Total Exploration and Production Liban Sal

Block 4 (Lebanon) offshore exploration drilling

Environmental and Social Management Plans – Volume 2A

80754

February 2020

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RSK GENERAL NOTES

Project No.: 80754

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CONTENTS

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INTRODUCTION

This document (Volume 2A) contains TEP Liban's Environmental and Social Management Plans, as follows:

- Waste Management Plan
- Chemicals Management Plan
- Pollution Prevention and Environmental Monitoring Plan
- Social Management Plan
- Oil Spill Contingency Plan

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TEP Liban's Management Plans

Waste Management Plan

Chemical Management Plan

Pollution Prevention and Environmental Monitoring Plan

Social Management Plan

Oil Spill Contingency Plan

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WASTE MANAGEMENT PLAN

	Name	Position	Date	Signature
Prepared by		HSEQ Engineer	09-Jan-2020	
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Verified by		Operations Manager		
Approved by		General Manager		

Revision	Date	Prepared by	Verified by	Verified by	Approved by
1	6-Feb-2020				

Métier: HSEQ	**Entity: Exploration & Production**

Table of Contents:

1 - OBJECTIVES

This Waste Management Plan (WMP) describes the methodology adopted by Company (TEP Liban) to implement best practices regarding the management of waste generated as a result of exploration drilling activities being conducted by Company in Lebanon offshore Block 4. This plan has been prepared taking into consideration findings of the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment, Lebanese legislation and regulations, applicable international conventions, and TOTAL's corporate requirements.

The purpose of the WMP is to safeguard the health of personnel whose work may require them to handle waste (or be exposed to waste), to protect the public, and to preserve the environment around the MODU and the support sites and facilities.

The WMP is a key component of TEP Liban's Health, Safety and Environmental Management System (HSE MS).

TEP Liban employees and Contractors are required to abide by the requirements in this WMP.

Note: This plan provides guidance to TEP Liban Contractors in waste management. Contractors' waste management procedures shall align with this WMP.

2 - SCOPE

The WMP brings together the waste management mitigation commitments in the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment (EIA) to either provide greater detail about how the commitment will be implemented or provide reference to the document where that detail is found.

To facilitate tracking of mitigation from the EIA commitments register (Appendix 8 of EIA) to this management plan the unique identifier (UID) from the commitments register is provided as appropriate. For example: A Waste Management Plan will be developed by TEP Liban and implemented by its contractors (**UID WM-15**).

The WMP applies to all exploration activities in Block 4, as well as support activities associated with the Project implementation. It is applicable to offshore and onshore, including the MODU, logistics base and support / supply vessels operating on behalf of the Project.

TEP Liban has following sites for this exploration campaign:

- Offshore - Vantage Tungsten Explorer (TUX) MODU that will drill the Block 4-1 exploration well
- Onshore - Fast Bolloré Logistics Base, Port of Beirut, including Liquid Mud and Cement Plant

This WMP will be updated as necessary to adapt to regulatory updates or changes in TOTAL corporate requirements, or if there is a significant change in TEP Liban operations. For any future exploration / appraisal drilling in Block 4 (subsequent to well B4-1) an updated version of this plan will be prepared to account for any differing contractors and processes.

3 - DEFINITIONS & ACRONYMS

3.1 - Definitions

Domestic Waste:	Also known as residential waste. Means any non-hazardous disposable materials generated from personal use such as food scraps, paper, bottles, etc…
Hazardous Waste:	Any waste, regardless of its industrial or economic origin, that has one or more properties likely to render it harmful. This kind of waste produced by industrial or economic activity may present a physico-chemical risk (such as flammability, explosivity, corrosiveness, etc.) and/or a risk to health and/or the environment. It is processed and transported via suitable means.
Industrial Waste (Non-Hazardous)	Non-hazardous industrial waste is waste generated during industrial processes or activities.
Inert Waste:	Waste which is not subject to any significant physical, chemical or biological transformation, shall not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact, in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the eco-toxicity of the leachate must be insignificant.
Liquid Mud Plant	The “Liquid Mud Plant” commonly includes the Liquid Mud Plant for mixing drilling fluids and the Cement Bulk Plant (CBP) for mixing cement, since they are usually contracted to the same contractor. As such, in the EIA, both plants are combined under “Liquid Mud Plant”. However, during selection of contractors, two separate contractors were selected for drilling fluids (LMP) and cementing (CBP).
Non-Hazardous Waste:	Either **inert waste**: any waste that cannot undergo any significant physical, chemical or biological transformation; which does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health.

