RP 549: Planning the Processing of Waste arising from a Marine Oil Spill:

Part 4: Information and Data

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ABBREVIATIONS, ACRONYMS AND GLOSSARY OF TERMS

ADR	European Agreement concerning the international carriage of Dangerous goods by Road
API	American Petroleum Institute
BOSCA	British Oil Spill Control Association
BRGM	Bureau de Recherches Géologiques et Minières
BSW	Bottom Sediment and Water
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CAPEX	Capital expenditures
CCW	Countryside Council for Wales
Cedre	Centre de documentation, de recherche et d'expérimentations sur les pollutions accidentelles des eaux
CM	Centimetre
DARD	Department of Agriculture and Rural Development
DDE	Direction Départementale de l'Equipement
DEFRA	Department for Environment, Food and Rural Affairs
DIREN	Direction Régionale de l'Environnement
DM	Decimetre
DOE (NI)	Department of the Environment (Northern Ireland)
DRIRE	Direction Régionale de l'Industrie, de la Recherche et de l'Environnement
DS	Dry Sediment

DTLR	Department for Transport, Local Government and the Regions
EA	Environment Agency
EC	European Commission
EG	Environment Group
EIA	Environmental Impact Assessment
ELO	Environment Liaison Officer
EU	European Union
EWC	European Waste Catalogue
FT	Feet
GC / MS	High resolution Gas Chromatography and Mass Spectrometry
GT	Gross Tonnage
HazMat	Hazardous Materials
HC	Hydrocarbon
HDPE	High Density Polyethylene
HNS	Hazardous and Noxious Substances
HTTD	High Temperature Thermal Desorption
HWIP	Household Waste Incineration Plant
IMO	International Maritime Organisation
IOPC	International Oil Pollution Compensation Funds
ITOPF	International Tanker Owners Pollution Federation Limited
JNCC	Joint Nature Conservation Committee

LDPE	Low Density Polyethylene
LTTD	Low Temperature Thermal Desorption
M^3	Cubic metre
MCA	Maritime and Coastguard Agency
MEIR	Marine Emergencies Information Room
MM	Millimetre
MRC	Marine Response Centre
MS	Matière sèche (Dry sediment – DS)
NCP	National Contingency Plan
NCV	Net Calorific Value
NE	Natural England
NIEA	Northern Ireland Environment Agency
NNR	National Nature Reserve
NOSCP	National Oil Spill Contingency Plan
OECD	Organisation for Economic Co-operation and Development
OMT	Oil Spill Management Team
OPEX	Operational expenditures
OPRC	Convention Oil Pollution Preparedness, Response and Co-operation Convention 1990
OSW	Oil Spill Waste
OSWM	Oil Spill Waste Management

OSWMP	Oil Spill Waste Management Plan
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCPSO	Principal Counter Pollution and Salvage Officer
PCT	Polychlorinated Terphenyl
POLREP	Pollution Report
PPB	Part per billion (= 0,001 mg/ kg)
PPE	Personal Protective Equipment
PPM	Part per million (= 1 mg/ kg)
PVC	Polyvinyl chloride (a type of plastic)
REMPEC	Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea
SAC	Special Area of Conservation
SCU	Salvage Control Unit
SEEEC	Sea Empress Environmental Evaluation Committee
SEERAD	Scottish Executive Environmental & Rural Affairs Department
SEPA	Scottish Environment Protection Agency
SFI	Sea Fisheries Inspectorate
SI	Statutory Instrument
SITREP	Situation Report
SNH	Scottish Natural Heritage

SOLAS	Safety of Life at Sea Convention
SOSREP	Secretary of State's Representative for Maritime Salvage and Intervention
SPM	Suspended Particle Matter
SRC	Shoreline Response Centre
SSSI	Site of Special Scientific Interest
STOp	Scientific, Technical and Operational Guidance Notes
T	Tons
TG	Technical Guidelines
THC	Total Hydrocarbon Content
UKHMA	UK Harbour Masters Association
UKMPG	UK Major Ports Group
UNCLOS	United Nations Convention on the Law of the Sea 1982
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
VHOC	Volatile Halogenated Organic Compounds
VOC	Volatile Organic Compounds
WGS 84	World Geodetic System 1984
WTS	Waste Tracking Sheet

1 INTRODUCTION

1.1 Project Background and Terms of Reference

The Maritime and Coastguard Agency (MCA) is the competent U.K. authority that responds to pollution from shipping and offshore installations. The MCA is regularly called upon to react to a wide range of maritime incidents and has developed a comprehensive response procedure to deal with any emergency at sea that causes pollution, or threatens to cause pollution.

As part of its contingency planning role, the MCA has produced a number of documents which set out the basis on which the UK deals with a marine oil spill. Details of these documents are contained in Part 1 of this report. In 2004, the MCA commissioned BMT Cordah to undertake four tasks which together comprised the "Development of a Protocol for the Treatment and Disposal of Oily Waste in the UK" (MCA/BMY Cordah 2007). The overall project objective focused on the management and infrastructure in place to deal with oily waste resulting from a marine spill in the United Kingdom. This project was reported in 4 volumes, addressing each of the four main tasks which formed the overall project brief. The report on Task 4 "Designing infrastructure for the handling of large quantities of oily waste" included brief references to treatment techniques and other considerations, but did not address detailed procedures for selecting appropriate treatment processes.

MCA considered that more detailed information on the availability and selection of treatment processes would be advantageous and in 2009, commissioned SLR Consulting Ltd (SLR) to provide this through the undertaking of a desktop study to develop a comprehensive technical and logistics plan for dealing with large quantities of solid and liquid oily waste which could arise from the spilling of oil into the maritime environment from tanker, fixed offshore development or production rig or onshore facility.

1.2 Structure of Outputs from Study

The results of this study have been compiled into four separate parts:

Part 1 – Local Authority Guidance – providing an overview of the management of oil spill waste and identifying the steps Local Authorities need to take to ensure they have effectively planned for an oil spill incident

Part 2 – Pre Incident Planning – this provides a guide to how Local Authorities or other emergency planners can undertake planning in advance of an incident using the best available data – particularly for temporary storage sites

Part 3 – Post Incident Planning – this provides a step-by-step guide to the means by which appropriate treatment solutions can be identified and implemented once an incident has occurred.

Part 4 – Information and Data – this section acts as a source of information and data relevant to the selection and implementation of waste processing solutions and the regulatory framework.

1.3 Part 4 Report Structure

This section of the study report has been structured as follows

Section 1 - Introduction

Section 2 - Scope and Purpose of Part 4

Section 3 - Bibliography

Section 4 - Relevant Legislation

Section 5 - European Waste Catalogue Codes

Section 6 - Information on the Erika Oil Spill

Section 7 - Waste Management Calculator User Guide

Section 8 - Summary Details of Refineries

Section 9 - Summary Details of Waste Facilities

Section 10 - Summary Details of Cement Works

Section 11 - Technology Providers

Section 12 - Licensed Sites

Section 13 - Treatment Process Details

Section 14 - Examples of Useful Forms

1.4 Overview

The term waste is defined as "any substance or object the holder discards, intends to discard or is required to discard" under the Waste Framework Directive (European Directive 2006/12/EC. Once a substance or object has become waste, it will remain waste until it has been fully recovered and treated and no longer poses a potential threat to the environment or to human health. Annex 1 of the Directive refers to “materials spilled, lost or having undergone other mishap, including any materials, equipment, etc., contaminated as a result of the mishap” (category Q4).

Processing of waste generated following a major oil spill involves a complex range of activities. Selection of the optimum solution depends on a large number of factors.

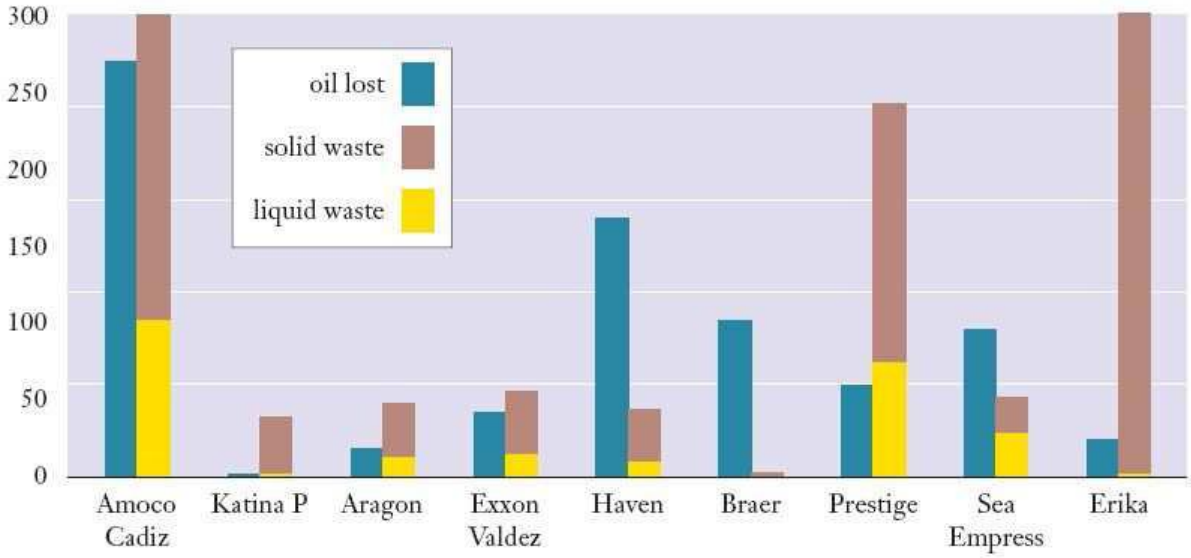
Figure 1-1 below indicates the types of waste which are likely to be generated by a marine oil spill.

Figure 1-2 shows the wide variation in volumes and characteristics of waste produced by historic oils spills.

The objective of strategy development is to develop a solution which achieves the best possible compromise between these factors, as indicated in the diagram in Figure 1-3, below, to achieve the optimum solution, taking all the factors into account.

Figure 1-1 : Types of waste generated by a marine oil spill[1]

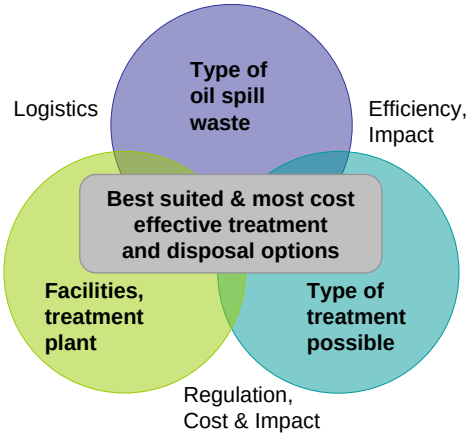
Figure 1-2 Waste generated during historical oil spill incidents – in 1,000 tonnes[2]



[1] Source - REMPEC

[2] (Source: IPIECA, Guidelines for Oil Spill Waste Minimization and Management, Report Series, Vol. 12).

Figure 1-3 : The Optimum Solution



The study has developed a process which can be followed to enable decisions to be made about the choice of the most appropriate technologies and/or facilities to use to treat waste materials arising from the response to an oil spill landfall incident in the UK.

The main difficulties associated with providing guidance on the planning of oil spill waste (OSW) processing are:

- the vast range of volume, type, characteristics and location of the waste generated;
- the equally wide range of technologies available with which the waste could be processed;
- the need for rapid response to mitigate initial environmental and commercial impacts;
- the different and possibly remote (from the spill) geographical location of potential treatment facilities;
- the unpredictability of the market and availability of potential outlets for processed materials;
- the very complex inter-relationship between political, regulatory, technical, logistical, environmental and commercial elements;
- the extensive range of stakeholders and other interested parties

The essence of the challenge faced by the authors in developing guidance on the steps to follow when choosing an appropriate strategy and/or technology for dealing with the waste arisings from a marine oil spill was to try to distil into a clear, logical and easily followed approach the thought processes and knowledge acquired by process engineers over many years undertaking similar projects. To achieve this, the approach adopted has been to produce a step-by-step methodology which starts with the spill, then at each stage identifies the critical information which would be required and on which an appropriate decision would be based. The guide then endeavours to indicate the responses which an experienced process engineer would develop with the benefit of this information – ultimately leading to a conclusion as to what to do.

Ideally, technical, regulatory, political and legal experts would be involved in all decision making processes, but the potential urgency of the situation being considered means that it may be necessary to start the process (or even complete it) without direct input from such experts. This tool is intended to inform such deliberations.

2 SCOPE AND PURPOSE OF PART 4

2.1 Purpose

The decision making guide and model have been developed to set out a process which can be used to inform decisions about the choice of technologies to be used to clean up waste materials arising from the response to an oil spill landfall incident in the UK. It is intended to be used and integrated with existing plans and procedures which have been developed to manage oil spill incidents which may have an impact on UK shores. Details of these and related parties are included in Part 1 of the output.

The guide considers the processing of waste arising from all possible oil spill types and magnitudes. Where small quantities of oil have been spilt and the areas impacted are limited, simple approaches including the employment of a relevantly experienced contractor with appropriate permits and equipment will often be the most effective and expedient means of managing the problem. In other instances, where thousands of tonnes of oil have been deposited and many kilometres of coastline affected, considerable planning and logistical effort will be required in addition to the selection of appropriate treatment methods. The documents endeavour to provide guidance on the approach which can be used in all instances.

Ideally, technical, regulatory and legal experts would be involved in all decision making processes, but the potential urgency of the situation being considered means that it may be necessary to start the process (or even complete it) without direct input from such experts. This document is intended to inform such deliberations. It is clear that this guide cannot act as a substitute for the appropriate application of the multi-disciplinary skills identified above, and that those using it must be aware of the limitations inherent in the development of such a tool. However, it is believed that the guide can provide a useful addition to the armoury of those faced with the impacts of a marine oil spill, and to assist in speeding decision making even for those who possess the necessary expertise to make decisions themselves.

The primary purpose is to allow a non-expert to quickly come to sensible conclusions about technologies which might be appropriate to the particular spill (or part of a spill) under consideration. The approach is a technical one, and only those logistical or legal considerations directly impacting on the selection process are considered. Simplicity is hence gained at the expense of specificity, and the use of this document is therefore not intended to fully replace the use of experts, but is intended to be entirely compatible with the use of such advisors.

