluted waste recovered was mainly stored in oil-tight skips positioned on the beach head and transported by truck directly to storage or treatment sites. By January 2004, all storage sites had been emptied and restored.

Oiled seaweed: The main concerns were the choice of storage sites to spread out the seaweed in layers in order to dry them and reduce the volume of waste to be treated. The piles formed varied greatly ranging from a few to several hundred cubic metres.

Treatment methods

In Galicia, the liquid products were sent to a refinery or to waste oil treatment centres where oil, seawater and sediments were separated. Sand resulting from the separation process was sent to a dedicated treatment centre.

Regarding the polluted materials recovered on the shoreline, the example of the treatment centre of Medioambiental is of particular interest. The residual polluted sand was recovered by mixing it with clay after it had been separated from water and oil. This mixture was fired to produce totally inert ceramic bricks which could be used for building work.

In France, the treatment option prioritised for the solid waste collected was incineration, whereby the oil and sediment contents determined which type of centre to consider for treatment. By January 2004, all the waste stored had been treated. In total, 17,627 tonnes of waste were treated in the south-west defence zone.

Oiled seaweed: Disposal of the largest pile (750 m^3), containing a large quantity of sand, was contracted to a private company. A large part of this treatment was carried out at the storage site: separation of sand and seaweed by sifting using a trommel and liming, before sending the dried seaweed to an incineration plant. After analysis, the treated sand was returned to the beach to reinforce riprap. For the majority of the other piles (20 to 250 m^3) two solutions were defined:

- Piles of seaweed with a low oil content were placed in the water at ebb tide, whereby the seaweed was cleaned naturally by the hydraulic action of the sea and the tarballs released were recovered manually on the foreshore.
- Piles of seaweed with a high oil content but without sand were sent to an incineration plant after liming in order to reduce the volumes to be treated.

Source of documentation

CEDRE. *Prestige* [online].

Available at: www.cedre.fr/en/spill/prestige/prestige.php

CEDRE. *Spécial accident du Prestige. Bulletin d'information du Cedre*. 2004, n°19, pp. 4-21

JIYEH

Circumstances

- Date: 13/07/2006
- Cause: Conflict (bombings, fire of fuel storage in a power plant)
- Location: South of Lebanon (Mediterranean Sea)
- Quantity spilt: About 10,000 to 15,000 tonnes of IFO 150
- Areas affected: Almost half of the 200 km of Lebanese coastline

Bucket brigade evacuating waste

Response organisation

Operations were conducted or supervised by the Ministry of the Environment (MoE) with support from international experts.
Given the extent of the pollution, international experts were mobilised, including REMPEC. The organisation of clean-up depended on sites. The two major difficulties for the establishment of a collection chain were linked to the destruction of infrastructures during the bombings, and the lack of financial means that led to the financial and technical assistance of various foreign countries through UNDP (United Nations Development Programme).

Type of waste

A study on oily waste management (Antea/*Cedre*) funded by the French Ministry of Finances and Industry gave the following results for the inventory of total quantities collected: 4,847 m^3

- Polluted equipment: 60 m^3.
- Semi solid: 173 m^3.
- Polluted pebbles: 264 m^3.
- Liquid/oil: 567 m^3.
- Polluted sand: 1,814 m^3.
- Polluted debris and sand in unknown proportion: 1,969 m^3.

One major problem was the large amount of debris that was already stranded on the coast of Lebanon and that became oiled, thus generating difficulties during clean-up operations (especially during skimming in ports) and a large volume of polluted waste.
Large scale surfwashing operations conducted by a Lebanese association helped to minimise waste quantities.

Collection techniques

The pollution impacted various substrates: sandy beaches, pebble and stone beaches, rocky platforms and shore and port facilities. Some oil sunk in front of the power plant.

Collection techniques were linked to the substrate type.