	Or **other waste**: any waste, regardless of its industrial or economic origin, presenting no properties likely to render it harmful. Examples: paper, cardboard, glass, unsoiled plastic (films, scraps, clean jugs and containers), metals (non-toxic ferrous and non-ferrous). For practical reasons, Non-Hazardous Waste generated on the logistics base will be categorized into Domestic Waste and Industrial Waste.
NORM:	Naturally Occurring Radioactive Material designates substances which, although they contain naturally radioactive elements, are not utilized for their radioactive properties. We also use the term TENORM or Technologically Enhanced NORM to designate more specifically NORM that have been concentrated by industrial activities.
Recovery:	All waste management operations, such as recycling or regeneration, whose chief result is the use of the waste to replace other substances, materials or products.
Recycling:	Waste treatment process by which manufacturing residues or materials from a former product, now at the end of its life, can be reintroduced into the production cycle of a new, similar item.
Re-use:	The action of re-using a product, substance or material for its initial purpose, without transforming its state.
Ship-Generated Waste	All waste, including sewage, and residues other than cargo residues, which are generated during the service of a ship and fall under the scope of Annexes I, IV and V MARPOL 73/78 and cargo-associated waste as defined in the Guidelines for implementation of Annex V to MARPOL 73/78
Site operator:	Any natural or legal person who operates a site on which waste is produced or held. As such, the Site Operator is necessarily a waste producer and/or holder.
Treatment:	Any operation that precedes the recovery or disposal. Examples:

- Inert waste treatment: re-use or storage on a suitable site;
- Treatment of non-hazardous waste whether it is of industrial or economic origin: a significant proportion can be recovered after segregation;

Hazardous waste treatment: thermal or biological processes for organic waste; physical and chemical processes to promote recycling; reduction of volumes prior to disposal (centrifugal dewatering / decanting); suitable specialized streams, etc.

Waste: Any substance, material or product that the holder is disposing of or intends/is obliged to dispose of (in the sense of "get rid of").

Waste holder: Any natural or legal person in possession of waste. The status of waste holder extends to the waste producer.

WEEE: Waste electrical and electronic equipment.

3.2 - Acronyms

CBP	Cement Bulk Plant
EIA	Environmental Impact Assessment
HSE	Health, Safety and Environment
IMDG	International Maritime Dangerous Goods
KPI	Key Performance Indicator
LMP	Liquid Mud Plant
MARPOL	International Convention for the Prevention of Pollution from Ships
MODU	Mobile Offshore Drilling Unit
MSDS	Material Safety Data Sheet
NABDF	Non-Aqueous Based Drilling Fluid
NORM	Naturally occurring radioactive materials
PCB	Poly Chlorinated Biphenyl
PPE	Personal Protective Equipment
PSV	Platform Supply Vessel
REX	Return of Experience
ROO	Register of Observations
RSES	Responsible for Safety & Environment on Site
RSO	Radiation Safety Officer
TUX	Tungsten Explorer (drilling rig)
WBDF	Water Based Drilling Fluid
WMP	Waste Management Plan
WTN	Waste Transfer Note

4 - RELATED DOCUMENTS

4.1 - Internal Documents

Reference	Title
0-PO-HSEQ-001	HSE Policy TEP Liban
1-MA-HSEQ-001	HSE-MS TEP Liban
2-PL-HSEQ-002	Chemical Management Plan
2-PL-HSEQ-006	Pollution Prevention and Environment Monitoring Plan
1-PL-HSEQ-003	Affiliate Emergency Response Plan
RSK/H/P80754/04/01 Block 4 rev1	Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment

4.2 - Contractor Documents

Reference	Title
TEPL-BLX-LBN-HSE-PRO-0003	FAST BOLLORE Waste Management Procedure
BHOS-FES-WMP-TEPL	Baker Hughes Waste Management Plan
LEB-WMP-V1	Schlumberger Waste Management Plan
HSE-GN-012	Vantage Waste Management Plan

4.3 - Total Group Documents

Reference	Title
CH GR HSE 001	Safety Health Environment Quality Charter
GS EP ENV 001	Environmental requirements for projects design and E&P activities

4.4 - Regulatory Requirements

Ref No.	Title
National Requirements	
Law No. 80/2018	Integrated Solid Waste Management
Decree No. 5606/2019	Determination of the Fundamentals of Hazardous Waste Management
Decree No. 5605/2019	Sorting of Solid Waste from Source
Law No. 64/1988	Preservation of the environment against pollution from dangerous waste and hazardous substances
Decree 10289/2013	Petroleum Activities Regulations (PAR)
Decision No. 1294/1 of 2017	Environmental conditions for transport of healthcare wastes

Circular No. 7/1	Ministry of Environment: Guidelines Concerning the Integrated Management of Domestic Solid Waste
International Conventions applied in the area	
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships (ratified by Law 13/1983)
Basel Convention	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989 (Ratified by Law 387/1994)
Barcelona Convention	Barcelona Convention (Convention on the Protection of the Marine Environment and the Coastal Region of the Mediterranean) 1976 amended 1995 (ratified by Decree 126/1977)
Rotterdam Convention	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (ratified by Law 728/2006)
Montreal Protocol	Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 (ratified by Decree 3277/2016 and 2604/2009)
Stockholm Convention	Stockholm Convention on Persistent Organic Pollutants (POPs) 2001 (ratified by Law 432/2002)
IMDG	International Maritime Dangerous Goods Code

5 - WASTE MANAGEMENT PLANNING

5.1 - Waste Management Hierarchy

TEP Liban promotes minimization of waste production and encourages recycling and recovery of waste to reduce environmental and social impacts. The waste hierarchy in Figure 5.1 presents the steps that have to be prioritized while managing waste.