This part of the output from the study provides useful information and data to accompany Parts 1 to 3 of the processing guide and decision making tool, including the responses received to the request for information from processing facilities and lists of permitted sites throughout the UK.

2.2 Scope of Project

There is a very large amount of literature in existence relating to the management of marine oil spills. This has been produced by an equally wide range of authors and sponsors. However, study of this literature identifies the common theme of three interconnected strands which have to be pulled together to reduce the complexity of the decision-making processes involved. These are:

A. Decisions about how to treat the area where oil has landed;
B. Decisions about how to treat wastes arising from this operation, and
C. Compliance with the prevailing logistical and legal constraints.

This project focused on addressing B and C above.

2.3 Overall Strategy

If sufficient information and resources could be made available, the most comprehensive strategy would be as follows:

- To develop an overall Contingency Plan (or a series of alternative plans) in advance of any spill, using the guide and model described in Part 2 of this report based on assumptions of what might be spilt, or repeating the assessments for a range of alternative scenarios and creating an "envelope" of possible outcomes. This approach is described in more detail in Part 2 of the reporting.
- To repeat the above as soon as the spill has been notified and modelling to identify probable points of landfall has been completed (referred to in Part 3 using techniques described in Part 2)
- When contamination has reached the shoreline and can be examined and classified (Part 3)
- By examination and analysis of material actually deposited in storage areas (either temporary or intermediate), as shown in Part 3.

2.4 Scope of this Part 2

This part of the report focuses on providing guidance on the provision of information essential to the team developing the solution to overall processing of oils spill waste specifically related to temporary storage sites, and indicates how preliminary plans could be prepared for actual processing using data generated at the contingency planning stage.

2.5 Areas not Addressed in the Project

Whilst it is recognised that the tighter the control of beach cleanup operations, the lower the yield of waste, and the more readily the wastes are treatable, detailed consideration of how to carry out these operations is outside the scope of this document, although reference must be made to this element of the response and information on the techniques being used and the data generated is essential.

The document does not address issues associated with the initial identification, transfer of waste and compliance with relevant waste management legislation at the shoreline.

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4 RELEVANT LEGISLATION

Title	Applicability
Control of Pollution (Amendment) Act 1989 c.14	Requires carriers of controlled waste to register with the Environment Agency or SEPA and outlines the penalties (including seizure and disposal) for vehicles shown to have been used for illegal waste disposal. AND AMENDMENTS
Controlled Waste (Duty of Care) Regulations (Northern Ireland) 2002 SR 271	Creates a duty of care for controlled waste that requires all producers, carriers and managers of waste to keep records and use waste transfer notes. AND AMENDMENTS
Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations (Northern Ireland) 1999 SR 362	Details the system for registering carriers of controlled waste and for seizing vehicles used for the illegal disposal of waste.
Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991 SI 1624	Introduces a registration system for carriers of controlled waste.
Controlled Waste Regulations (NI) 2002 SR 248	Defines household, industrial and commercial waste, for waste management licensing purposes. AND AMENDMENTS
Controlled Waste Regulations 1992 SI 588	Defines household, industrial and commercial waste for waste management licensing purposes. AND AMENDMENTS
Council Decision 2003/33/EC	Establishes acceptance criteria and procedures for allowing wastes into landfill sites.
Environment Act 1995	Establishes the Environment Agency and SEPA as the regulatory bodies for contaminated land, control of pollution, conservation or enhancement of the environment and fisheries.
Environmental Permitting (England and Wales) Regulations 2007 SI 3538	Introduces a new system for environmental permits for industrial activities and waste operations, including landfill and waste incineration and sets out the powers, functions and duties of the regulator.
Environmental Permitting (England and Wales) Regulations 2010 SI 675	Provides a consolidated system for environmental permits and exemptions for industrial activities, mobile plant, waste operations, mining waste operations, water discharge activities, groundwater activities and radioactive substances activities. AND AMENDMENTS

Title	Applicability
Environmental Protection (Duty of Care) Regulations 1991 SI 2839	Imposes a duty of care on any person who imports, produces, carries, keeps, treats or disposes of controlled waste to ensure there is no unauthorised or harmful depositing, treatment or disposal of the waste. AND AMENDMENTS
Environmental Protection Act 1990	Establishes in England, Scotland and Wales the structure and authority for waste management and control of emissions into the environment. Defines the legal framework for duty of care for waste, contaminated land and statutory nuisance.
EU Directive on the Landfill of Waste 1999/31	Sets out measures to prevent and reduce the impact of landfill on the environment. Defines which types of waste need pre-treating, bans certain wastes from landfill and sets up a permit system for landfill sites.
Hazardous Waste (England and Wales) Regulations 2005 SI 894	Details requirements for controlling and tracking the movement of hazardous waste and bans mixing different types of hazardous waste. AND AMENDMENTS
Hazardous Waste (Wales) Regulations 2005 SI 1806	Details requirements for controlling and tracking the movement of hazardous waste and bans mixing different types of hazardous waste.
Hazardous Waste Regulations (Northern Ireland) 2005 SR 300	Details the regime for controlling and tracking the movement of hazardous waste. AND AMENDMENTS
Landfill (Scotland) Regulations 2003 SSI 235	Make changes to the waste control regime to cover agricultural waste. Classifies landfill sites, details the permits needed to create and operate a landfill site and the requirements for care after site closure. AND AMENDMENTS
Landfill Allowances Scheme (Northern Ireland) Regulations 2004 SR 416	Assigns landfill limits to councils, sets out how to borrow and transfer limits between councils and how the scheme will be monitored by the NIEA.
Landfill Allowances Scheme (Scotland) Regulations 2005 SSI 157	Sets up administration and arrangements for allocating, banking, borrowing and transferring landfill allowances. Makes SEPA the monitoring authority and sets out duties for waste disposal and landfill operators to keep records and make returns to SEPA.
Landfill Regulations (Northern Ireland) 2003 SR 496	Introduces permits to create and operate a landfill, and sets out which categories of waste can be accepted at each class of landfill site. Also sets out a pollution control regime. AND AMENDMENTS
List of Wastes (England) Regulations 2005 SI 895	Provides the European Waste Catalogue list of codes used to classify wastes. AND AMENDMENTS

Title	Applicability
List of Wastes (Wales) Regulations 2005 SI 1820	Provides the European Waste Catalogue list of codes used to classify wastes.
List of Wastes Regulations (Northern Ireland) 2005 SR 301	Requires the List of Wastes to be used when determining if a material or substance is waste or hazardous waste and for classifying and coding wastes for the waste control regime. AND AMENDMENTS
Marpol 73/78 is the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" is short for marine pollution and 73/78 short for the years 1973 and 1978.)	Marpol 73/78 is one of the most important international marine environmental conventions. It was designed to minimize pollution of the seas, including dumping, oil and exhaust pollution. Its stated object is: to preserve the marine environment through the complete elimination of pollution by oil and other harmful substances and the minimization of accidental discharge of such substances.
Pollution Control and Local Government (Northern Ireland) Order 1978 SR 1049 (including updates)	Regulates waste on land, abandoned vehicles, noise nuisance, noise abatement zones, sulphur content of oil fuel used in furnaces and engines, cable burning, and pollution of the atmosphere and water. Other aspects have been revoked.
Pollution Prevention Guideline 1 General guide to the prevention of pollution	Businesses and individuals are responsible for complying with environmental regulations and for preventing pollution of air, land and water. Responsible waste management can ensure that you comply with the relevant regulations and reduce waste.
PPG 2 Above ground oil storage tanks	These guidelines will help you look after your above ground oil storage tanks safely and to minimise the risk of causing pollution.
Pollution Prevention Guideline 8 Safe storage and disposal of used oils	These guidelines are intended to help everyone that handles used oils – from people carrying out a single engine oil change to large industrial users.
PPG 18 Managing fire water and major spillages	These guidance notes have been drawn up to assist in the identification of the equipment and techniques available to prevent and mitigate damage to the water environment caused by fires and major spillages.
Pollution Prevention Guideline 21 Pollution incident response planning	These guidelines set out best practice for producing an incident response plan to deal with an environmental incident on your site.
Pollution Prevention Guideline 26 Storage and handling of drums and intermediate bulk containers (IBCs)	The Agencies publish guidance on fixed oil storage tanks and for containers directly connected to a point of use (PPG2; Reference 2). However, other containers of oil, chemical or other potentially polluting materials that are handled or stored incorrectly can also lead to pollution, through accidental leakage or spillage.

Title	Applicability
Special Waste (Scotland) Regulations 1997 SI 257	Establishes that managers of specified waste facilities operated by local councils who meet certain criteria should be treated as technically competent for special waste facilities. AND AMENDMENTS
Special Waste Regulations 1996 SI 972	Provides a definition of 'special waste' in Scotland, to cover all hazardous waste, and regulates waste carriers by requiring them to complete and keep consignment notes. AND AMENDMENTS
Transfrontier Shipment of Waste Regulations 2007 SI 1711	Sets out rules for shipping waste, including within the European Community and importing and exporting to and from countries outside the EC.
Waste (Scotland) Regulations 2005 SSI 22	Extends controlled waste to cover mine, quarry and agricultural waste. Categorises waste as household, industrial or commercial. Requires anyone involved in depositing, disposal or recovery of mine, quarry or agricultural waste to be authorised.
Waste and Contaminated Land (Northern Ireland) Order 1997 SI 2778 (including updates)	Sets out the waste management regime covering waste carrier registration and identifying and remedying contaminated land.
Waste Collection and Disposal (Amendment) Regulations (Northern Ireland) 1997 SR 52	Amends 1992/254. Implements EC Directive 91/156/EEC on waste and makes it an offence to carry out an exempt activity without registering with the local council.
Waste Incineration (Scotland) Regulations 2003 SSI 170	Prevents the operation of certain waste incineration installations or mobile plants without authorisation.
Waste Incineration Regulations (Northern Ireland) 2003 SR 390	Amends the Pollution Prevention and Control Regulations 2003, particularly on incineration and co-incineration of waste.
Waste Management (England and Wales) Regulations 2006 SI 937	Extends controlled waste to cover mine, quarry and agricultural waste. Categorises waste as household, industrial or commercial. Bans householders from treating, keeping, disposing of controlled waste if it could pollute the environment.
Waste Management Licensing (Scotland) Regulations 1996 SI 916	States that managers of specified waste facilities operated by local councils are 'technically competent' if they meet certain age and experience criteria. AND AMENDMENTS
Waste Management Licensing (Water Environment) (Scotland) Regulations 2006 SSI 128	Amends 1994/1056 to align it with regulations to control activities affecting the water environment in Scotland.

Title	Applicability
Waste Management Licensing Regulations (Northern Ireland) 2003 SR 493	Covers applications for waste management licenses, which authorise the deposit, disposal and treatment of controlled waste. Includes conditions on the use of certain mobile plant
Waste Management Licensing Regulations (Northern Ireland) 2003 SR 493	Covers applications for waste management licences, which authorise the deposit, disposal and treatment of controlled waste. Includes conditions on the use of certain mobile plant. AND AMENDMENTS
Waste Management Licensing Regulations 1994 SI 1056	Covers applications for waste management licences, which authorise the deposit, disposal and treatment of controlled waste. Includes conditions on the use of certain mobile plant. AND AMENDMENTS
Waste Management Regulations (Northern Ireland) 2006 SR 280	Extends the controlled waste regime to bring mine, quarry and agricultural waste within waste management control. Categorises waste as household, industrial or commercial. Amends existing legislation to further implement Directives on waste and landfill.

5 EUROPEAN WASTE CATALOGUE CODES

The possible EWC categories for waste streams arising from oil spill clean-up operations are as follows:

05 Wastes from Petroleum Refining
05 01 wastes from petroleum refining
05 01 02* desalter sludges
05 01 03* tank bottom sludges
05 01 04* acid alkyl sludges
05 01 05* oil spills
05 01 06* oily sludges from maintenance operations of the plant or equipment
05 01 07* acid tars
05 01 08* other tars
05 01 09* sludges from on-site effluent treatment containing dangerous substances
05 01 10 sludges from on-site effluent treatment other than those mentioned in 05 01 09
05 01 11* wastes from cleaning of fuels with bases
05 01 12* oil containing acids
05 01 13 boiler feedwater sludges
05 01 14 wastes from cooling columns
05 01 15* spent filter clays
05 01 16 sulphur-containing wastes from petroleum desulphurisation
05 01 17 bitumen
05 01 99 wastes not otherwise specified
13 Oil wastes and wastes of liquid fuels
13 05 oil/water separator contents
13 05 01* solids from grit chambers and oil/water separators

13 05 02* sludges from oil/water separators 13 05 03* interceptor sludges 13 05 06* oil from oil/water separators 13 05 07* oily water from oil/water separators 13 05 08* mixtures of wastes from grit chambers and oil/water separators
13 08 oil wastes not otherwise specified 13 08 01* desalter sludges or emulsions 13 08 02* other emulsions 13 08 99* wastes not otherwise specified
14 Waste organic solvents, refrigerants and propellants
14 06 waste organic solvents, refrigerants and foam/aerosol propellants 14 06 05* sludges or solid wastes containing other solvents
15 Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified
15 02 absorbents, filter materials, wiping cloths and protective clothing 15 02 02* absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances 15 02 03 absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02
16 Wastes not otherwise specified in the list
16 07 wastes from transport tank, storage tank and barrel cleaning 16 07 08* wastes containing oil 16 07 09* wastes containing other dangerous substances 16 07 99 wastes not otherwise specified
17 Construction and demolition wastes (including excavated soil from contaminated sites)
17 05 soil (including excavated soil from contaminated sites), stones and dredging spoil