- Manual recovery of heavily oiled sand and pebbles.
- Skimming or manual recovery of floating oil.
- Recovery of litter and debris in the port area from boats.
- Use of local divers for manual recovery of the pollutant in shallow water.
- Surfwashing for recovery of the pollutant using makeshift means.
- High pressure hot water washing for rocky shores, platforms and infrastructures.

Initial collection and final collection were mostly conducted by private companies.

Transportation

Various unspecialised companies were mobilised for transportation, mainly at the beginning of operations and tracking of waste was not always easy.

Storage

Liquid oil was stored in existing tanks or purpose built tank-tainers. Some of the beach head storage sites remained for more than one year and were implemented using inappropriate storage capacities without soil protection for such a long period. The waste was then transferred into containers and tanks and sent to two sites adjacent to refineries and one waste landfill site for intermediate storage, until treatment solutions were found.

Treatment methods

Complete information on final waste treatment and disposal is not available. As co-processing in cement kilns was not considered a good solution by the Lebanese Ministry of the Environment, various solutions were developed but some waste is still pending for treatment:

- Some oily sand was cleaned by centrifugation (oily sand is first mixed with water, oil is then adsorbed on specific granules and then separated by centrifugation on the beach using mobile equipment).
- Lightly oiled sediment was screened and then, boulders and stone washed while oily sand was stabilised with quicklime (about 2,300 m^3).
- In 2009, a consultation was launched by UNDP/MoE for the treatment of oiled debris and equipment (about 320 m^3) before their ultimate storage in a licensed landfill while residue would be processed in a power plant.

Source of documentation

www.cedre.fr/fr/accident/liban/index.php

http://ec.europa.eu/echo/civil_protection/civil/leb_cy_2006.htm

www.rempec.org/rempecwaste/admin/inc/fichier/Mediterranean Oil Spill Waste Management Guidelines-Web.pdf

Mobile equipment for oil and sand separation in Beirut

MSC Napoli

Circumstances

- Date: 18/01/2007
- Location: North of Trégastel, Côtes d'Armor (France), Western Channel
- Cause: Structural damage
- Quantities spilt: 119 containers of various goods + 50 tonnes of IFO 380 + 150 tonnes of marine diesel oil
- Areas affected: Oil pollution in Brittany; containers in England

The MSC Napoli

Response organisation

SAR operations were conducted at sea, initially in the French zone of the English Channel, until the SOSREP gave directions for salvage actions in accordance with the procedures described in the Manche Plan and NCP. The response units and the Environment Group were also set up in accordance with the NCP.
With the vessel grounding so close to shoreline and due to the potential risk for the public, a major incident plan procedure was invoked, on land, under the lead of the Police.
There were therefore two response structures:

- The SOSREP with the SCU and the MRC at sea.
- The Police and the LRF (Local Resilience Forum) for land response.

Type of waste

- It is estimated that 50 tonnes of the IFO-380 grade and 150 tonnes of MDO were spilt at the beginning and later due to operations, a combination of oil 'residues' (lubricating oil, MDO, diesel, IFO-380 and bilge oil). It is estimated that a total of 302 tonnes of hydrocarbons was lost.
- Furthermore, the MSC Napoli was transporting 2,318 containers. Two containers were lost at sea in the English Channel. From 21 January, due to the ship's list and the adverse weather conditions, a further 117 were lost overboard, 80 of which were eventually washed ashore. None of the 159 containers with 1,684 tonnes of contents classified as 'Dangerous Goods' under the IMDG Code were lost overboard and all were subsequently recovered.

Collection techniques

- France: In late January, oil arrived on the north coast of Brittany, along 100 km of coastline, mixed with small plastic packets of chocolate biscuits. Clean-up operations were carried out by local personnel, mainly manually.
- England: Pumping operations were conducted within 3 weeks to remove the 3,512 tonnes of IFO and 152 tonnes of MDO remaining onboard the ship.
  - Regarding containers:
    Soon after the Napoli beaching covered by the media, people came to recover objects washed up on the shore and forced open beached containers to plunder their content (motorbikes, jet skis, bottles of wine, etc.), in accordance with UK regulations which authorise the recovery of objects washed up on beaches. People had to fill in a declaration, so that the owner may reclaim the goods.
    Operations began on 29 January to remove the 2,204 containers remaining onboard and recover those fallen overboard. The last of the containers was removed on 17 May.
    The ship's hull was split in two using explosives, cutting and traction by tugs. The bow was towed to Belfast and the stern was cut up onsite over a period of 5 months. The operation was finally completed on 29 July 2009. In total, 45,660 tonnes of goods were recovered from the ship and transferred to land.