In the waste transportation phase, distances covered for the purposes of equivalent processing are kept to a minimum.

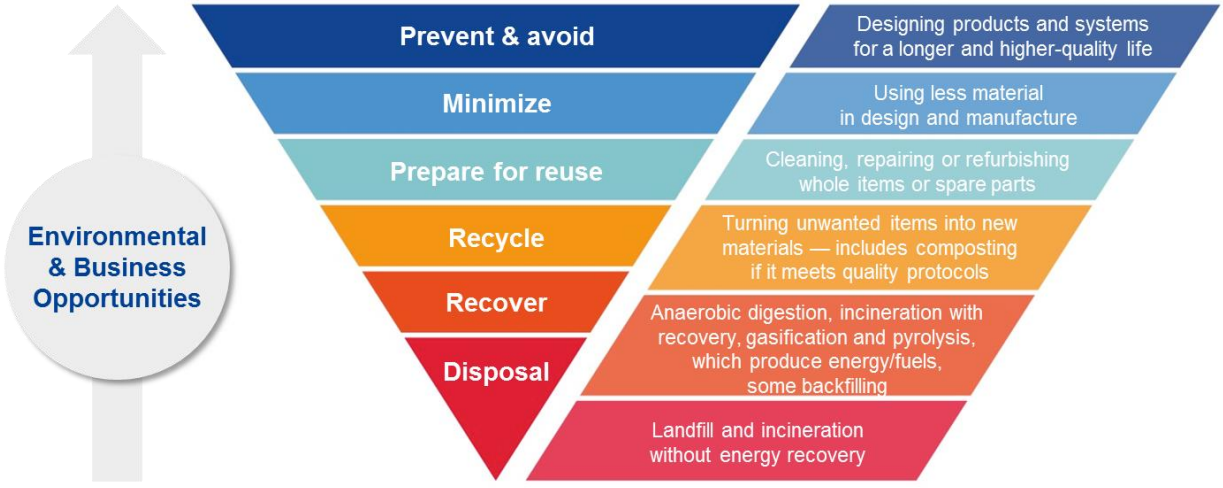


Figure 5.1 - Waste management hierarchy and examples

5.2 - Waste Management Contracts and Waste Streams

TEP Liban's waste contractors and key details are listed in Table 5.1 below:

Table 5.1 - Waste Management Contractors details

Waste Generator	Company	Waste Type	Waste Site	Managed By	Internal Contract Owner
Rig contractor	Vantage	**Non-Hazardous**	Rig	Fast Bolloré	Logistics Manager
Fluids contractor	Baker Hughes		Rig/Log Base	Baker Hughes*	Fluids Superintendent
Cementing contractor	Schlumberger		Rig/Log Base	Schlumberger*	Fluids Superintendent
Logistics base contractor	Fast Bolloré		Log Base	Fast Bolloré	Logistics Manager
PSV contractor	Vroon / Tidewater		PSV	PSV's Agent	Logistics Manager
Rig contractor	Vantage	**Hazardous**	Rig	Vantage	Rig Superintendent
Fluids contractor	Baker Hughes		Rig / log base	Baker Hughes	Fluids Superintendent
Cementing contractor	Schlumberger		Rig / log base	Schlumberger	Fluids Superintendent
Logistics base contractor	Fast Bolloré		Log base	Fast Bolloré	Logistics Manager
PSV contractor	Vroon / Tidewater		PSV	PSV's Agent	Logistics Manager
Operator	TEP Liban	**NADF drilling cuttings**	Rig	Baker Hughes	Fluids Superintendent
Operator	TEP Liban	**Drilling Slops**	Rig	Baker Hughes	Fluids Superintendent
Rig Contractor	Vantage	**Rig Bilge Water**	Rig	Vantage	Rig Superintendent
PSV contractor	Vroon / Tidewater	**Slop water (liquid waste from tanks)**	PSV	Vroon / Tidewater	Logistics Manager

*This includes non-hazardous industrial waste (such as chemical packaging, etc…) but not domestic waste which is managed by Logistics Base Contractor, FAST BOLLORE.