19 Wastes from waste management facilities, off-site waste water treatment plants and the preparation of water intended for human consumption and water for industrial use
19 02 wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation
19 02 03 pre-mixed wastes composed only of non-hazardous wastes 19 02 04* pre-mixed wastes composed of at least one hazardous waste 19 02 05* sludges from physico/chemical treatment containing dangerous substances 19 02 06 sludges from physico/chemical treatment other than those mentioned in 19 02 05 19 02 07* oil and concentrates from separation 19 02 08* liquid combustible wastes containing dangerous substances 19 02 09* solid combustible wastes containing dangerous substances 19 02 10 combustible wastes other than those mentioned in 19 02 08 and 19 02 09 19 02 11* other wastes containing dangerous substances 19 02 99 wastes not otherwise specified
19 03 stabilised/solidified wastes
19 03 04* wastes marked as hazardous, partly stabilised 19 03 05 stabilised wastes other than those mentioned in 19 03 04 19 03 06* wastes marked as hazardous, solidified 19 03 07 solidified wastes other than those mentioned in 19 03 06
19 12 wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 13 wastes from soil and groundwater remediation 19 13 01* solid wastes from soil remediation containing dangerous substances 19 13 02 solid wastes from soil remediation other than those mentioned in 19 13 01 19 13 03* sludges from soil remediation containing dangerous substances 19 13 04 sludges from soil remediation other than those mentioned in 19 13 03

6 INFORMATION ON THE ERIKA OIL SPILL

See pdf file 101005_403.02652.00001_ Information_on_the_Erika_Oil_Spill_1

See pdf file 101005_403.02652.00001_ Information_on_the_Erika_Oil_Spill_2

See pdf file 101005_403.02652.00001_ Information_on_the_Erika_Oil_Spill_3

7 WASTE MANAGEMENT CALCULATOR USER GUIDE

See pdf file 101005_403.02652.00001_Waste_Management_Calculator_User_Guide

13 TREATMENT PROCESS DETAILS

PRE-TREATMENT	Screening
Description	Separation of the polluted solid waste and sand and pebbles from the liquid phase (oil and/ or water). Note. Some equipment is specifically designed to sort metallic from non-metallic elements (and plastic from non-plastic), using magnetic sorting equipment.
Waste	Liquid Polluted sand and pebbles/ stones Polluted solid waste
Situation / Potential in the country	Use of public work/ construction work equipment easy to import and implement in any country.
Interest	Allows segregation of solids and sediments from the liquid phase for more specific waste treatment.
Entry criteria	Any type of liquid with pastes and solid, polluted sand/ pebbles/ solid waste.
Operational constraints	Requires personnel, specific screening equipment, energy, and storage for segregated material. May not be carried out on sediment trapped in heavy / weathered / emulsified oil without fluidification. Possible installation ranges from simple screen to heavy industrial screening equipment.
Impacts	Minimal if equipment is suited, correctly operated and there are no oil leaks.
Legal constraints	Refer to those applying to the transport, handling and storage of oil products.
Efficiency	Depending on equipment.
Cost	CAPEX and OPEX vary widely depending on the installation purchased/ rented.

PRE-TREATMENT	Size sorting
Description	Sorting of sediments (and other waste) based on size (fine sediment, sand, gravel, pebble, cobble, boulder).
Waste	Polluted sand and pebbles/ stones
Situation / Potential in the country	Use of public work/ construction work equipment easy to import and implement in any country.
Interest	Some machinery is suited to use with sand, some with gravel, others with pebbles and cobbles. Most organic and inorganic contaminants tend to bind to the fine fraction of a soil (i.e. clay and silt). Thus, separating the fine clay and silt particles from the coarser sand and gravel soil particles concentrates the contaminants into a smaller volume of soil that can then be treated or disposed of.
Entry criteria	Any type of pastes and solid, polluted sand/ pebbles/ solid waste.
Operational constraints	Requires personnel, specific sorting equipment, energy, and storage for the sorted sediment. May not be carried out on sediment trapped in heavy / weathered / emulsified oil without fluidification (because oil fills in the pores of the sorting equipment).
Impacts	Minimal if equipment is suited, correctly operated and there are no oil leaks.
Legal constraints	Refer to those applying to the transport, handling and storage of oil products.
Efficiency	Depending on equipment, can allow sorting waste / various sizes of sand and pebbles (depending on the screen used in the machine). The size of the installation ranges from simple sorting equipment (few 10's of cubic

	metres per hour) to heavy of industrial equipment, e.g. Trommel screening type (screened cylinder used to separate materials by size, 200 to 300 cubic metres per hour).
Cost	CAPEX and OPEX vary depending on the installation purchased/ rented.
PRE-TREATMENT	**Mills/ Shredders/ Shearing machines/ Crushers**
Description	Equipment used to reduce size of solid waste. Equipment used depends on the type of waste. •Mills: breakable solid waste •Shredders: cardboard, polystyrene •Shearing machines: plastic, paper, cardboard, wood •Crushers: wood/ log, rubble, plastic, large pieces of waste
Waste	Solid waste Mineral waste (gravel, pebble, boulder)
Situation / Potential in the country	Equipment can be imported and implemented easily.
Interest	Allows preparation smaller size material for treatment (e.g. incineration, co-incineration etc.).
Entry criteria	Depends on the type of equipment.
Operational constraints	The equipment is subject to rapid wear, and wearing parts must be changed frequently.
Impacts	Environmental impacts are limited to the noise.
Legal constraints	Limited.
Efficiency	Very good when implemented adequately.
Cost	CAPEX: price of the equipment ranges from few thousand Euros to few million Euros depending on the capabilities and complexity of the equipment. OPEX will vary accordingly.

PRE-TREATMENT	**Drying of seaweed**
Description	Drying of oiled seaweed and sea grass before incineration. Seaweed and sea grass are disposed in piles (e.g. 2m x 2m), height must not exceed 20 cm.
Waste	Seaweed and sea grass lightly (to medium) oiled
Situation / Potential in the country	Pre-treatment can be implemented very easily with limited equipment (earth moving equipment).
Interest	Allows decreasing the overall weight of a minimum of 50% of the sea weed and grass (and removing water) before incineration, thus reducing the cost and facilitating the incineration.
Entry criteria	Drying is used for light to medium oiled marine plant derived waste.
Operational constraints	The drying requires non sensitive land areas. Ground must be protected to avoid infiltration.
Impacts	Environmental impacts are limited to the odours (if infiltration is managed).
Legal constraints	Limited
Efficiency	In a temperate country, seaweed dries off in 15 days, less on hotter conditions.
Cost	Limited to the rental cost of earth moving machines, personnel and land.

PRE-TREATMENT	Decantation (settling)
Description	Separation of a liquid phase (oil or oily water) from another phase (liquid and/ or solid) either on the field during response operations or after the response operations in specialized installations (refinery, deballasting stations, etc.).
Waste	Liquid (may contain limited volumes of pastes and solid)
Situation / Potential in the country	Equipment easy to implement in any country (requires tanks for settling and storage, and pumps able to pump water and oil).
Interest	Allow separation of oil and water from an oil and water mix (may also allow recovery of sediment depending on equipment). During response operations, it might be acceptable for the separated water to be discharged into the environment thus reducing the need for storage capabilities (on the working sites and on the spill response vessels recovering oil offshore).
Entry criteria	Any oil, water and solid particle mix may be decanted to a certain degree. Oil and water cannot be recovered directly from emulsified oil. Emulsion breaking is necessary prior to decantation.
Operational constraints	Requires personnel, a suitable site and storage capabilities for the recovered oil, water and solids (and/ or the possibility to discharge the recovered water in the environment).
Impacts	➔ Decantation in the field during response operations: the decantation has limited impact. It is often accepted that the recovered water is discharged in the environment (during the spill response operations). ➔ During waste treatment in specialized plants (once emergency response operations is completed): minimal if equipment is suited, correctly operated and there are no oil leaks.
Legal constraints	Refer to those applying to the discharge of water in the environment. Higher concentrations of oil in water (in the discharged water) are acceptable during spill response operations.
Efficiency	Typical maximum flow rate depends on the pumps and decantation equipment. ➔ Decantation in the field during response operations: decantation time depends on the oily water recovered (typical time is one hour). Pumps with typical flow rates of 10 to 50m3/ hr are used. ➔ During waste treatment in specialized plants: few cubic metres to 10's of cubic metres per hour.
Cost	CAPEX, mobilisation cost: •Decantation in the field during response operations: costs of rental/ purchase for storage tanks (10 m3 or more) and volumetric pumps (10 to 50 m3/ hr flow rate) •None if existing installation OPEX : varies depending on the type of installation; however costs are limited (around 50 Euros/ per m3 of waste to decant).

PRE-TREATMENT	Centrifugation
Description	Separation of phases : oil - water – sediment using specific centrifugation machine.
Waste	Liquid (with limited fraction of sediments, threshold depends on equipment). Simple centrifugation may also be used to recover oil from heavily polluted sands.
Situation / Potential in the country	Equipment easy to import and implement in any country.
Interest	Allows separation of oil, water and sediment. Recovered oil may be re-used.
Entry criteria	Typical feed limit characteristics for centrifugation equipment: •Oily sludge pumpable by standard volumetric pumps •Dry solid content : maximum 15 % •Grain size : no particles bigger than 5 mm (plastic, sand, stones, wood, rust and other materials) •Oil content : 0 - 100 % •Water content : 0 - 100 % Note. Other equipment allows the centrifugation of heavily oiled sands.
Operational constraints	Requires personnel, site (surface of 200 m2 minimum), and input: •Electrical supply •Polymer (flocculent) powder can be used to facilitate the recovery of fine sediment (use 10 to 12 kg per ton of dry solid) •Demulsifying chemicals can be used for emulsion. •Water may be required in case of heavy sludge with low water content, to liquefy the product before inputting into the centrifugation machine.
Impacts	Minimal if equipment is suited, correctly operated and there are no oil leaks.
Legal constraints	Refer to those applying to the transport, handling and storage of oil products.
Efficiency	Typical maximum flow rate : •750 kg dry solids per hour •12 m^3/h maximum. Based on experience, 40 to 60 m3 of sludge can be treated daily (based on an 8 hours working day). Quality of oil recovered: •Contains 5% < BSW < 10%. Depending on the type of mud and machine tuning. Quality of water output by centrifuge machine: •Contains 2%<oil<10% and 0,1%<SPM<3%. Depending on the mud & machine tuning. •Water can be retreated in a lamellar decanter to reach a content of oil inferior to 0,1% and SPM inferior to 0,1%. Quality of sediment: •Contains 5 < Oil leachate < 10% and 30% < DS < 45%. •Depends on the type of mud, machine tuning and additives (flocculants).
Cost	CAPEX, example of mobilisation cost for centrifugation equipment with above mentioned efficiency: •Trans Mediterranean transport of equipment (2 x open-top containers: 1 x 20 ft container, and 1 x 40 ft container) : approx. 10,000 Euros •Installation and start-up: approx. 25,000 Euros OPEX : Using centrifuge decanter and lamella decanter for the water and including flocculants and de-emulsifier: approx. 60 Euros/ m^3 of sludge treated.

PRE-TREATMENT	Emulsion breaking
Description	Breaking up of emulsion of water in oil to discrete phases, either on site or in a suitable facility. Water in oil emulsions are very viscous and may contain up to 50 to 80% of water. ➔ Unstable emulsions can be broken by simple decantation or by heat treatment followed by decantation. The oil/water mixture should preferably be heated by circulation through an external heat-exchanger. ➔ Stable emulsions can be broken up by using demulsifying chemicals, which should be used as early as possible. The recommended dose rate varies with the type of oil and the age of the emulsion, but are usually very low (ranges from 250 to 5,000 ppm). Process lasts a minimum of 10 to 20 minutes.
Waste	Emulsified oil
Situation / Potential in the country	Heating equipment can be easily implemented. Demulsifying chemicals are easy to import and implement in any country.
Interest	Any decrease of the content of water in the emulsion implies less waste to treat afterwards. Water and oil can then be recovered separately using decantation or centrifugation.
Entry criteria	Any emulsified oil.
Operational constraints	➔ Heating. The safe working temperature limits is usually considered to be the flash point of the oil less 8°C. Generally, a working temperature of 60-66°C is used with a maximum temperature of 80°C to maintain operational safety. ➔ Use of demulsifying chemicals. There is no universally effective product. Screening and testing will be required.
Impacts	Emulsion breaking: minimal if equipment is suited, correctly operated and there are no oil leaks. ➔ Demulsifying chemicals may remain in the water after separation so care will be needed when disposing of the water. ➔ The water phase may be discharged to the environment after emulsion breaking at the recovery site (since the residual oil content is unlikely to increase damage to any species in an area already affected by a significant oil spill). If emulsion breaking is carried out after the cleanup operations, the water recovered should undergo further treatment via a separator unit to further reduce the oil content
Legal constraints	Refer to those applying to the transport, handling and storage of oil products, and discharge of water in the environment.
Efficiency	Generally, after separation into two layers, the water phase contains less than 1,000ppm of oil.
Cost	CAPEX will depend on the type of installation used but will be limited (especially for demulsifying agent). OPEX is also limited as installations are simple, and limited personnel are required (less than 50 Euros / m3).

PRE-TREATMENT	Draining of sorbent
Description	Draining of oil from sorbent prior to treatment (e.g. incineration) to recover the oil.
Waste	Oiled sorbent (may also be used for heavily oiled solid waste)
Situation / Potential in the country	Easy to implement in any country.
Interest	Allows recovery of the major part of the oil from the sorbent before further treatment.
Entry criteria	Any type of sorbent.
Operational constraints	Mainly related to the handling of the oily waste. No other specific technical requirements.
Impacts	Minimal if the oil and sorbent are recovered and managed correctly.
Legal constraints	Refer to those applying to the transport, handling and storage of oil products.
Efficiency	Limited, only to be used to recover bulk oil coating the waste or from sorbent.
Cost	Limited (depends mainly on personnel cost, equipment required is limited).