Transportation

In order to remove the 2,200 containers remaining onboard and recover those fallen overboard, Smit International, in charge of the operation, mobilised two barges:

- Big Foot 1 from Rotterdam, equipped with two giant cranes – 500 and 250 tonne lift capacity – to remove the containers.
- Boa 21, from Rouen, France, to transfer containers to Portland Port.

Storage

- Portland Port was the closest port for receiving the containers but did not have the appropriate infrastructure for container handling. Severe logistical challenges were created, requiring container handling equipment to be brought from all over Europe, and a watertight area was set up for reception and storage of containers.

- The first batch of containers arrived in Portland Port on 1 February and the last batch 106 days later. Dry containers in good condition were transferred from the shuttle barge directly onto the quayside. Those recovered from the holds, often waterlogged and frequently covered with oil, were placed in specially-constructed bunded areas to prevent contamination of the port facilities.

Treatment methods

The containers and their content were inspected by cargo surveyors and insurers' representatives to assess their condition. Those in sound condition were the responsibility of SMIT Salvage. A disused football pitch, nicknamed 'The Hospital', was used to examine and segregate the containers. The dirty containers were hosed down in built 'pens'. Damaged containers were broken up on-site for disposal.

DV Howells Ltd were assigned a bunded area for dealing with containers with Dangerous Goods contents, until the end of September 2007. Certain chemicals required specific precautions or rapid handling, when it began to rain on products which react with water. All of the container handling and processing activity was regulated and overseen by the Environment Agency.

Source of documentation

CEDRE. *MSC Napoli* [online].

Available at: www.cedre.fr/en/spill/napoli/napoli.php

CEDRE. *L'accident du MSC Napoli. Bulletin d'information du Cedre*. 2010, n°26, pp. 16-23

Ievoli Sun

Circumstances

- Date: 30/10/2000
- Location: Near the Island of Batz, Brittany (France),
- Cause: Damage to ship
- Quantities spilt: styrene: 3,998 tonnes, MEK (Methyl Ethyl Ketone): 1,027 tonnes, IPA (Iso Propylic Alcohol): 996 tonnes
- Areas affected: Not measurable

The Ievoli Sun

Response organisation

- The vessel sank in international waters, at the boundary between French, British and the Channel Islands' territories. Within the framework of the Manche Plan, the English authorities sent MCA representatives to Cherbourg where the French Maritime Prefect had activated the Polmar Command Centre. On Tuesday 31 October, the Polmar Plan and the Polmar Command Centre were activated for the "Manche" area.
- On 1 November, the Prefect of the West Defence Zone set up an emergency centre in Rennes.

Type of waste

- Styrene: 3,998 tonnes.
- MEK: 1,027 tonnes.
- IPA: 996 tonnes.

Product behaviour

Styrene is a volatile product that forms an explosive mixture with air. Stability during transport is ensured by adding a polymerisation inhibitor. Its vapours are heavier than air and are classified as irritating to the eyes and lungs. According to MARPOL, the product falls into Y category. In seawater, the immediate toxicity threshold varies between 2 and 100 mg/l depending on the animals. The risk will therefore focus on the plume formed by the evaporation of the product slick.

IPA is stable, highly flammable and very volatile. It floats and mixes with water. It is classified Z according to MARPOL. The risks presented by IPA for humans and the environment are very low. The main risk is fire/explosion in the event of massive release into the air.