Details of each waste stream will be provided in the waste management plans of respective Contractors referenced in the Table 5.1.

6 - WASTE IDENTIFICATION, SEGREGATION, STORAGE, TRANSPORT AND TREATMENT

6.1 - Waste Identification and Classification

Waste will be identified, inventoried and classified into hazardous and non-hazardous waste, then further into sub groups, in order to facilitate appropriate collection, segregation, storage processing and treatment. Sorting of solid waste will be compliant with applicable national regulations in force (**WM-19**).

The list of hazardous waste (as specified in Annex V of Decree No.5606/2019) will be referred to in order to comply with national requirements.

A list of the waste types from all sites as listed in the EIA is presented below:

Table 5.2 - Waste Types

Waste
Non-Hazardous
Metal
Paper/cardboard (packaging)
Absorbents, filters, rags, uncontaminated PPE
Plastic
Plastic Packaging
Wood packaging
Glass
Edible oil and grease
Alkaline batteries (without mercury)
Ink cartridges without hazardous substances
Hazardous
Fluids for machines and gears and lubrication
Absorbents, filters, rags, contaminated PPE
Packaging contaminated by dangerous goods
Lead batteries
Nickel-cadmium batteries
Fluorescent tubes and other wastes containing mercury
Medical waste
Electric and electronic waste
Chemical wastes (including dry wastes from vessel tank cleaning)
Printing cartridges with hazardous substances
Slops

6.2 - Waste Segregation, Storage and Handling

Waste will be segregated at source on site by the generator and coded according to the appropriate waste coding (if applicable) (UID WM-10).

This is mandatory for several reasons:

- Waste that is not correctly segregated then cannot be collected and treated properly;
- Proper waste segregation management improves recyclables recovery rate;
- Incompatible wastes cannot be stored together in order to prevent safety hazards.

Due to the varying types of waste generated on each site and space constraints, the type of waste that can be segregated may differ. In general provisions are made to segregate the following waste streams:

- Non-Hazardous inert waste stream - landfill classified;
- Non-Hazardous Recyclable waste streams – aluminum, steel, plastic, cardboard, paper, glass and wood;
- Hazardous waste streams – waste oils, oily rags, paint/thinner, used batteries without mercury, medical waste, electrical and electronic equipment waste (WEEE), empty hazardous chemical containers and hazardous class's 3, 4.3, 5.1, 8 and 9 as per IMDG regulations on DG.

There may be several types of waste receptacles available for segregation and transportation of wastes including: skips, cargo containers, drums, clinical waste bins and recycling bins.

Segregated waste is collected in containers/receptacles suited for the waste classification. Containers/receptacles are:

- Clearly identified by color codes and labelled corresponding to their classification and the selected mode(s) of transportation;
- Designed to withstand damage and bad weather, and to prevent unpleasant odors;
- Placed close to the work sites, in sufficient amounts and size to avoid waste overspill and reduce the need for frequent pickup;
- Leak-proof, and made from materials which have a low flammability;
- Waste receptacles will be designed to prevent release of wind born waste (**UID WM-11**);
- Standing stable on the ground, easy to handle, without danger for users;

For hazardous waste, containers will have to be chemically resistant to the contained product and may be sealed to reduce risks (**UID WM-12**). The compatibility of waste streams will be considered when segregating and storing wastes (**UID WM-16**). Hazardous substances are separated or segregated according to their hazard classification (see Appendix 1 for compatibility matrix) and considering other requirements (e.g. IMDG - International Maritime Dangerous Good Code).

In accordance with industry best practice black plastic bags should be avoided for waste segregation. Clear plastic degradable/biodegradable/standard bags are recommended to be used instead.

Waste storage areas will be located with respect to minimizing/eliminating: safety, security; hygiene and environmental risks (e.g. mobilization of dust/particles; runoff; leachate; odor; visual impact).

The location of waste receptacles and types of waste permitted in each container/bin on each site will be indicated on the site location/deck plans and in the site induction booklets (an example is provided in Appendix 9 for the MODU Tungsten Explorer, the location of the waste area at the logistics base is provided in Appendix 10).

The quantity and duration of waste temporary storage will be kept to the minimum. It should be noted that the logistics base is not a permanent storage area and is used as will only have a temporary ("in-transit") waste storage area.

Waste which will be treated in Lebanon will be handled by a facility listed by the MoE. Hazardous waste on the MODU which will be exported, will be transported directly from the MODU to avoid storage of hazardous waste at the logistics base. The equipment mobilized in order to collect, store and transport waste, and the associated lifting apparatus, will be detailed in each contractor's waste management plan.

Suitable Personal Protective Equipment (PPE) will be provided to personnel in charge of waste management if needed.