NATURAL TREATMENT	Monitored Natural Attenuation
Description	Comprises a range of physical and biological processes, which, unaided by deliberate human intervention, reduce the concentration, toxicity, or mobility of contaminants. Natural attenuation can be classified as destructive and non-destructive. • Destructive processes include biodegradation, photo-oxidation and hydrolysis. Biodegradation or bioremediation is by far the most prevalent destructive mechanism. • Non-destructive attenuation mechanisms include sorption, dispersion, dilution (most important non-destructive mechanisms) and volatilization.
Waste	Residual pollution (soil and groundwater on site)
Situation / Potential in the country	Does not require any equipment (apart from monitoring capabilities).
Interest	No investment (apart from monitoring capabilities).
Entry criteria	Controversial technique from a public and environmental point of view. May only be considered on residual and biodegradable pollution (or pollution that may be attenuated by the non-destructive mechanism).
Operational constraints	Long-term monitoring is necessary to demonstrate that contaminant concentrations continue to decrease at a rate sufficient to ensure that they will not become a health threat or violate regulatory criteria.
Impacts	Natural Attenuation is not appropriate where imminent risks are present.
Legal constraints	Refer to those applying to polluted soil and groundwater.
Efficiency	To be ascertained by the monitoring program. Research is on-going.
Cost	Related to the monitoring program (expertise, sampling and analysis).

PHYSICAL TREATMENT	**Washing of oiled sediment and soil** (Also known as “Solvent extraction” if solvent is used).
Description	Soil washing uses water to remove contaminants from soils. The process works by either dissolving or suspending contaminants in the wash solution (using hot water, 30° to 50°C and solvent/ dispersant chemical agent when required). It is often used in conjunction with other physical separation techniques (see decantation, centrifugation etc.).
Waste	Contaminated sediment and soil.
Situation / Potential in the country	Equipment may exist in public works, construction industry, or mining sectors or mobile units may be imported.
Interest	Soil washing starts by the separation of soil by particle size. Most organic and inorganic contaminants tend to bind and sorb to clay, silt, and organic soil particles. This fine sediment is separated from the remaining soil during the washing by scrubbing, water and possibly solvation. Washing does not treat the pollution but helps by removing the pollutants bonded to the finer sediments from the coarser sediments and concentrates them in a small volume of oily water, easier to treat and dispose of afterwards.
Entry criteria	The pollutants must be soluble in the given solvent (adsorbed to the fine sediment). Soil washing is a technique of concentrating contaminants through separation. It does not destroy or immobilize the contaminants. Consequently, the resulting concentrated contaminated soil and/ or effluents must be disposed of carefully.
Operational constraints	The "clean" portion of the separated soil must be analysed for residual contamination before it can be disposed of as clean material. Sand and gravel are relatively easy to wash. However, mud and clay retain, by adsorption, some oil and will require an additional treatment (Source: Bocard). Wash water requires treatment before it can be discharged, as it usually contains smaller particles or organic particles.
Impacts	Limited if wash waters are managed adequately and treated material is analysed before further treatment or disposal.
Legal constraints	Refer to those applying to polluted soil and groundwater and to the management of oily water.
Efficiency	Depending on the installation, may treat from few 10's of tons of waste per day to few 100's of tons.
Cost	OPEX: around 150 Euros / m3 (Source: KOLLER)

PHYSICAL TREATMENT	Washing of heavily oiled solid waste
Description	Washing oil from solid waste before storage or other final disposal using various techniques: ➔ Cold Water Flushing, simple technique, moderately successful, to wash large quantities of oiled debris with a high pressure hose to loosen and float away oil. The resulting oil/water mixture can then be treated via a separator ➔ Warm/Hot Water Flushing to clean pebbles, gravel and sand contaminated with oil or emulsion, using standard mineral processing equipment coupled to a conventional oil/water separator. ➔ High velocity steam jets directed onto an inclined, vibrating, perforated tray placed above a collector to trap oil and condensate, may be used to clean oil-contaminated sand. Possible use of demulsifier. ➔ Solvent Extraction may be considered as a possible mean of removing oil from collected sand, pebbles and debris. Limited research has been carried out in relation to the use of this technique.
Waste	Polluted solid waste and sediment
Situation / Potential in the country	Small installations are easy to implement (however, depends on the size of the equipment).
Interest	Recovery of recyclable material (e.g. plastic and other type of waste). Possibility of incinerating the cleaned waste or storing the cleaned waste in landfills. Possible recovery of oil (if decantation / centrifugation is used after the washing).
Entry criteria	Any type of heavily oiled solid waste or sediment.
Operational constraints	Requires personnel, specific site, washing equipment, energy, effluent management facility, cleaning products and large volumes of water.
Impacts	Minimal if the washing effluents are managed correctly. However, requires large volume of water.
Legal constraints	Refer to those applying to the management of oily water.
Efficiency	Depending on the equipment used.
Cost	OPEX: around 150 Euros / m3 (Source: KOLLER) CAPEX and OPEX varies depending on the size and flow rate of the installation.

PHYSICAL TREATMENT	Flotation (using heated water)
Description	Flotation of oil from oiled sand in a tank filled with heated water tank (to fluidise the oil) by introducing air bubbles at the bottom of the tank. The air bubbles mobilize the oil from the sediment and re-float it at the surface of the water.
Waste	Polluted sand
Situation / Potential in the country	Mobile installation may be easily implemented in the country.
Interest	Allows cleaning of the sand, which may be returned on the beach (with possible final cleanup using surfwashing).
Entry criteria	Lightly to medium polluted sand (oil from heavily polluted sand should be recovered prior to flotation using e.g. centrifugation).
Operational constraints	Requires the setup of a complete installation, power supply and water supply. Requires effluent management (for the recovered oil and the used water).
Impacts	Minimal if the washing effluents are managed correctly.
Legal constraints	Refer to those applying to the management of oily water.
Efficiency	Flotation is reportedly capable of cleaning about 1 ton of oil contaminated sand per hour. When operating with sand containing up to 2% of oil, approximately 95% of the oil may be removed.
Cost	Varies depending on the size and capabilities of the installation.

PHYSICAL TREATMENT	Filtration
Description	Filtration is the physical process whereby particles suspended in water are separated by forcing the fluid through a porous medium (i.e. a filter). The suspended particles are trapped in the filter. Filtration relies on the pore size of the membrane, which can be varied to remove particles and molecules of various sizes. Micro-filtration processes generally work best for separating very fine particles (0.1-0.001 microns) from the liquid.
Waste	Liquid (oil, oily water, water) with sediment (usually fine sediment)
Situation / Potential in the country	Easy to import and implement in any country.
Interest	Allows removal of fine sediments from a liquid waste before treatment.
Entry criteria	The liquid phase must not be too viscous to flow through the filtering device.
Operational constraints	Limited. The filtering device must be cleaned and/ or changed frequently.
Impacts	Minimal if equipment is suited, correctly operated and there are no oil leaks.
Legal constraints	Refer to those applying to the transport, handling and storage of oil products.
Efficiency	Depends on the type of installation, few cubic metres to few hundred's of cubic metres per day. Sampling the filtered water monitors the effectiveness of these processes.
Cost	CAPEX depends on the type of installation used (and its capabilities). OPEX are limited to the personnel, power supply and maintenance of the filtering device.

PHYSICAL TREATMENT	Washing of pebbles (concrete mixer or hot water/ high pressure)
Description	Cleaning of pebbles and stones using high pressure / hot water cleaners.
Waste	Polluted pebbles/ stones
Situation / Potential in the country	Required equipment could be sourced in any country
Interest	Allows return of clean pebbles to the beach.
Entry criteria	Any polluted pebbles and stones.
Operational constraints	Requires personnel, specific site, high pressure cleaner / steam cleaners, energy, washing effluent management facility. Steam cleaners that can work with sea water should preferably be used to limit the use of fresh water.
Impacts	Minimal if the washing effluent is managed correctly and if sea water is used.
Legal constraints	Refer to those applying to the management of oily water.
Efficiency	Depends on the number of cleaner used.
Cost	CAPEX : one high pressure / hot water cleaner working with sea water: 7,000 Euros. One portable concrete mixer (petrol engine): 1,000 Euros. OPEX is mainly related to the cost of manpower (3 to 4 workers per high pressure machine/ concrete mixer).
	 **Pebble washing on site (Source: Le Floch Depollution)**

PHYSICAL TREATMENT	Surf-washing
Description	Cleaning of polluted sand and pebbles by moving the sediments into the surf zone.
Waste	Medium to lightly polluted sands Medium to lightly polluted pebbles & stones
Situation / Potential in the country	May be considered in every country, require marine geologist advice and testing in situ.
Interest	Use of the “natural” energy of the waves and return of the sediments on the beach. Low cost and no specific, costly equipment required.
Entry criteria	Usable only for sediments that will remain on the beach and that are lightly to medium polluted.
Operational constraints	Requires personnel and earth moving equipment to push the polluted sediment in the surf zone and sorbent material to recover the oil.
Impacts	Minimal if the oil is correctly recovered using sorbent.
Legal constraints	Refer to those applying to the management of oily water and quality of coastal water (however, special authorisation will be required for such work).
Efficiency	Depending on viscosity and weathering of oil, temperature, exposure to waves.
Cost	CAPEX : none (if local equipment is rented) OPEX for one working site and team: daily cost of one or two mechanical shovel, team of one supervisor, 10 personnel, PPE and sorbent.

STABILISATION TREATMENT	Stabilisation, using binding agent, e.g. quicklime (Pastes and solid and oily sands)
Description	This process comprises two steps: •Solidification: transforms the waste into a granular solid with limited porosity and improved mechanical characteristics, •Stabilisation: transforms soluble compounds into stable less soluble compounds. The redox reaction of quicklime with the oil on the sediments stabilises the thickest oil compounds and (partially) degrades the lightest compounds of the oil. Stabilisation may be carried out on the working site or in specialized units.
Waste	Pastes and solid Polluted sands Note. Liquid waste should not be treated if oil content is too high.
Situation / Potential in the country	Quicklime is easily available and cheap. Other proprietary hydraulic binding materials are also available.
Interest	•Stabilizing the leachate of oil and toxic compounds. •Produces a granular hydrophobic material, physically and chemically suitable for use as a filling material, as raw material in civil works (quality of the material must be tested prior to any use), or to be left in-situ in a stabilised condition.
Entry criteria	Avoid polluted (organic?) waste, polluted sorbent and pebbles.
Operational constraints	Requires easily available equipment (e.g. earth moving equipment to mix the quicklime with the polluted material), little personnel, and binding agent (e.g. quicklime). If oil content is too high or high environmental temperature, there is a risk of fire. The grain size of the bulk quicklime has to be adapted to the grain size of the oiled sediment to treat (the smaller the sediment, the coarser the quicklime, e.g. quicklime grain of 20 to 40mm to treat silt and sand mix).
Impacts	The redox reaction is followed by atmospheric releases of dust, gases and fumes. Leachate of stabilised material has less than 1% of oil (in the worst case). The gradual degradation of the stabilisation process and the consequent release of the remaining contaminants into the environment must be anticipated, when considering the final disposal environment.
Legal constraints	Refer to atmospheric releases legislation (however, special authorisation may be required for such work). May require THC and leachate testing, and EIA or legal authorisation.
Efficiency	80 m^3/ day of waste treated with one mechanical shovel and one experienced driver.
Cost	CAPEX/ OPEX: the price for the stabilisation of 1 m3 of waste is approx. 150 to 200 Euros (depending on the local availability of binding agent).

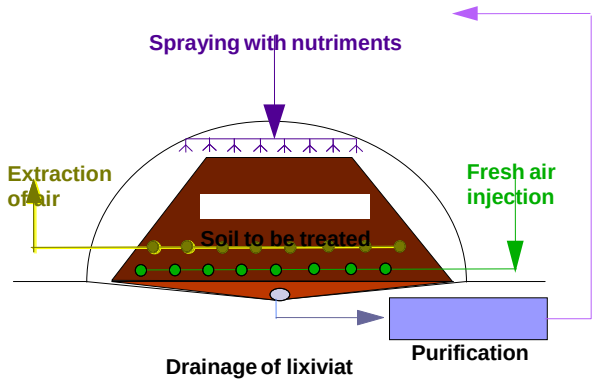
STABILISATION TREATMENT	Stabilisation - Vitrification
Description	Vitrification uses heat to melt at very high temperature, (1,500° to 2,300°C) the waste, then decrease the temperature abruptly to solidify harmful chemicals in a solid mass of glasslike material. It can be applied on soil in-situ (in-situ vitrification or ISV) or in an external treatment unit (ex-situ).
Waste	Final wastes from incident (e.g. polluted soils, solid waste)
Situation / Potential in the country	Equipment can be imported and installed. Transportable vitrification systems exist.
Interest	Contaminants is stabilized and solidified in a glasslike material, with better long term performance than other solidification means (hydraulic binding agent).
Entry criteria	Complete characterization of the candidate waste stream is essential, before initiating either in-situ or ex-situ vitrification, to determine what glass forms are already present in the waste and what additional glass stabilizers and fluxes need to be added. Debris greater than 60 mm in diameter typically must be removed prior to processing.
Operational constraints	Use, storage, or disposal of the vitrified slag is required. High level of heat/ energy are required.
Impacts	Concerns include the durability of the vitrified waste, although vitrified waste (as compared to a grouted or cemented waste form) is expected to be more stable over longer periods due to the corrosion resistance of glass. The heat used to melt the soil can also destroy some of the harmful chemicals and cause others to evaporate. The evaporated chemicals must be captured and treated.
Legal constraints	Related to waste management and disposal (for the glass like material) and to gas emission and treatment during vitrification.
Efficiency	Vitrification is a proven technology that has been employed during various oil spills. However, very high levels of energy are required, which leads to high costs.
Cost	OPEX: from 150 to 230 Euros/ ton (Source: KOLLER), depending on the size and capabilities of the installation, to more than 300 Euros/ ton for specific waste.