MEK is a stable and highly volatile product that forms an explosive mixture with air. Its vapours are heavier than air and a pleasant smell is perceptible at a concentration of 2 ppm. According to MARPOL, this product is classified Z, like IPA.

Collection techniques

As the release of IPA and MEK was considered harmless to the environment, the response operations consisted in a controlled and monitored release in the environment.
Pumping operations of styrene and heavy fuel oil were successfully completed.

Transportation

The fuel oil recovered was transported by ship.
The styrene pumped out, to which a polymerisation inhibitor was added, was stored in a reception barge on the deck of the Smit Pioneer. The product was transferred from these tanks to a chemical tanker in sheltered waters in the south of England.

Storage Treatment methods

The fuel oil was treated in a refinery.
3,012 m^3 of recovered styrene were recycled in a chemical plant.

Source of documentation

CEDRE. *Ievoli Sun* [online].
Available at: www.cedre.fr/en/spill/ievoli/ievoli.php
GIRIN M., ROUSSEAU C. *Naufrage du Ievoli Sun, Les Casquets (Manche), 31 octobre 2000. Bulletin d'information du Cedre*. 2000, n°14, pp. 4-7
CEDRE. *Le traitement des épaves. Bulletin d'information du Cedre*. 2006, n°21, pp. 4-17
CEDRE. *Styrene. Chemical response guide.* Brest: Cedre, 2004. 62 p. [online].
Available at : www.cedre.fr/en/publication/chemical/styrene_gb.pdf

Analysis and olfactory tests carried out at Cedre to measure the styrene contamination of halieutic products

Ece

Circumstances

- Date: 31/01/2006
- Cause: Collision
- Location: Les Casquets (Guernsey)
- Areas affected: Not measurable
- Quantity spilt: 10,000 tonnes of phosphoric acid

The Ece sinking

Response organisation

- The regional marine rescue coordination centre (CROSS-Jobourg) coordinated the crew rescue operation, in collaboration with the British Maritime and Coastguard Agency. The 22 crew members were safely evacuated to Guernsey. The tug boat Abeille Liberté was sent to the scene of the accident. The other vessel involved in the collision, General Grot Rowecki, whose bluff bow was slightly damaged, was able to continue its journey.

- The French maritime authorities for the English Channel and the North Sea then carried out a pollution risk analysis, with the support of *Cedre*. In addition to the cargo, according to information provided by the ship owner, there were 70 tonnes of bunker fuel (IFO 180), 20 tonnes of marine diesel and 20 tonnes of lubricating oil onboard.

- In the course of towing, the Ece sank 70 m deep 50 nautical miles west of the point of La Hague, on 1st February at 3:37 am. The Manche Plan, a bilateral French-British mutual aid agreement for rescue and pollution response, was activated. The wreck now lies in international waters, on the continental shelf of the United Kingdom, in the French Exclusive Economic Zone and the French pollution response zone.

Type of waste

10,000 tonnes of phosphoric acid (classified Z according to MARPOL) were transported by the chemical tanker Ece.

Product behaviour

Phosphoric acid is, like all acids, a corrosive liquid. It is non volatile and does not produce vapour. It has a higher density than that of seawater (density of 1.53 at 20 °C for a solution of about 50% P_2O_5 or about 75% H_3PO_4) and therefore sinks when spilt. It is totally soluble in water and does not accumulate in the food chain.

The main risk for humans is essentially linked to contact with the skin or mucus membranes, causing irritation or even burns in the case of prolonged contact with a concentrated solution. The same risk applies to marine animals. Phosphoric acid leaking from the wreck would mix with water and acidify the immediate surroundings. Once the leaking stopped, the neutralising power from the seawater would quickly raise the pH back to its original value (around 8) in the affected zone. The environmental impact would be too temporary and localised to be quantifiable.

Collection techniques

Negotiations between French and British authorities on the one hand and the ship-owner and insurers on the other led to an agreement on 16 June 2006 for the removal of the oil remaining onboard the wreck (some forty tonnes) and for the controlled release of the phosphoric acid, by opening the access channels to the six tanks using an UUV.