At the logistics base, the hazardous waste storage area will be designed as follows: Storage on an impervious surface connected to a drainage and collection system and/or in a bunded area; Storage area equipped with suitable fire-fighting equipment and spillage recovery equipment; Restricted/controlled area and access to the storage site (**UID PL-1**).Wastes will be stored in areas of the logistics base that minimize the risk of accidental loss of confinement or leaching (bunded areas). All effluents from waste storage areas will be collected and disposed of appropriately (**UID PP-37**).

6.3 - Waste Transportation

Waste will be transported using the following means:

- For maritime transport, all PSV's will be certified and authorized according to IMO and IMDG standards and requirements, for sea transport of dangerous goods, including drilling waste.

Waste transported shall be labeled and packaged appropriately for its type and in compliance with the regulations in force. Waste transportation takes place in conditions that preserve safety and the environment, particularly when hazardous products are being loaded/unloaded.

6.4 - Waste Treatment and Disposal

Discharge to sea

Liquid discharges from MODU and PSVs, like sanitary water, slop water and bilge water are considered in the Pollution Preventions and Monitoring Plan:

- Slop water will be treated onboard the MODU in a slop treatment unit. The separated drilling fluids and slops exceeding 15 ppm in oil in water content will be sent to shore for treatment / disposal (UID PP-8).

- Bilge water will be treated and discharged, with discharge automatically stopped if effluent exceeds 15 ppm of oil (special area requirements for Mediterranean Sea, ships of >400 gross tonnage) (UID PP-7). If necessary, sludge resulting from treatment will be transported to shore and treated as per appropriate regulations by a contractor approved by competent authorities.
- Discharge of any food waste from the MODU and support/supply vessels will only be carried out more than 12 nm from the nearest land and all food waste will macerated in order to pass through a 25 mm mesh before discharge, in line with MARPOL 73/78 Annex V (Mediterranean Sea 'special area' requirement) (UID WM-7). Any discharges of food waste into the sea will be recorded in the Garbage Record Book of the MODU (MARPOL Annex V) (UID WM-8). With respect to drill cuttings and fluids from well B4-1, water-based cuttings and drill fluids from the riserless well sections will be discharged to sea. Non-aqueous drilling fluids (NADFs) will be used for the lower whole sections of the well and

cuttings from these well sections will not be discharged to the marine environment, they will be contained and shipped to shore for treatment and disposal (see Section 6.6).

Onboard incineration

For well B4-1 there will be no onboard incinerator on the Tungsten Vantage MODU.

For any future wells, where an incinerator is present on the MODU, any onboard incineration will be carried out in compliance with the requirements of MARPOL 73/78 Annex XI Chapter 3, regulation 16 – Shipboard Incineration (UID PP-14).

Slop water treatment

PSV's are MARPOL compliant. Sewage water will be sent onshore and handled to approved companies by MPTW.

Cleaning of vessel tanks contaminated with chemicals will be performed outside of Lebanon by the PSV's agents.

Waste treatment and disposal onshore

All non-hazardous and hazardous solid waste generated by the Block 4 exploration drilling program will be transported to shore for recycling/treatment/disposal in accordance with MARPOL 73/78 Annex V (with the exception of water-based drill cuttings and drill fluids) (UID WM-9).

The Waste Management contractors listed in Table 5.1 will ensure the final destination of the waste is guaranteed and complies with both regulatory requirements and Total contractual commitments (UID WM-17).

Onward export of drill cuttings outside of Lebanon for treatment and disposal will be compliant with the requirements of the Basel convention (UID WM-5).

Hazardous waste will be transported, stored and treated/disposed of in line with applicable national regulations in force (including reporting requirements, etc) (UID WM-13).

The waste management method per waste stream and sites/premises which will be used by TEP Liban for the operations of Block 4 Well 1 will be finalized once the waste strategy is confirmed with contractors.

Some hazardous waste streams cannot be treated in Lebanon as there are no companies or facilities which can treat these types of wastes. These waste streams will be exported to a treatment facility in another country in accordance with Basel Convention.

Treatment and disposal requirements are selected in line with Group waste management requirements and are directed, depending on its type and characteristics, to the appropriate treatment process or final elimination point.

The practice of open-air burning will be prohibited, as well as using unauthorized waste disposal/dumping sites.

Accidental Oil Spill

In case of an accidental oil spill, the spill will be cleaned up as per procedures detailed in TEPLB's Oil Spill Contingency Plan (2-PL-HSEQ-004). For large spills that fall within Tier 2 or 3 (as defined in the Oil Spill Contingency Plan), a specific waste management plan will be developed for waste resulting from the spill cleanup (oily rags, oily PPE, etc.)

LMP Decommissioning

The remaining drilling fluids will be temporarily stored inside the tanks of the LMP and will be then exported as per applicable regulations.