BIOREMEDIATION TREATMENT	Bioremediation: enhanced bioremediation In Situ
Description	Stimulating bioremediation by addition of microorganisms (e.g., fungi, bacteria, and other microbes) and/ or nutrients (e.g. oxygen, nitrates) to the subsurface environment to accelerate the natural biodegradation process by the naturally occurring microorganisms of the soil. Bioremediation can take place under aerobic or anaerobic conditions. There are four major processes, briefly described below. **Bio-Stimulation:** •**Gaseous Nutrient Injection** In this case, nutrients are fed to contaminated groundwater and soil via wells to encourage and feed naturally occurring microorganisms. •**Oxygen Enhancement** with hydrogen peroxide as an alternative to pumping oxygen gas into groundwater. •**Nitrate Enhancement** A solution of nitrate is sometimes added to the groundwater to enhance anaerobic biodegradation. **Bio-augmentation** Sometimes acclimated microorganisms are added to the soil to increase biological activity. However, the efficiency of this technique is not as well proven as the bio-stimulation. The first three methods are preferred because they stimulate the naturally occurring indigenous micro-organisms, already adapted to the environment.
Waste	Lightly oiled sediment (sand, gravel, soil, mud). Oiled seaweed and vegetation (even fauna) may be treated
Situation/potential in the country	May be easily implemented on any polluted site (usually considered for coastal sheltered sites with slow natural clean-up by waves or inland sites).
Interest	it is relatively inexpensive with low energy requirements it can be carried out without elaborate equipment
Entry criteria	Oil with a high asphaltene and resin content degrades slowly due to the recalcitrance of the hydrocarbons. Oil with a high aliphatic and aromatic content is a much more nutrient-dependent process and will degrade more rapidly within an adequate environment. It is recommended to carry out a GC/ MS analysis to define the composition of the oil and evaluate its biodegradability. To achieve maximum biodegradation, sediment pore water should exhibit concentrations of 1.5 mg nitrate/litre, Phosphorous concentrations of approximately one-tenth of the nitrate levels, with oxygen levels above 2 mg/litre (Source: AMSA). High permeability soils are required to allow the nutrients to reach the indigenous microorganisms (avoid fine clays).
Operational constraints	Easy access to the treatment site. Biodegradation is less efficient at low temperature. Soil must be humid. Pollutants must not be adsorbed to clay and/ or mud. In this case, they are unavailable for the microorganisms.
Impacts	Under anaerobic conditions, contaminants may be degraded to a product that is more hazardous than the original contaminant. Nitrate injection to groundwater is of concern because nitrate is a regulated compound. Bio-augmentation using non-native micro-organisms is also controversial. The circulation of water-based solutions through the soil may increase contaminant mobility and necessitate treatment of underlying groundwater.
Legal constraints	Refer to those applying to the management of polluted soils in situ. Special authorisation should be delivered for such work.
Efficiency	Bioremediation is a long term process (months to year(s)). Bioremediation degrades aromatics, N-alkanes and iso-alkanes. Resins and Asphaltenes are usually resistant to bioremediation. Cyclic hydrocarbons (Saturated and Aromatics) are partially biodegraded. The efficiency of biodegradation can be 99% when correctly implemented on biodegradable material.
Cost	Limited, less than 30 Euros / m3 (Source: KOLLER), 15 to 75 Euros/ ton (Source: Bocard) Related to the manpower, equipment for the spreading and purchase of stimulating agent.

BIOREMEDIATION TREATMENT	Bioremediation: land farming
Description	Contaminated soils are mixed with soil bulking agents and nutrients, and then they are tilled into the earth. The oily debris should be evenly spread over the scarified land surface in a layer 2-10cm thick. Contaminants are degraded, transformed, and immobilized by microbiological processes and by oxidation.
Waste	Pastes and solids lightly oiled.
Situation / Potential in the country	May be very easily implemented.
Interest	Allows biodegradation of oily waste with little equipment (requires large area of land away from ground water and human settlements).
Entry criteria	Oil with a high asphaltene and resin content degrades slowly due to the recalcitrance of the hydrocarbons. Oil with a high aliphatic and aromatic content is a much more nutrient-dependent process and will degrade more rapidly within an adequate environment. It is recommended to carry out a GC/ MS analysis to define the composition of the oil and evaluate its biodegradability. Lightly oiled sediment (sand, gravel, soil, mud), less than 1 to 2% of oil. Land farming is best suited for debris comprised of small particles such as oiled soils, and should not be attempted for waste comprised of particles larger then 15cm to avoid handling difficulties and problems with mixing of the waste.
Operational constraints	Requires large area of land in a suitable environment: land farming is best suited to warm climates with moderate precipitation and evaporation. The degradation process may stop when temperatures fall below freezing. Regular tilling is necessary for aeration. Sufficient moisture is required in the oil/soil mixture to support microbial activity, which is usually naturally available except in very dry areas. Areas should be located where water bodies and other supplies of potable water are not at risk from the possible release of contaminants. Slope of area should be less than 4% (or else plan for run-off water management). Soil permeability should be low to avoid percolation of leachates into the ground water. Slope should also be low to avoid running. Additions of nitrogen (as ammonium nitrate) and soluble phosphorous (eg superphosphate) are necessary for the degradation of oily wastes at optimum rates. Environmental monitoring is necessary (soil and ground water analysis).
Impacts	Main risk is the contamination of the ground water by percolation of contaminants and running surface water carrying the contaminant away from the land farming area.
Legal constraints	Refer to limits of contaminants that can be spread on land (e.g. regulations related to land farming of mud from sewage water treatment plants). May require EIA or legal authorisation.
Efficiency	Land farming degrades oil into carbon dioxide gas, water and residue within 2 years or less. Bioremediation is a long term process (months to years). Bioremediation degrades aromatics, N-alkanes and iso-alkanes. Resins and Asphaltenes are usually resistant to bioremediation. Cyclic hydrocarbon (Saturated and Aromatics) are partially biodegraded.
Cost	Cost of the equipment is limited (earth moving equipment). However, land farming requires large areas of land (to rent or purchase for years). OPEX: •5 to 50 Euros / m^3 for “natural” treatment (without nutriments and/ or enzymes) and without any treatment of leachate. •20 to 150 Euros / m^3 for treatment with nutriments or enzymes and without any treatment of leachate (Source: UNDP).

BIOREMEDIATION TREATMENT	Bio-treatment: composting
Description	Composting is the biological conversion of organic waste solids into stable, humic material (which contributes to the soil structure as well as its nutritional status). Composting is achieved by mixing with bulking agents and organic amendments, spreading the oily waste in windrow (or other shapes), regular tilling for oxygenation and addition of nutrients. There are three major designs used in composting. • aerobic static pile/ compost is formed into piles and aerated with blowers or vacuum pumps, • use of a vessel similar to a bio-reactor, where the compost is mechanically agitated and aerated, • windrow composting, usually considered the most cost-effective composting alternative.
Waste	Lightly oiled seaweed and vegetation (i.e. biodegradable material), sand may be present
Situation / Potential in the country	May be very easily implemented.
Interest	•Recovery of natural resource (sand) •Low cost •Larger quantity will result in economy of scale
Entry criteria	Oil with a high asphaltene and resin content degrades slowly due to the recalcitrance of the hydrocarbons. Oil with a high aliphatic and aromatic content is a much more nutrient-dependent process and will degrade more rapidly within an adequate environment. It is recommended to carry out a GC/ MS analysis to define the composition of the oil and evaluate its biodegradability. Usable only for oiled vegetal that are lightly to medium polluted, and should not contain cobble or boulder.
Operational constraints	Requires personnel, expertise, earth moving equipment, nutrients and large area of ground, particularly for in-situ treatment options. The site must meet hydro-geological and physical requirements. Selection criteria include the following items: •no oil is recovered; •requires a lot of testing, monitoring, foundation and mechanical work; •requires large surface area; •dispersed quantity of contaminated soil increases the cost.
Impacts	Minimal if suited monitoring and containment program is implemented. But possible increase of VOC (Volatile Organic Compound) emissions. Windrow composting has a high dust emission.
Legal constraints	Refer to waste and oily water / soil legislation.
Efficiency	Composting is faster than enhanced bioremediation on site: process lasts less than one year (may be 3 to 6 months depending on the degree of pollution of the waste). Bioremediation degrades aromatics, N-alkanes and iso-alkanes. Resins and Asphaltenes are usually resistant to bioremediation. Cyclic hydrocarbon (Saturated and Aromatics) are partially biodegraded.
Cost	Costs comparable to land farming (usually less than 50 Euros per ton). However, composting does not require large areas of land and compost can be sold at 15 to 23 Euros per ton (Source: Damien).

BIOREMEDIATION	Bioremediation: Biopile

TREATMENT	
Description	A bio-pile is a bioremediation technology in which excavated soils are mixed with soil amendments, formed into compost piles, and enclosed for treatment. The basic bio-pile system includes a treatment bed, an aeration system, an irrigation/nutrient system and a leachate collection system. Note. Systems known as Bio-Reactors are usually used to treat sewage water. They can also treat oily water, and testing is on-going to treat polluted soils with this technique. Contaminated groundwater is circulated in an aeration basin where microbes degrade organic matter, forming a sludge that is disposed of or recycled.
Waste	Oily water. Light to Medium polluted sediment (up to 5% of oil, more depending on installation)
Situation/potential in the country	Technically easy to implement if land is available on long term basis (few years).
Interest	Biopile is a more controlled and efficient treatment than composting, allowing treatment of more oiled sediment and waste. The material may be returned on site once the treatment is completed.
Entry criteria	Oil with a high asphaltene and resin content degrades slowly due to the recalcitrance of the hydrocarbons. Oil with a high aliphatic and aromatic content is a much more nutrient-dependent process and will degrade more rapidly within an adequate environment. It is recommended to carry out a GC/ MS analysis to define the composition of the oil and evaluate its biodegradability. Treatability testing should be conducted to determine the biodegradability of contaminants and appropriate oxygenation and nutrient loading rates. Laboratory or field treatability studies are needed to identify the best amendments.
Operational constraints	The site of implementation of the biopile depends on the land availability in the area and on the volume of waste to treat (cost of transport). Testing (in laboratory and on limited quantities) is necessary. Continuous contaminant and environmental monitoring program is necessary (moisture, heat, nutrients, oxygen, and pH).
Impacts	Biogas and leachate must be managed adequately. The treatment area is generally covered or contained with an impermeable liner to minimize the risk of contaminants leaching into an uncontaminated soil.
Legal constraints	Refer to waste and oily water / soil legislation.
Efficiency	Bioremediation is a long term process, although speed is increased in biopile, degradation of resistant oil compound may still take more than 2 years. Bioremediation degrades aromatics, N-alkanes and iso-alkanes. Resins and Asphaltenes are usually resistant to bioremediation. Cyclic hydrocarbon (Saturated and Aromatics) are partially biodegraded.
Cost	Varies depending on the volumes to be treated. Ranges from 60 to 200 Euros per tons of waste to treat (if there is less than 100 tons) to 50 to 100 Euros per ton (for 1,000 tons or more of waste) including the analysis.
	 **Figure 13-1 : Conceptual model of a Biopile (lixiviat is French for leachate)**

THERMAL TREATMENT	Incineration in domestic waste incinerators
Description	Incineration of the waste in incinerators used for domestic waste.
Waste	Liquid Pastes and solid Lightly Polluted sorbent Lightly Polluted solid waste
Situation / Potential in the country	Some domestic waste incinerators may be technically suited to receive oily waste.
Interest	•Permanent waste elimination. •Could achieve up to 99% volume reduction. •Operated at very high temperature (at 1,200°C), the process is suitable for the destruction of many hazardous air pollutants.
Entry criteria	The list of types of domestic waste that can be treated in the plant is often defined by national regulations. This list may be temporarily and exceptionally enlarged to accept oil spill waste. Domestic incinerators can manage lightly to medium oiled waste, but may not be able to handle heavily oiled waste (which may cause thermal imbalance of the incinerator unless diluted sufficiently with the "normal waste".
Operational constraints	Domestic waste incinerator are generally not the best suited incinerators since chlorides from sea water leads to corrosion. The oily waste may have to be diluted with the "normal" waste, thus decreasing the treatment rate. Requires personnel, site, incinerator and waste handling equipment. •Treatment rate is limited (oily waste must be diluted with other type of waste). •No energy is recovered. •Air pollution control devices might not be suitable. •Salt in recovered oil could increase corrosion in system.
Impacts	Incinerators may release carcinogenic and toxic chemicals, including heavy metals, partially-burned organic material such as polyvinyl chloride (PVC), and other organic chemicals, including polycyclic aromatic hydrocarbons (PAHs), dioxins and furans. The concentration of the release depends on the type of waste, of incinerator and of filter installed on the chimney.
Legal constraints	Refer to incineration and atmospheric releases legislation. Special authorisation may be required for such work.
Efficiency	Relies on the type of incinerator and gas treatment.
Cost	For the construction of a domestic incinerator: CAPEX: high investment cost, OPEX : 100 to 400 Euros / m3 (Source: KOLLER), depends on the size and personnel of the installation, and on pre-treatment required.

THERMAL TREATMENT	Incineration in industrial incinerator or other type of furnace / kiln or power plant
Description	Incineration of the waste in specialized incinerators used for hazardous waste / industrial waste.
Waste	Any type of waste but mainly used for: Liquid Pastes and solid Polluted solid waste
Situation / Potential in the country	Installation that may incinerate oil spill waste: • Industrial incinerator (850° to 1,100°C) • Power plant • Lime kiln (operates at 950° to 1050° C) • Glass industry • Smelting industry
Interest	•Permanent waste elimination. •Could achieve up to 99% volume reduction. •Operated at very high temperature (at 1,200°C), the process is suitable for the destruction of many hazardous air pollutants. •Able to handle waste with hazardous substances (Cl, S, heavy metals, PAH, PCB…).
Entry criteria	Industrial incinerator can accept a wide variety of waste, even over 30% oil content. Entry criteria depends on the gas and fume treatment capability of the plant. Power plant can accept solid waste (when operating with grill incinerator or fluidized beds). Power plants with fuel burner/ gas burner can accept liquid waste and solid waste (if it is finely shredded). Other kilns have more restrictive entry criteria, e.g. for lime kilns in France: • Size of particle < 10 mm, • Calorific value > 2500 kcal/Kg, • Water content < 30%, • Sulphur < 1%, • Total halogens (Cl, Br, F, I) < 1%, • PCB < 100 mg/Kg, and PCT < 100 mg/Kg. The oily waste will be added to the incinerator feed in a proportion depending on the composition of the oily waste.
Operational constraints	Requires personnel, site, incinerator and waste handling equipment. •No energy is recovered. •Air pollution control devices must be suited to monitor the incineration of large quantities of petroleum product. •Salt in recovered oil could increase corrosion in system. • If the facility does not exist, this type of project needs a long period to be implemented.
Impacts	Incineration (e.g. in power plants) result in the production of ashes and co-products that must be disposed of correctly. Incinerators may release carcinogenic and toxic chemicals, including heavy metals, partially-burned organic material such as polyvinyl chloride (PVC), and other organic chemicals, including polycyclic aromatic hydrocarbons (PAHs), dioxins and furans. The concentration of the release depends on the type of waste, of incinerator and of filter installed on the chimney.
Legal constraints	Refer to incineration and atmospheric releases legislation. Special authorisation may be required for such work.
Efficiency	Relies on the type of incinerator and gas treatment.
Cost	CAPEX : Very high investment cost. OPEX : 100 to 400 Euros / m3 (Source: KOLLER).