After an international call for tenders, the submarine worksite was organised on 29 August. 76 % of the cargo was gradually released without a considerable increase in the level of phosphate in the environment.
As for the oil, investigations showed that one of the three starboard tanks was empty. Due to the deformation of the hull and its being embedded in the sea-floor, the 39 tonnes of fuel could not be pumped from the two remaining tanks. The lubricating oil was successfully pumped out of two tanks, although two smaller ones could not be reached. A small amount of oil escaped due to pressure and the major deformation of the hull, explaining the oily sheen observed periodically on the water surface. Response operations finished on 18 September.

Transportation

Recovered oil was transported to Zeebrugge.

Storage Treatment

The oil was sent to a recycling centre in Zeebrugge.

Source of documentation

CEDRE. *Ece* [online].
Available at: www.cedre.fr/en/spill/ece/ece.php
L'accident de l'Ece. Bulletin d'information du Cedre. 2006, n°22, pp. 4-12
BERTHELEME S. *Phosphoric acid. Chemical response guide.* Brest : Cedre, 2008. 76 p. [online].
Available at: www.cedre.fr/en/publication/chemical/phosphoric-acid.pdf

Allegra

Circumstances

- Date: 01/10/1997
- Location: Western Channel
- Cause: Collision
- Quantity spilt: 900 tonnes of palm oil
- Areas affected: Guernsey, Alderney and Sark, and Cotentin

The breach in the hull of the Allegra

Response organisation

- On 1 October 1997, in the Channel, just off the coast of Guernsey, the Liberian tanker Allegra was involved in a collision and subsequently spilt 900 tonnes of palm oil. The oil solidified, quickly forming a slick which continued to spread to form a slick of 20 km long by 4 km wide. The slick came ashore on the Channel Islands and in the Cotentin (France) where it beached at the high water mark.

- French Customs and the MPCU worked together to track the slick drift.

Type of waste

The pollution was made up of 5 to 50 cm diameter margarine-like rubbery balls with a spongy yellow core and a whitish crust.

Product behaviour

Synonyms:	Palm oil, Palm butter
Marpol category:	Y
Cas n°:	8002-75-3
Appearance (state at 20°C):	Orange-red -solid, light to dark
Density relative to sea water (at 20°C):	0.895 to 0.95
Melting point (°C):	+26 to +30 (or even 45)
Flash point (°C):	+314
Solubility in sea water (mg/l):	insoluble
Viscosity (cSt at 20°C):	25 to 31 (at 50°C)

Collection techniques

12 tonnes of palm oil were recovered manually on the shores of Guernsey and 2 tonnes on the shores of Alderney. The quantities of oil were estimated at 2 or 3 tonnes on Sark and at least 10 tonnes on the shores of Cotentin. No bunker oil was recovered on the French coast. In the areas affected where the oil was not collected, it was broken down naturally.

Transportation

Vans went round regularly to collect full bags to take them to the dump.

Storage Treatment

The 12 tonnes recovered on Guernsey were stored in bags, then at a dump and finally incinerated.

Source of documentation

CEDRE. *Allegra* [online].
Available at: www.cedre.fr/en/spill/allegra/allegra.php
CEDRE. *Vegetable oil spills at sea. Operational guide*. Brest: Cedre, 2004. 36 p. [online].
Available at: www.cedre.fr/en/publication/vegetable-oil/vegetable-oil.pdf
- BUCAS – LE GOFF G. *Le comportement des polluants flottants en cas de déversement accidentel en eau de mer.* Thèse de doctorat de l'université de Paris 6, 2002. 222 p.

Allegra palm oil washed up on the shoreline

Fénès

Circumstances

- Date: 25/09/1996
- Location: Lavezzi Islands, Bonifacio, Corsica (France)
- Quantity spilt: 2500 tonnes of wheat
- Cause: Grounding
- Areas affected: 500 m along the coast-line and in waters between 8 and 20 m deep

The Fénès sunken in the Lavezzi Islands

Response organisation

The French maritime authorities in Toulon and the vessel's insurers were directly involved in the incident management.