Any slops generated by the cleaning of the LMP during decommissioning (which are considered as waste) would be stored by the drilling fluids contractor or their subcontractors and then exported in accordance with the Basel Convention.

6.5 - Waste Quantification

Waste is tracked and manifested either by weight/volume, or by the size of container (skip, etc…) used for transport. The Waste Management Contractor's calibrated and certified weighing scale system is used to confirm waste weights. The confirmation of waste weight is done onshore, and spot checks are conducted regularly by a representative of the TEP Liban to ensure that the process is carried out according to TEP Liban and regulatory requirements.

6.6 - Drill Cuttings

6.6.1 - Cuttings Waste Management

As stated in Section 6.4, cuttings associated with non-aqueous drilling fluids (NADFs) from the lower B4-1 well sections will not be discharged to the marine environment, they will be contained and shipped to shore for treatment and disposal. Cuttings will be carried up the riser by the drilling fluid. On the MODU the cuttings will be separated from the drilling fluid using shale shakers. The recovered drilling fluid will be sent back to the drilling process, and the separated cuttings will be contained in certified cuttings skips (UID WM-4).

The cuttings will be collected in skips and transferred directly to the treatment facility in Cyprus, (authorizations from Lebanese authorities to grant direct exportation is obtained). The skips will be transferred in the PSV's offline and in batches of about 70 to 80 skips to Limassol Port, Cyprus, and from there to the IESC (Innovating Environmental Solutions Center) facility for treatment. Treatment and disposal are then completed in the certified facilities of IESC in Cyprus, in line with local and international standards.

Transboundary permitting and transportation will be compliant with the Basel convention, requirements of the Lebanese Ministry of Environment and the receiving country.

6.6.2 - Contractor Responsibilities

Baker Hughes is the waste management contractor who is responsible for collection, segregation and management of drilling cuttings.

Baker Hughes will provide dedicated DNV certified cutting boxes (skips). They will have the capacity and capability to handle and evacuate 70 cuttings skips in 6 hours from the skip transit area to shore.

Baker Hughes will also provide and manage the following services:

- Emptying and cleaning skips/tanks at the treatment plant and certified disposal site
- Treatment of cuttings waste to its own specifications, which shall be compliant with Lebanese laws and specifications for disposal of wastes
- Transportation/trucking of end-processing waste to disposal area(s)
- Technical evaluation, recording, and reporting of treated materials
- Residual drilling fluids: Baker Hughes intends on exporting these fluids onshore to Lebanon at the logistics base, storing them in the liquid mud plant (LMP) and then sending them back to Egypt where the Fluids Contactor's regional base is located, for chemical reconditioning (UID WM-3).

6.6.3 - NORM Management

Proof that the drilling cuttings skips are not NORM contaminated is required by the Ministry of Environment in Cyprus. For this purpose, a certified Radiation Safety Officer (RSO) from Baker Hughes will perform radiation monitoring of the cuttings, and the inside and outside of the cuttings skips and fill out the NORM Monitoring Report provided by TEP Liban (see Appendix 4). Disposal of NORM waste in Lebanese waters is strictly prohibited.

Baker Hughes' Waste Management Plan shall contain details on the procedure of collection, movement, transport, and disposal of cuttings, including procedure for management of NORM contaminated waste.

NORM contaminated cuttings will be placed in separate waste skips which shall be clearly labeled as NORM contaminated. All measures must be taken to keep contaminated cuttings skips separated from the rest of the skips for ease of detection. During transportation, skips containing NORM contaminated cuttings shall be placed the furthest away from the cabin where personnel stays during movement.

Baker Hughes' subcontractor for hazardous waste management shall have a specific procedure for the management of NORM waste, which shall be shared with TEP Liban before start of operations.

7 - WASTE TRACEABILITY AND REPORTING

TEP Liban has a waste tracking system to ensure appropriate management of waste from cradle to grave (even after they have been transferred to a third-party waste company). The main components of this tracking system are: site waste register, Waste Transfer Note and waste reporting.

7.1 - Site Waste Register

Each site maintains a "live" waste register (see Appendix 2) which:

- Tracks the waste skip/container movements offsite and corresponding Waste Transfer Note numbers;
- Inventories the waste streams, both in terms of composition, quantity and final treatment/disposal method;
- Provides the functionality for TEP Liban to verify and cross Waste Transfer Notes and contractor reporting;
- Inventories the waste streams, both in terms of composition and quantity, produced at each of the facilities;
- Is sent to the TEP Liban HSE department, which will ensure there are no significant anomalies in the register and report to the concerned sites (if required).

7.2 - Waste Transfer Note

Waste transfer notes will provide an auditable trail of the waste management process (UID WM-14). These forms are applicable for all sorts of waste and must be used by all waste management contractors for the tracking of any waste transport and disposal, be it hazardous or non-hazardous waste.