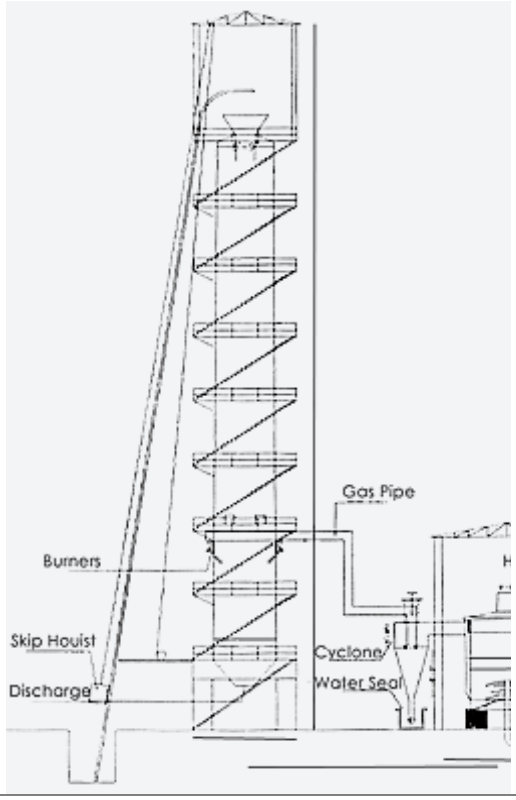


Figure 13-2 : Lime kiln

THERMAL TREATMENT	Co-Incineration as fuel source (in cement works, lime kiln, power plant or other kiln)
Description	Incineration of the liquid oil recovered as fuel source in cement works (and/ or industrial furnaces) Note. Co-incineration is the incineration of waste in industrial incinerators, kilns, furnaces as an alternative or complementary fuel source and/ or as material source.
Waste	Liquid Pasty waste Depending on installation: solid waste
Situation / Potential in the country	Some cement facilities have special adaptations to receive OSW as fuel.
Interest	Liquid : •Recovery and re-use of oil as valuable energy source •Cost recovery option
Entry criteria	Waste has to meet stringent technical specifications: • heavy metals, mercury, MgO and zinc (e.g. less than 1%), • chlorine (e.g. less than 2%), • sulphur (e.g. less than 4%), etc. • (Possible reference to the Stockholm convention). The kiln operator will evaluate the calorific value of the waste, minimum of 2,500 to 3,000 kcal/ kg is required. Additional monitoring requirements will be required by the kiln operators regarding sulphate, alkalinity, and solid residue content. ➔ Some cement kilns have restrictive criteria: • no sand, •dry residue: 2% maximum, at 90 microns maximum, •no (or very little) chlorine), •plastic is possible but no PVC or chlorine. Pre-treatment is often needed.
Operational constraints	Waste must be homogeneous and of a controlled and quantified calorific value. Requires personnel, site, incinerator and waste handling equipment. •salt in recovered oil could increase corrosion in system; •depends on the installations (i.e. burners and injectors); •content in chlorine and sulphate must be limited; •requires **pre-treatment** (processing and screening) which is labour intensive; •quality of oil recovered could be a limiting factor.
Impacts	Incinerators may release carcinogenic and toxic chemicals, including heavy metals, partially-burned organic material such as polyvinyl chloride (PVC), and other organic chemicals, including polycyclic aromatic hydrocarbons (PAHs), dioxins and furans. The concentration of the release depends on the type of waste, of incinerator and of filter installed on the chimney.
Legal constraints	Refer to incineration and atmospheric releases legislation. Special authorisation may be required for such work.
Efficiency	Depends on the substitution rate : from 1 to 1.5 tons/ day
Cost	CAPEX: use of already existing installation, may require adaptation to handle oil spill waste. OPEX : Estimated to 30 to 50 Euros/ ton but may be free, depending on the quality of the recovered oil and on the additional cost for waste pre-processing in the plant (demulsifying, screening for absence of heterogeneous elements etc.)

THERMAL TREATMENT	Co-Incineration as Raw alternative material (in cement works or other)
Description	Incineration of polluted sand and solid waste in cement works as Alternative Raw material (Sand is a natural raw material consumed in cement production). Note. Co-incineration is the incineration of waste in industrial incinerators, kilns, furnaces as an alternative or complementary fuel source and/ or as material source.
Waste	Polluted sand Polluted solid waste
Situation / Potential in the country	Some cement facilities have special adaptations to use OSW (sands, muds solid waste) as raw material.
Interest	•Contaminated solid waste (woods, plastic, and other macro-waste) could be processed in kiln as Alternative Fuel and Raw material. •Final elimination of contaminated sand and of most solid waste material. Previous successful experience in Holcim France for treatment of waste generated from Erika spill (Source: Holcim Europe direct communication).
Entry criteria	➔ Depending on each facility: • Sand may be processed; •No pebbles are allowed in the system; •Plastic is possible but no/ very little PVC or chlorine. The kiln operator must maintain an overall waste composition comprising: • Si O2 : 21 to 24%, • Al2 O3 : 4.5 to 6%, • Fe2 O3 : 3 to 4%, • Ca O : 64 to 66%.
Operational constraints	The content of oil in the waste must be limited to avoid energetic imbalance of the kiln (e.g. waste must have less than 0.5% THC in France) Requires personnel, site, incinerator and waste handling equipment. •salt in recovered oil could increase corrosion in system; •should be free of mercury, zinc, MgO and ferrous metals as it effects kiln operation; •potential change in emission characteristics due to waste characteristics; •requires **pre-processing** which is labour intensive.
Impacts	Loss of natural sand resources. Incinerators may release carcinogenic and toxic chemicals, including heavy metals, partially-burned organic material such as polyvinyl chloride (PVC), and other organic chemicals, including polycyclic aromatic hydrocarbons (PAHs), dioxins and furans. The concentration of the release depends on the type of waste, of incinerator and of filter installed on the chimney.
Legal constraints	Refer to incineration and atmospheric releases legislation. Special authorisation may be required for such work.
Efficiency	Depends on the substitution rate : from 1 to 5 tons/ day
Cost	OPEX: from 30 to 150 Euros / ton according to waste condition. Mostly no additional cost if lightly contaminated soil with oil and solid waste (Source: Holcim Europe direct communication)

THERMAL TREATMENT	**Thermal Desorption** (Low Temperature Thermal Desorption LTTD)
Description	Thermal desorption separates contaminants from soil. Soil is heated in a chamber in which water, organic contaminants and certain metals are vaporized. A gas or vacuum system transports vaporized water and contaminants to an off-gas treatment system (the design of a system aims to volatize contaminants, while attempting not to oxidize them; otherwise, thermal desorption would be another way of saying incineration). It is important to note that thermal desorption does not destroy organic compounds. Based on the operating temperature, this process is categorized into two groups. In **Low Temperature Thermal Desorption (LTTD),** wastes are heated to between 90° and 320°C. LTTD is most often used for remediating fuels in soil. Unless heated to the higher end of the LTTD temperature range, organic components in the soil are not damaged, which enables treated soil to retain the ability to support future biological activity. In **High Temperature Thermal Desorption (HTTD),** wastes are heated to 320° to 560 °C. HTTD is not used for oil/ fuel contaminated soil treatment.
Waste	Polluted soil, sand and often small pebble (e.g. no larger than 5cm)
Situation / Potential in the country	Equipment can be imported and installed.
Interest	•Very effective in reducing concentrations of petroleum products including gasoline, jet fuels, kerosene, diesel fuel, heating oils, and lubricating oils.
Entry criteria	•Applicable to constituents that are volatile at operating temperatures.
Operational constraints	Requires personnel and expertise to operate, site, waste transport and handling equipment. •Treatment of the off-gas must remove particulates and contaminants. •Dewatering may be necessary to achieve acceptable soil moisture content levels. •Technique developed for soil remediation (not accidental pollution treatment), applicability for OSW depends on the characteristics and on the hydrocarbon content of the waste. •THC concentration should be maximum 3% (except for systems operating in an inert atmosphere e.g. thermal screw). System is not suited for high concentrations of oil in waste (e.g. 20 to 30%). •Due to the low temperature used, it is probable that weathered oil generally recovered on beach will not be treatable as it would require higher temperatures to evaporate.
Impacts	Minimal, if the vaporized hydrocarbons are correctly treated in a secondary treatment unit: afterburner, catalytic oxidation chamber (which destroys the organic constituents), condenser, or carbon adsorption unit (which trap organic compounds for subsequent treatment or disposal) prior to discharge to the atmosphere.
Legal constraints	Refer to incineration and atmospheric releases legislation. Special authorisation may be required for such work.
Efficiency	•Rapid treatment time; most commercial systems capable of over 25 tons/ hr throughput. Thermal screw: up to 15 tons/ hr. •Can consistently reduce THC to below 10 ppm and BTEX below 100 ppb (and sometimes lower).
Cost	Total cost of treatment for one m3 ranges from 40 to 200 Euros / ton (Source: Bocard) Typical cost for oily waste treatment is approx. 150 Euros (Source: Cedre)

THERMAL TREATMENT	Incineration in mobile incinerators
Description	Incineration of the waste in mobile incinerators.
Waste	Liquid Pastes Oiled seaweed and vegetation Solid waste
Situation / Potential in the country	May be easily implemented in any country.
Interest	Complete incineration of the waste.
Entry criteria	Some plastic and metal wastes may cause problems (e.g. sorbent, gloves, complex plastics etc.). Sand, gravel and stones will not be incinerated.
Operational constraints	
Impacts	Incinerators may release carcinogenic and toxic chemicals, including heavy metals, partially-burned organic material such as polyvinyl chloride (PVC), and other organic chemicals, including polycyclic aromatic hydrocarbons (PAHs), dioxins and furans. The concentration of the release depends on the type of waste, of incinerator and the filter installed on the chimney.
Legal constraints	Refer to incineration and atmospheric releases legislation. Special authorisation may be required for such work.
Efficiency	Modern incinerators are efficient and allow treating on site the gas.
Cost	Highly variable depending on the size, capabilities and emission treatment capabilities of the incinerator.

THERMAL TREATMENT	Burning of lightly oiled vegetation (open air)
Description	Burning on site of vegetation (i.e. wood) lightly oiled.
Waste	Lightly oiled plant derived waste
Situation / Potential in the country	
Interest	Permanent elimination of oiled plant derived waste.
Entry criteria	Vegetation must be lightly oiled to avoid atmospheric releases of burnt HC.
Operational constraints	Requires adequate site, and personnel. Burn vegetation away from any sensitive areas, houses, etc. Ensure that fire is controlled.
Impacts	Limited if only vegetation such as wood is burnt.
Legal constraints	Refer to legislation related to burning of vegetation and atmospheric releases (open air burning of waste is often prohibited, but may be tolerated in emergency cases, for remote locations or islands for example). Specific authorisation may be delivered.
Efficiency	Allow reducing the volume of vegetation and wood by 80 to 90%. Ashes may be dispersed in fields.
Cost	CAPEX: none required. OPEX: limited to the operators.

THERMAL	Evapo-incineration

TREATMENT	
Description	This technique combines incineration and physicochemical treatment. It involves thermal cracking, during which the aqueous phase of the oil-water mixture vaporises: • Water evaporates (water in the vapour phase is treated by high temperatures in order to remove the residual organic phase). • An oily condensate forms that can easily be incinerated.
Waste	Liquid waste (Oily water, oil with water)
Situation / Potential in the country	May be implemented in any country.
Interest	Complete elimination of the waste.
Entry criteria	Can manage solid waste and sediment.
Operational constraints	Depends on the type of machine used.
Impacts	Minimal when processes are well managed and monitored regularly.
Legal constraints	Refer to incineration and atmospheric releases legislation. Special authorisation may be required for such work.
Efficiency	High with latest installation.
Cost	CAPEX: very high if no existing installation. OPEX: to define depending on installation.

THERMAL TREATMENT	Pyrolysis
Description	Pyrolysis is a form of incineration that chemically decomposes organic materials in the absence of oxygen. Pyrolysis typically occurs under pressure and at operating temperatures above 430 °C (as opposed to incineration and co-incineration which occur under aerobic conditions). Several types of pyrolysis units are available, including rotary kiln, rotary hearth furnace, and fluidized bed types.
Waste	Pastes and solid Polluted sand
Situation / Potential in the country	There are few installations available (recent technology).
Interest	Organic materials are transformed into gases, small quantities of liquid, and a solid residue containing carbon and ash. These co-products can be re-used (as energy or material).
Entry criteria	The technology requires drying of the soil prior to treatment. Particulate removal equipment is also required.
Operational constraints	Depends on the type of equipment used.
Impacts	Pyrolysis results in the production of solid residues (char), liquid residue (oil/ water) and gases that must be disposed of adequately. Incinerators may release carcinogenic and toxic chemicals, including heavy metals, partially-burned organic material such as polyvinyl chloride (PVC), and other organic chemicals, including polycyclic aromatic hydrocarbons (PAHs), dioxins and furans. The concentration of the release depends on the type of waste, of incinerator and the filter installed on the chimney.
Legal constraints	Refer to incineration and atmospheric releases legislation. Special authorisation may be required for such work.
Efficiency	Pyrolysis is still a recent technology.
Cost	CAPEX: very high if no existing installation. OPEX: to define depending on installation. 75 to 300 Euros / m3 (Source: Koller)

FINAL DISPOSAL	Re-use of oil in refinery
Description	Re-use of oil in refinery.
Waste	Oil (recovered and treated)
Situation / Potential in the country	Depends on the capabilities of the refineries in country.
Interest	Re-use of the oil as fuel.
Entry criteria	Oil must be compliant with the specific criteria of the refinery.
Operational constraints	Requires personnel, transport equipment and oil handling/ transfer equipment.
Impacts	None additional to those of the refinery.
Legal constraints	Depends on local regulations for refining oil.
Efficiency	Complete.
Cost	CAPEX: use of existing refineries. OPEX: limited to the handling of the oil and integration into oil production circuit of the refinery.