Type of waste

2,500 tonnes of wheat were spilt.

Collection techniques

The bunkers and lube oils were removed from the vessel by 10 October.

A scientific committee quickly reached an agreement on:
- How best to remove the wheat (suction hoses handled by divers).
- The extent of the operation (until the tips of the Posidonia reappeared).
- Who would oversee the operation (divers working for the nature park).

The pumping operation started on 4 December and the wheat was drained via a sieve system in a hosepipe used to dispose of the polluted water far from the creek.
Emissions of hydrogen sulphide, in addition to significant quantities of methanol and ethanol affecting men and equipment led the French maritime authorities to suspend the operation on 20 December for health reasons. The operation resumed on 27 December once responders on the barge had been given masks and filters and the divers had received facial protection and gloves.

Transportation

10 round trips offshore.

- Wheat treatment: The most difficult decision was to decide how to dispose of the wheat and the polluted water (8 to 10 times the quantity of spilt wheat): should it be left to drip dry in situ or not, disposed of further out at sea or be shipped ashore to be incinerated in a certified facility which would mean shipment by road from Bonifacio to Corte (Corsica). A meeting at ministerial level comprising a thorough examination of the environmental situation encouraged scientists and the Ministry of the Environment to accept the decision to dump the non-contaminated wheat further offshore (outside the marine park) and in such a fashion as not to exceed limits of 1 kg of wheat per square metre of seabed. Recovered wheat was dumped for the first time, under French Navy supervision, 20 nautical miles offshore at a depth of 300 metres on 7 December. On 13 January, after 10 round trips offshore involving about 2,500 tonnes of wet wheat which made up about three quarters of the entire cargo carried by the Fénès, the French maritime authorities notified the owners that the dumping operation had been completed as recommended by nature park divers.

- Removal of the wreck and debris from the seabed, between 8 and 20 metres deep and stretching 500 metres along the coastline: This operation was postponed until after the winter months, between 10 April and 10 May 1997. The owner requested permission to dump debris offshore but permission was denied and the debris had to be taken to a Greek shipyard for disposal.

Dumping of wheat at sea

Source of documentation

CEDRE. *Fénès* [online]. Available at: www.cedre.fr/en/spill/fenes/fenes.php

CEDRE. *Le traitement des épaves. Bulletin d'information du Cedre.* 2006, n°21, p. 4-17

Ice Prince

Circumstances

- Date: 15/01/2008
- Location: Near Le Havre, Normandy, Channel (France)
- Cause: Power failure
- Quantity spilt: 2,000 tonnes of timber
- Areas affected: the coastline of Sussex (England) affected by the timber

The bulk carrier Ice Prince a few hours after the accident

Response organisation

- On 14 January 2008, the Greek bulk carrier Ice Prince carrying 5,000 tonnes of sawn timber suffered total power failure while in the Channel. Due to very rough sea and weather conditions, the vessel sank the following day, half-way between Cherbourg (Normandy) and Portland (England) in waters under British jurisdiction. 1,200 tonnes of timber stacked on deck fell overboard.
- The 20 crew members were evacuated and an exclusion zone with a diameter of 1,000 m was established. The vessel's bunkers contained 423 tonnes of fuel oil (IFO 180) and 123 tonnes of marine diesel oil (MDO), which was at risk of being released from the wreck.

Type of waste

- Timber.
- Heavy fuel oil (IFO 380).
- Marine diesel oil (MDO).

Collection techniques

The shipowner organised pumping operations for the bunker fuel and recovery operations for the timber remaining in the holds. For recovery, a ROLS (Remote offloading system) and ROVs (remote operated vehicles) were deployed. After having pumped the pollutants from 12 tanks and the engine room, the removal operation was completed on 6 May.
Timber washed ashore was collected on site (mechanically) and then turned into sawdust on the upper beach.