The Waste Transfer Note (WTN) provides a record of waste due diligence across the process, documenting the quantities per type of waste produced and providing an auditable trail of the waste management process. Examples of the TEP Liban WTN template for onshore and offshore sites is included in Appendix 3. The waste management contractor may opt to use this form or their own Waste Transfer Note, as long as the content allows to trace the transport of waste from the pickup point to the final destination and provides types and quantities of waste and information on the final disposal of each waste.

The WTN:

- Is prepared on the site where the waste is generated/produced;
- Must always accompany the waste skip/container, etc. until the waste is treated, recovered or disposed of;
- Is completed correctly, checked and signed by every party in the waste transfer process (producer, collector, carrier and recipient) and a copy of the WTN retained;
- Specifies the origin, type, characteristics and quantity of the waste, information about its transportation and destination, and its storage, processing and elimination and contains a unique identifier number;
- May be accompanied by other supporting documentation such as a Material Safety Data Sheet (MSDS) for the waste that is being back loaded (for example waste chemical).
    - This information is important as it allows safety, environmental and health issues to be evaluated during transportation and subsequent waste management handling;

Waste Transfer Notes signed by all parties will be sent to TEP Liban by logistics base contractor and copies retained on site (UID MR-7).

All documentation relating to the transfer of waste is retained/archived by contractors for at least 5 years. This includes the WTN, MSDS and other supplementary information sheets to support the transfer of waste (so that is can be presented to any internal or external inspection body).

Further information on WTN completion is provided in Table 5.3.

Table 5.3 – WTN completion guidance

WTN Part	Responsibility for Completion & Signature	Guidance
Part A	Producer – MODU	- The producer is the person whose activities produced the waste
Part B	Transporter - Supply Vessels	- The collector removes or transports the waste from the place where it is being held - Offshore, this is the vessel master
Part C	Handler – Logistics Base	- Waste arriving onshore from offshore shall pass through the logistics base before being transported onwards - In case of direct transportation to Cyprus this part is filled in by receiver in the port in Cyprus
Part D	Carrier / Transporter	- The carrier transports the waste between the logistics base and the recipient (waste disposal contractor facility)
Part E	Recipient – Waste Disposal Contractor	- Receives the waste for treatment, disposal or recovery at suitable facility - Part E of the WTN requires the method of treatment and the location of final disposal/treatment to be stated - The details in this declaration are cross-checked against the site waste register, WTN and waste contractor reports by the waste producer

In the event that the wastes are received by Waste Disposal Contractor (recipient) and then are sent off site to another site operated by the Waste Disposal Contractor or a subcontractor, the Waste Disposal Contractor becomes the secondary waste originator and has to complete the "Declaration of final waste treatment/disposal" once it has received the final information from its subcontractor/other site.

For cuttings treatment / disposal in Cyprus IESC will be required to complete the "Declaration of final waste treatment/disposal" on the WTN.

7.3 - Waste Reporting

The TEP Liban HSE department gathers waste data for internal and external reporting purposes in a waste management reporting database/xls. The reporting of waste is performed as per the table below.

Table 5.4 - Waste management reporting

Frequency	Reporting expectation
Monthly	- Issuance of site waste register to HSE department including site environmental reporting of the quantities of food waste discharged offshore (if applicable); - Waste Management Contractor issue to TEP Liban HSE department reports including following minimum information: o Waste type and treatment/disposal method o Any anomalies on TEP Liban waste management documentation and segregation (e.g. Register of Observations) o Copies of all waste transfer notes issued during the month.
Every 3 months	- Waste report to the environmental authorities as per local regulation Note: Decree 5606/2019 requires a report to be submitted to the MoE every three months stating the types and quantities of hazardous wastes transported outside the lot or lots where they were generated, the date of transfer, the name of the carrier, the storage facility and/or recovery, and/or treatment and/or final disposal. The reports should include all completed hazardous waste movement forms.

An example of a monthly waste contractor report is provided in Appendix 5.

8 - WASTE CONTINUAL IMPROVEMENT, AUDITS, INSPECTIONS & REVIEWS

8.1 - Waste Non-Compliances

The Waste Management Contractor may generate waste non-conformances or suggest improvements in TEP Liban's waste practices (for example by issuing an Anomaly Card, Stop Card, or others).

TEP Liban's procedures relating to incident reporting, are followed if appropriate for anomalies raised by Waste Management Contractor and incidents involving waste. If a HSE event related to waste occurs, its severity is evaluated and Return of Experience (REX) will be developed.

8.2 - Improvements/Changes in How Waste Contractor Manages Wastes

Improvements or changes in waste practices which may impact the contracts in place and associated rates shall be discussed with relevant persons prior to TEP Liban's approval (Waste management contract engineer, HSE department etc.). The Waste Management Contractor shall provide a full proposal which includes appropriate commercial and technical information as well as measurable environmental benefits.