FINAL DISPOSAL	Return of clean sediment on site
Description	Return on the beaches of sediments (sand and pebbles) to limit erosion.
Waste	Clean to lightly polluted sand and pebbles
Situation / Potential in the country	
Interest	•Limits coastal erosion. •Diminishes the volume of waste to dispose of.
Entry criteria	Sediment must be clean to be returned on the beaches (however, sediments will continue to be cleaned in exposed areas by the action of the waves, see “surfwashing”). There are no general rules for the return of the sediments on site. Each situation will be considered on a case by case basis by the National Authorities. Example of ERIKA oil spill in France: the threshold was set at 2,500ppm for the cleaned sediments.
Operational constraints	Requires personnel, transport equipment and earth moving equipment.
Impacts	None for clean to very lightly oiled sediments.
Legal constraints	None.
Efficiency	Complete.
Cost	CAPEX: no specific equipment required. OPEX: hire existing equipments and personnel.

FINAL DISPOSAL	Discharge in natural environment
Description	Discharge of water following decantation of washing effluents from operations (washing of solid waste, high pressure cleanup of pebbles, etc.)
Waste	Recovered oil (from decantation) Treated washing effluents (from washing operations)
Situation / Potential in the country	During clean-up operations, it is usually allowable for recovered water from oil and water mixtures is discharged directly in the sea, after decantation in decantation tanks. This discharged water will have very little to insignificant impact compared to the on-going oil spill. During waste treatment, more restrictive threshold values must be in force (as time and equipment should be available to adequately treat effluent): • concentration for sea discharge • daily volume limit for sea discharge.
Interest	Avoids the treatment of lightly to very lightly polluted sea water resulting from clean-up operations.
Entry criteria	HC content of the discharged water must not exceed certain amount – to be validated by the National Authorities.
Operational constraints	Water must not be discharged close to sensitive areas. Check the HC content of the discharged water.
Impacts	None if HC content is low.
Legal constraints	Refer to legislation related to coastal water quality. Specific authorisation may be delivered.
Efficiency	Complete.
Cost	CAPEX: none. OPEX: none (related to the cleaning operations).

FINAL DISPOSAL	Landfilling (controlled containment in specialized cells and/ or landfills)
Description	Storage in landfills or specialized industrial waste storage or specialized cells. Oil spill debris can also be incorporated into an active landfill along with municipal refuse or industrial wastes. Co-disposal with domestic waste may also be considered. Oil can biodegrade slowly with the domestic waste and also remains absorbed by all type of domestic waste, with little tendency to leach out. "*As a general guide, oily waste should be deposited on a top of at least 4m of domestic refuse either in surface strips 0.1m thick or in silt trenches 0.5m deep to allow free drainage of water. The oily material should be covered by a layer of soil followed by a minimum of 2m of domestic waste to facilitate degradation* (...)". Source: IMO. Burial is another landfilling option. Oil spill debris is deposited into pits, trenches or other depressions prepared for debris disposal onsite. The excavated soil is used as intermediate and final cover of the debris.
Waste	Liquid Pastes and solid Polluted sand and pebbles Polluted sorbent Polluted solid waste
Situation / Potential in the country	Landfills are present in all countries. However, only controlled landfills must be considered.
Interest	**In landfills:** •May be suitable for disposal of lightly oiled waste, which is usually mixed with domestic at a 1 to 5 % ratio, to allow biodegradation of the oil. •Most cost effective solution. **In specialized OSW cells** (industrial landfill) •Depends on the type of storage that could be implemented.
Entry criteria	**In landfills:** •Landfills usually have strict and precise entry criteria. They can be adapted by the authorities: e.g. waste with less than 5% oil contamination. •Restriction on acceptance of oil solid waste types. **In specialized OSW cells**. •Depends on the type of storage and national regulation.
Operational constraints	Requires personnel, specific site, transport equipment, weather-proof containers and cover layer, etc.: •subject to stringent long term monitoring; •will not permanently eliminate the waste; •medium-long period for implementation; •potential higher cost for land filling of oil waste compared to normal domestic waste disposal cost.
Impacts	Leachate and biogas must be managed adequately. Limited if safe storage is implemented with a monitoring program (to avoid potential release of toxic compounds). However, landfills do not lessen the toxicity, mobility or volume of waste: they only control migration.
Legal constraints	Requires agreement of the National Authorities.
Efficiency	Complete if safe storage is used.
Cost	In controlled landfills: 75 to 270 Euros / m3 (for French installation, Source: Koller), 100 to 300 Euros/ ton (Source: Bocard)

FINAL DISPOSAL	Re-use as road work material
Description	Re-use of treated material as road fill or construction material.
Waste	Stabilized material
Situation / Potential in the country	No specific requirements.
Interest	Reduces the demand on raw material needed for construction projects if non-hazardous waste can be reused.
Entry criteria	Characteristics of material output to be ascertained.
Operational constraints	Personnel, energy, consumables, place, installation, etc.
	If test reveals hazardous material, then the material cannot be re-used: •Requires pre-processing; •Cost of raw material might be cheaper than cleaning of contaminated sand.
Impacts	Mishandling could result in offsite contamination.
Legal constraints	Refer to legislation regarding the characteristics of construction/ filling material (physical, chemical, geotechnical).
Efficiency	Complete
Cost	None if waste is usable on a “as is” basis.

FINAL DISPOSAL	De-ballasting station
Description	Facilities where oil tankers can berth and unload their washing waters from their tanks. These waters are then treated in the deballasting station by decantation often using API separators allowing skimming of the oil in surface and recovery of the settled sediment before discharging the water.
Waste	Liquid oily water (if not too weathered or emulsified and with no waste or no sediment) Washing effluent (from washing operations)
Situation / Potential in the country	Depends on installations present in the country.
Interest	Allows treating oily wash effluent and/ or oily water in a controlled environment before discharging in the environment.
Entry criteria	Must be liquid waste.
Operational constraints	Limited capacities Recovered oil is routed to oil refineries. Water is discharged after treatment in the environment.
Impacts	Minimal when processes are well managed and monitored regularly.
Legal constraints	Refer to legislation regarding waste management.
Efficiency	High with latest installation.
Cost	CAPEX: high if no existing installation. OPEX: to define depending on installation.

14 EXAMPLES OF USEFUL FORMS

14.1 Scat Form

SHORELINE POLLUTION SURVEY AND CLEAN-UP ASSESSMENT RECORD FORM

The role of the SCAT is to be the "eyes and ears" for the shoreline response / coordination centre and Environment Group. Record, on the form below form or in a field notebook and transfer to the form below, any and all information required to recreate later the character and location of the oil. Define practical segments, based on the physical shoreline character, oiling conditions, or operational units. Be more, rather than less, detailed and do not categorise (i.e., enter the actual value of 15% for Distribution, not >3%). Patchy; enter the value 15 m for Width of Oiled Band, not >3m. Always make a sketch (or draw a map or on a map) to indicate important features and the location of the oil. − If there is no standard term or definition that fits an observed feature, then define and describe the feature. Look around and identify advantages or constraints that might help or hinder the field cleanup crew. Be as clear as you can with respect to information to be used to determine the best processing options (highlighted in green below) for the waste once it has been removed from the shore.

BASIC INFORMATION								**Document Reference**
Shoreline Segment		**Date**		**Time**		**To**		
Surveyor Name		**Organisation**				**Tel No**		
Surveyor Signature						**SRC/LA Briefing:**	**Yes/No**	
Location Grid Reference		**Latitude/Longitude:**						
		State of tide:						
Weather:		**Shoreline Sensitivity**						
State of Sea:		**Shoreline access e.g. on foot only, by car etc.**						
Photographs taken:	If film used:	Roll #		Frames		To		
		Roll #		Frames		To		
If digital camera used		File name references				1		
2		3		4		5		
(indicate location & direction of the photos on a map)								

Surface Oil: (indicate areas on map and allocate identifier – definition of abbreviations below)														
	Area		**Cover/oil distribution**		**Oil Thickness**		**Oil Characteristics**	**Estimated percentage of area necessitating manual removal of waste**	**Estimated percentage of free oil easily recovered**	**Oil Type**	**Tidal Zone**	**Slope**	**Substrate/ shoreline**
	Length (m)	Width (m)	Range	Est (%)	Range	Est (cm)							
A													
B													
C													
D													
E													

Sub-surface Oil: (indicate areas on map and allocate identifier – definition of abbreviations below)									
Pit	**Tidal Zone**	**Oiled Zone Depth**			**Contaminated Material Characteristics**	**% Void Filled**	**Depth of Water Table (cm)**	**Sheen Colour**	**Substrate**
		Pit Depth (cm)	**Top**	**Bottom**					
1									
2									
3									
4									
5									
6									

Is the oil likely to remobilise:		If Yes	Sheen/Bulk (indicate on map)
Is there any floating oil:		If Yes	Sheen/Bulk (indicate on map)
Will next tide movement move oil?	out to sea/on to the shore/unknown		

Samples					
Samples taken:		(indicate sampling position on map)			
Type of sample e.g. water, emulsion, sand, shellfish etc					
Sample Code Reference 1		Time		Type	
Sample Code Reference 2		Time		Type	
Sample Code Reference 3		Time		Type	
Sample code should include site name/date/unique number					

Summary of Oil Present:

Resources/receptors impacted					
Live oiled birds (contact response centre)	If Yes give details here	Dead oiled birds	If Yes give details here		
Live oiled marine mammals (contact response centre)	If Yes give details here	Dead oiled marine mammals		If Yes give details here	
Mass strandings of marine species e.g. Shellfish	If Yes give details here	Boats/Marinas		If Yes give details here	
Public amenity	If Yes give details here	Water intakes	If Yes give details here		
Other: (specify)					

Is the Contingency Plan still appropriate?				
If No, outline the operational and environmental constraints for clean-up.				
Operational:				
Environmental:				
Is clean up required?	If Yes, indicate rationale, technique and resources required.			
Other Information - map/sketch:				
Indicate position of:				
Stranded oil	Strandline	Photo no. and Direction	Floating oil	Sea/shore interface
Include:	**Scale** and the **direction of North** **Substrate types** (sand, shingle, boulder, mud, seawall, pebble, hard cliff, soft cliff, rock) **Prominent features** (Boulders, streams, trees, fences, paths, caves, jetties etc.) **High water** and **low water** marks			

Definitions - Surface Oil

Oil Thickness

PO Pooled (Oil Generally consists of fresh oil or mousse accumulations >1cm thick

CV Cover (0.1cm - 1cm)

CT Coat (0.01cm - 0.1cm) - Can be scratched off with fingernail on coarse sediments/bedrock

ST Stain (<0.01cm thick) - cannot be scratched off easily on coarse sediments/bedrock

FL Film (transparent/translucent film or sheen)

Oil Characteristics

FR Fresh

SR Surface Oil Residue (non cohesive, oiled surface sediments

MS Mousse (emulsified oil and water)

AP Asphalt Pavement (cohesive mixture of oil and sediments)

TB Tar Balls (dia. = <0.1m) or Mousse Patties (dia. 0.1 - 1.0 m)

TC Tar (weathered coat/cover of tar)

DB debris.

NO No Oil

Tidal Zone

S Splash zone; U Upper shore, M Mid shore, L Lower shore.

Slope

V Vertical (>90o); VS Very Steep (61 - 90o); Steep (31 - 60o); M Moderate (5-30o); F Flat (<5º)

Substrate

Sand-mixed sediment - Beaches composed of sand or a combination of sand, granules, pebbles and cobbles.

Coarse Sediment beach - A beach where the clearly dominant material is pebbles and/or cobbles. Pebbles grain size diameter 4 - 64mm & cobbles 64 - 256mm.

Cobble/Boulder - A beach where the clearly dominant material is cobbles (64 - 265mm) and/or boulders (>256mm).

Bedrock or Solid (includes ice) - Bedrock shorelines are impermeable outcrops of consolidated native rock.

Wetland - Vegetation - A coastal zone that is covered at least once a month at high tide and which supports >15% cover of salt-tolerant plants e.g. grasses, reeds, rushes & sedges.

Oil Type	Oiled Debris - Scattered organic or inorganic materials that have washed up onto the shore. Snow - A shoreline composed of seasonal snow that covers the underlying substrate. Volatile - Gasoline products - viscosity like water Light - Diesel & light crudes - viscosity like water Moderate - Intermediate products and medium crudes Heavy - Residual products and heavy crudes - viscosity like molasses Solid - Bitumen, tar, asphalt - does not pour

% Cover - visual aid

Definitions - Sub-surface Oil

Tidal Zone	See definitions for surface oil
Characteristics	AP Asphalt Pavement (cohesive mixture of weathered oil & sediment below the surface) OP Oil-filled pores (pore spaces between the sediments are completely filled) PP Partially filled pores (pore spaces filled with oil but no visible oil flow if disturbed) OR/C Cover (>0.1 - 1 cm) or Coat (0.01 - <0.1cm) of oil residue. (Easily removed with fingernail) OR/S Stain (<0.01 cm). (Can not be easily removed by fingernail) TR Trace. (Discontinuous film of oil on sediments or an odour/tackiness without visible oil) NO No Oil.
Sheen	S Silver sheen, R Rainbow sheen, B Brown sheen
Substrate	See definitions for surface

14.2 Temporary Waste Storage Location Information Sheet 1

TEMPORARY WASTE STORAGE LOCATION INFORMATION SHEET			
The storage location information sheet is used to compile information concerning the waste which can be stored at a temporary waste storage site. The sheet should be completed in its entirety in as much detail as possible as each question provides valuable information to ensure the best form of treatment is selected for the waste.			
SITE DETAILS			
Site Name		Site Reference	
Address		Postcode	
		Grid Reference	
Site Contact		Landline	
Mobile		Email	
Site Emergency Contact		Fax	
Details of the 'catchment area' which the storage site would cover (receive waste from):			
SITE ACCESS			
Is there road access to the site e.g. for cars, lorries etc?	yes / no	If yes, what is the maximum size the road vehicle can be to gain access by road and how close is the road to the site?	
Is there rail access to the site e.g. for trains, freights etc?	yes / no	If yes, what is the maximum tonnage of the rail vehicle and how close are the tracks to the site?	
Is there port access to the site e.g. for boats, ships etc?	yes / no	If yes, what is the maximum size the floating vessel can be to gain access via the port and how close is the port to the site?	
By inland waterway access to the site e.g. for boats, ships etc?	yes / no	If yes, what is the maximum size the floating vessel can be to gain access by inland waterway and how close is the waterway to the site?	