Transportation

Timber turned into sawdust was transported by truck.

Storage
Treatment

- Storage was organised directly on the upper beach for timber.
- Sawdust collected was not treated but finally sold.

Source of documentation

CEDRE. *Ice Prince* [online].

Available at: www.cedre.fr/en/spill/ice_prince/ice_prince.php

Further information

Glossary and acronyms

ARCOPOL: The Atlantic Regions Coastal Pollution Response

Beachmaster: Beachmasters have overall supervision for a specific section of shoreline and manage the clean-up operations within it. They liaise with the Technical team of the SRC

CAS: CAS Registry Numbers are unique numerical identifiers assigned by the Chemical Abstracts Service to every chemical described in the open scientific literature

Cedre: Centre of Documentation, Research and Experimentation on Accidental Water Pollution

CLC: Civil Liability Convention

EA: Environment Agency

EEC: European Economic Community

EROCIPS: Emergency Response to Coastal Oil, Chemical and Inert Pollution from Shipping

Flushing: Use of a low pressure hoses with moderate flow to remove clusters of pollutant from hard surfaces, boulders and stones or to rinse and direct washing effluents towards a containment site

GIS: Geographic Information System

High pressure washing: Washing of polluted hard surfaces using high pressure washers usually with hot water

HNS: Hazardous and Noxious Substance

IFO: Intermediate Fuel Oil

IMDG Code: International Maritime Dangerous Goods Code

IMO: International Maritime Organization

IOPC Funds: International Oil Pollution Compensation Funds

IPIECA: International Petroleum Industry Environmental Conservation Association

ITOPF: International Tanker Owners Pollution Federation

LNG: Liquefied Natural Gas

LPG: Liquefied Petroleum Gas

MARPOL: MARine POLlution

MCA: Maritime and Coastguard Agency

MDO: Marine Diesel Oil

MoE: Ministry of the Environment

MPCU: Marine Pollution Control Unit

MRC: Marine Response Centre. The MRCC manages at sea response operations and aerial activities

NCP: National Contingency Plan for marine pollution from shipping and offshore installations. The NCP is maintained by the MCA and sets out the response framework to respond to a maritime pollution incident

NIEA: Northern Ireland Environment Agency

OSRL: Oil Spill Response Limited

PAH: Polycyclic Aromatic Hydrocarbons

PPE: Personal Protective Equipment

REMPEC: Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea

ROLS: Remote offloading system

ROV: Remote Operated Vehicle

SAR: Search and Rescue

SASEMAR: Spanish maritime emergency response organisation which is dependent on the board of the merchant navy of the Spanish Ministry of Transport

SCAT: Shoreline Clean-up Assessment Technique

SCU: Salvage Control Unit. The purpose of the SCU is to support the SOSREP and to manage salvage operations during a maritime incident

SEPA: Scottish Environment Protection Agency

SOSREP: Secretary of State's Representative. Their role is to represent the Secretaries of State for

Transport and the Department for Energy and Climate Change by removing or reducing the risk for safety, property and the environment in the UK arising from accidents involving ships, fixed or floating platforms or sub-sea infrastructure. The SOSREP has the 'ultimate' control of salvage acting in the overriding public interest

SRC: Shoreline Response Centre. The SRC manages the shoreline operations linked with the clean-up of maritime pollution incidents. It is led by the Local Authority. The SRC is divided into 3 main cells with a support cell:

- Management Team: to manage the shoreline clean-up in its totality. The strategy sub group identifies short, medium and long term issues
- Technical Team: responsible for directing and implementing operational response. It is divided into 2 sub groups: Waste Management and Health & Safety
- Procurement/Finance Team: responsible for procurement and provision of all resources
- Support: includes an Administration team; an Information Dissemination team and a Media/ Public Relations Team

Surfwashing: Consists of mechanical dispersion and scouring of oil trapped or stuck to sediments through wave action. Polluted sediments are moved down to the surf zone

UNDP: United Nations Development Program

UUV: Unmanned Undersea Vehicle

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