Are there multiple Entrances?	yes / no	If yes, which should be used?

Is key fob/keypad access used?	yes / no	If yes, is there emergency access (e.g. via security guard, site contact)?
Is there a barrier and/or height restriction?	yes / no	If yes, what is the maximum height and/or width for a vehicle to access the site?
Is 24 hour access to the site required and/or permitted?	yes / no	If yes, by whom, on what basis, etc.
Can local access roads/routes be used by large vehicles, including roads between local access to the site and main trunk roads? Are there any other vehicle restrictions?		

WASTE HANDLING AT THE SITE		
What is the approximate size of the site? (m^2)		What is the maximum height at which the waste can be stored? (m)
How much could be used for storage? (m^2)		What is the maximum height at which the waste can be stored? (m)
Is there any type of waste which the site could not store?	yes / no	If yes, please provide details
Could waste stored on the site migrate off site (e.g. via wind, leaching, rainwater run-off etc.)		If yes, please provide details
If yes, what measures could be used to prevent migration of waste (e.g. bunding, fencing etc.)		If yes, please provide details
Is there a water supply on site?		If yes, please provide details

Is there a power supply on site?	If yes, please provide details

Is there space on site to allow for segregation of the waste?	If yes, please provide details
Are there any sensitive receptors (e.g. to noise, smell) nearby (e.g. housing, school)?	If yes, please provide details
Will the site be completely rehabilitated after the waste has been completely removed?	If no, please provide details and reasons
Name & Reference of nearest intermediate storage facility if known	
GENERAL INFORMATION	
What is the site normally used as/for?	
Can the normal site use/activity be stopped whilst the site is used for storage?	If yes, how long for (approx)?
	If no, how much of the site (m^3) can be used for storage whilst normal operations continue?
Describe the availability of the site to be used as a waste storage site on the following scale	
(1 - available 24-7) (2 - Available, causing no/little interference with normal site usage) (3 - Available, causing manageable disruption to site) (4 - Available, but would cause significant disruption) (5 - Available only in case of emergency)	
Is there a weighbridge?	yes / no

14.3 Temporary Waste Storage Location Information Sheet 2 - Part 1

TEMPORARY WASTE STORAGE LOCATION INFORMATION SHEET					
The storage location information sheet and accompanying waste classification sheet are used to compile information concerning the waste stored at a temporary waste storage site. The 2 sheets should be completed in their entirety in as much detail as possible as each question provides valuable information to ensure the best form of treatment is selected for the waste.					
SITE DETAILS					
Site Name			Site Reference		
Address			Postcode		
			Grid Reference		
Site Contact			Landline		
Mobile			Email		
Site Emergency Contact		Fax			
Details of the 'catchment area' which the storage site has received waste from:					
SITE ACCESS					
Is there road access to the site e.g. for cars, lorries etc?	yes / no	If yes, what is the maximum size the road vehicle can be to gain access by road and how close is the road to the site?			
Is there rail access to the site e.g. for trains, freights etc?	yes / no	If yes, what is the maximum tonnage of the rail vehicle and how close are the tracks to the site?			
Is there port access to the site e.g. for boats, ships etc?	yes / no	If yes, what is the maximum size the floating vessel can be to gain access via the port and how close is the port to the site?			
By inland waterway access to the site e.g. for boats, ships etc?	yes / no	If yes, what is the maximum size the floating vessel can be to gain access by inland waterway and how close is the waterway to the site?			

Are there multiple Entrances?	yes / no	If yes, which should be used?
Is key fob/keypad access used?	yes / no	If yes, is there emergency access (e.g. via security guard, site contact)?
Is there a barrier and/or height restriction?	yes / no	If yes, what is the maximum height and/or width for a vehicle to access the site?
Is 24 hour access to the site permitted?	yes / no	If yes, by whom, on what basis, etc.
Can local access roads/routes be used by large vehicles, including roads between local access to the site and main trunk roads? Are there any other vehicle restrictions?		

WASTE HANDLING AT THE SITE		
How much liquid waste is currently being stored on the site? (m^3)		How much more liquid waste could be stored on site? (m^3)
How much solid waste is currently being stored on the site? (m^3)		How much more solid waste could be stored on site? (m^3)
Is there any type of waste which the site could not store?	yes / no	If yes, please provide details
Is/could waste stored on the site migrate off site (e.g. via wind, leaching, rainwater run-off etc.)	If yes, please provide details	
If yes, what measures are/could be used to prevent migration of waste (e.g. bunding, fencing etc.)		
How long can the waste be stored on site for?		

Is there a water supply on site?	If yes, please provide details
Is there a power supply on site?	If yes, please provide details
Is there space on site to allow for further segregation of the waste?	If yes, please provide details
Is there any form of treatment currently being carried out on the on site waste?	If yes, please provide details
Are there any sensitive receptors (e.g. to noise, smell) nearby (e.g. housing, school)?	If yes, please provide details
Will the site be completely rehabilitated after the waste has been completely removed?	If no, please provide details
Name & Reference of nearest intermediate storage facility, if known	

14.4 Temporary Waste Storage Location Information Sheet 2 - Part 2

WASTE CLASSIFICATION AND VOLUME											
This table is used to classify the oily waste at the temporary storage site and provides an estimate of the volumes of each classification of oily waste present. This sheet should be completed in addition to the Temporary Waste Storage Location Information Sheet.		OIL TYPE									
		Volatile - Gasoline products - Viscosity like water		**Light** - Diesel & light crudes - Viscosity like water		**Moderate** - Intermediate products & medium crudes		**Heavy** - Residual products & heavy crudes - Viscosity like molasses		**Solid** - Bitumen, tar, asphalt - Does not pour	
		Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil
TYPE OF OILY WASTE	Oil										
	Oil/Water										
	Oil/Water Emulsion										
	Sand - mixed sediment - sand or a combination of sand, granules, pebbles and cobbles.										

WASTE CLASSIFICATION AND VOLUME											
This table is used to classify the oily waste at the temporary storage site and provides an estimate of the volumes of each classification of oily waste present. This sheet should be completed in addition to the Temporary Waste Storage Location Information Sheet.		**OIL TYPE**									
		Volatile - Gasoline products - Viscosity like water		**Light** - Diesel & light crudes - Viscosity like water		**Moderate** - Intermediate products & medium crudes		**Heavy** - Residual products & heavy crudes - Viscosity like molasses		**Solid** - Bitumen, tar, asphalt - Does not pour	
		Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil
TYPE OF OILY WASTE	Coarse Sediment - the clearly dominant material is pebbles and/or cobbles. Pebbles grain size diameter 4 - 64mm & cobbles 64 - 256mm.										
	Cobble/Boulder - the clearly dominant material is cobbles (64 - 265mm) and/or boulders (>256mm).										
TYPE OF OILY WASTE	Oiled Debris - Scattered organic or inorganic materials e.g. fish, birds, plants, cans, plastic bottles etc.										

WASTE CLASSIFICATION AND VOLUME											
This table is used to classify the oily waste at the temporary storage site and provides an estimate of the volumes of each classification of oily waste present. This sheet should be completed in addition to the Temporary Waste Storage Location Information Sheet.		**OIL TYPE**									
		Volatile - Gasoline products - Viscosity like water		**Light** - Diesel & light crudes - Viscosity like water		**Moderate** - Intermediate products & medium crudes		**Heavy** - Residual products & heavy crudes - Viscosity like molasses		**Solid** - Bitumen, tar, asphalt - Does not pour	
		Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil	Volume of oil or oiled waste (m^3)	% of waste contaminated with oil
	PPE and construction material used in the manual clean up of the oil spill.										

14.5 Oily Waste Processing Equipment Enquiry Form

Enquiry for Oily Waste Processing Equipment		
We have a requirement for equipment to treat EWC Code	INSERT DESCRIPTION OF WASTE INSERT IF KNOWN	with the following detailed characteristics:
Oil characteristics	Gasoline products – viscosity like water	
	Diesel/ light crudes – viscosity like water	
	Intermediate products and medium crudes-viscosity around twice that of water	
	Residual products and heavy crudes – viscosity like molasses	
	Bitumen, tar, asphalt – does not pour	
Solids Characteristics	N/A: Oil with no substantial water or solids content	
	N/A:Oil + Water mix (including emulsions)no substantial solids content	
	Mineral : sand (< 4mm) or a combination of sand, pebbles and cobbles.	
	Mineral: predominantly pebbles (4-64 mm) and/or cobbles (64-256 mm range)	
	Mineral: predominantly cobbles (64-256 mm) and boulders (greater than 256 mm)	
	Predominantly organic debris (Plant and animal origin)	
	Predominantly PPE/equipment	
Water characteristics	N/A: Water not present	
	Fresh	
	Brackish	
	Salt	
Degree of Contamination	Very light	
	Light	
	Moderate	
	Heavy	
	N/A: Oil with no substantial water or solids content	
Urgency of Enquiry	URGENT-please reply within 24h of receipt if you wish your tender to be considered	
	Please reply within one week of receipt if you wish your tender to be considered	
	Please reply within two weeks of receipt if you wish your tender to be considered	
Waste Quantity	<250 t	
	250 - 1000 t	
	1000 - 5000 t	
	5000 - 10000 t	
	>10000 t	
Please advise as a minimum your best availability and price for equipment, as well as		

technical characteristics as listed below

Temporary Plant

Rate of processing (as a function of waste characteristics if appropriate)
Physical limitations (eg max particle size, max oil content, oil viscosity etc)
Pre-treatment requirements
Residual contamination post processing
Waste streams generated
Area needed
Transport and access requirements
Enabling facilities needed
Power requirements
Water requirements as feed and waste streams
Chemicals/solvents required
Waste management considerations
Time to mobilise to full operation
Existence of Mobile Plant Permit?
Cost
Impact - noise, odour etc
Other Technical Considerations

Fixed Plant

Storage Capacity
Current Availability
Rate of processing (as a function of waste characteristics if appropriate)
Physical limitations (eg max particle size, max oil content, oil viscosity etc)
Pre-treatment requirements
Residual contamination post processing
Waste streams generated
Area needed
Transport and access requirements
Power requirements
Water requirements as feed and waste streams
Chemicals/solvents required
Waste management considerations
Cost
Impact - noise, odour etc
Other Technical Considerations

Please distinguish in your offer between fixed and mobile plant. Where both are offered, please list information separately above
Please attach technical brochures for offered equipment along with your reply.

14.6 Template for Fixed Facility Data

UK Fixed Treatment Facility Datasheet

Facility Name:xxxxxxxxxxxxx

This data sheet is used to identify and categorise assess each waste treatment facility. If more than one process is installed at one location, please provide details for each process on separate sheets.

Facility Name:	
Company:	
Process:	
	Information on the facility/ entity
Specify:	•Name and location(s) of the facility(ies) (if possible please provide Nat Grid reference or postcode) •Contact information o Name(s), telephone numbers, addresses and email addresses •Brief description of installation o Please describe broad nature of process(es) employed o Please list main items of equipment installed (where appropriate)
	Waste processing and acceptance criteria
Specify:	•Type of waste managed / treated •Analytical facilities available? •Acceptance criteria o Percent solids? o Percent liquids? o Maximum solid particle size? o Maximum oil contamination level that can be treated? o Upper viscosity limit of oil spill waste that can be accepted? o Facility to handle volatile materials? o Maximum degree of water contamination (for two-phase oil/water mixtures and also water-in-oil emulsions) of recovered oil that can be accepted o Any other restrictions on the composition of recovered oil that can be accepted (e.g. contamination by dispersants, surfactants or demulsifiers, salt, sulphur etc). o Specify pre-treatment required (if any). •Pre-treatment capability (please specify if facility has the option of being able to undertake any pre-treatment which may be required to render unacceptable materials acceptable)? •Treatment rate (tons of waste per hour/day/ month/ year)? •Batch or continuous operation? •Average utilisation (%)?
Rank:	+ Little variety of waste manageable to + + + Wide variety of waste manageable
	Logistics/ Operational requirements & constraints
Specify:	•Reception facilities: o By sea? Max size of vessel? Daily reception capacity? o By road? Max size of vehicle? Daily reception capacity? o By train? Daily reception capacity?

	○ By inland waterway? Daily reception capacity? •Storage capacity (total, typically available)? •Energy, water and other input required (nature and typical quantity required per ton treated) •Other constraint?
	Potential environmental impacts
Specify:	•Noise •Atmospheric releases (after on site treatment)? •Solid waste (hazardous?) •Leachate or liquid effluents produced (after on site treatment)? Discharge consent in place? •Highways/transport? •Others
Rank:	**x** Little impact to **x x x** Potentially severe impact
	Material Produced after Treatment
	•Nature of material produced from the waste? •Oil ○ Is it acceptable for general/commercial use? ○ Is there an existing outlet for product? Is this fixed in volume/capacity terms? ○ Please specify possible uses not currently being employed as outlets ○ Could it be further treated to render it acceptable? •Solids ○ Is it acceptable for general/commercial use? ○ Is there an existing outlet for product(s)? Please specify. Are these fixed in volume/capacity terms? ○ Please specify possible uses not currently being employed as outlets ○ Could it be further treated to render it acceptable? ○ Could it be landfilled with no further treatment?
	Legal constraints
Specify:	•Is facility currently permitted? If yes, please provide details. •If no, what is the basis of operational regulation?
Rank:	**x** No regulatory constraints **x x x** Significant regulatory barriers
	Cost
Specify:	•Cost per tonne treated •Cost per tonne stored (if required)
Rank:	**x** Low cost to **x x x** Highly expensive