8.3 - Waste Audits, Inspections, Verifications and Reviews

Periodic audit of the “cradle to grave” waste management system is be carried out to ensure compliance to regulatory and TEP Liban’s requirements (see Table 5.5). The table below summarizes the audits, inspections and reviews conducted associated with waste management that can be applied.

Table 5.5: Waste auditing schedule

Evaluation type		Evaluation details	Frequency	Affiliate Entity
INTERNAL	**Onsite focused waste inspections**	Regular inspection of onsite practices is required for continuous improvement Example of reporting format in Appendix 7 and 8	Weekly HSE Inspections	Site HSE Advisor for rig, Base Supervisor for logistics base
INTERNAL	**Waste skips & containers**	In order to improve waste segregation, feedback is given to each site based in the form of a report documenting the results of a visual check on the contents of one general waste skip per site Example reporting format in Appendix 9	Weekly HSE Inspections	Waste Management Contractor
INTERNAL	**Site waste register**	Provision of site register to HSE department, who review for significant anomalies waste information and waste handling practices	Monthly	Waste Management Contractor
INTERNAL	**Waste reviews**	The HSE department, will organize regular reviews of the waste management processes, including: - Assessing and mitigating the hygiene, health and safety risks to workers; - Reviewing the types of waste, the volumes, origin and processing streams; - Securing reliable storage, whether temporary or permanent.	At start and end of B4-1 drilling program	HSE Department, Contractor Rep & Contract holder

9 - WASTE MANAGEMENT AWARENESS

General waste management awareness is raised among personnel through the site inductions, Toolbox Talks, site HSE Committee meetings (if applicable), performance reports and general waste management awareness campaigns (e.g. posters, brochures) (UID TR-1). Labeling and posters are available on each site to indicate wastes which are too be segregated and in which receptacle (including their location on site).

10 - ROLES & RESPONSIBILITIES

The following section indicates the roles and responsibilities of the key actors in the management of wastes associated with TEP Liban's activities.

10.1 - Waste Management Contractor

Contractors shall appoint and keep assigned during the entire course of their services a dedicated waste management focal point who shall have the specific responsibility of coordinating the implementation of the Contractor Waste Management Plan in line with TEP Liban's requirements. The Waste Management Contractor is responsible for:

- Respecting the internal and country regulations governing waste management;
- Respecting TEP Liban's requirements governing waste management (Total Group rules and TEP Liban's WMP);
- Having the authorizations and approvals required by law (i.e. authorizations, technical certification, financial guarantees, insurance policies, etc.);
- Ensuring the final destination of the waste is guaranteed and complies with both regulatory requirements and with the service providers' contractual commitments;
- Advising the TEP Liban HSE department on procedures and developments in waste legislation for collection, segregation and storage of waste;
- Coordinating onshore waste management for onshore and offshore waste;
- Ensuring that the work is performed by trained personnel equipped with appropriate protection;
- Providing TEP Liban HSE department with a WMP applicable to its activities and wastes managed on behalf of TOTAL Group;
- Collecting waste and signing relevant documentation (e.g. WTN);
- Ensuring that WTNs signed by all parties are sent back to TEP Liban and retain copies of all applicable waste documentation (including WTNs);
- Completing and signing the "declaration of final waste treatment/disposal" on the WTN;
- Recording, keeping up to date and sending to TEP Liban all information related to traceability of waste;
- Conducting audits and inspections (of their sites and their subcontractors), and sending the results to the TEP Liban;
- Submitting monthly waste reports to waste coordinator with details of waste including] storage inventory of any waste, all information pertaining to traceability of waste (including WTN's, waste
    - Updated storage inventory of any wastes
    - All information related to traceability of waste including electronic copies of fully completed originals of Waste Transfer Notes (waste weight, type and characterization and acceptance

reports, storage conditions (container/tank number), treatment/elimination date, waste weights treated/disposed, and any other information considered as useful. This information shall be summarized in an electronic summary table (excel) and provided to COMPANY

- All 3rd party waste disposal documents to COMPANY as proof of disposal/destruction/final storage;

- Committing to all clauses relating to Waste Management within its respective contract with TEP Liban.

10.2 - TEP Liban HSE Department

The main responsibilities of the HSE department are:

- Advising on procedures and developments in local and international waste regulations;
- Advising on the segregation and storage of waste;
- Raising waste non-compliance to the authorities;
- Regular monitoring of on-site practices and reports on contractor performance, in an approach geared toward continuous improvement;
- Regular updating of the TEP Liban centralized waste reporting database/xls to monitor, in quantitative terms, collection and destination of waste by category;
- Collecting and preparing of data for internal and external reports;
- Assessing suitability of PPE for waste management activities;
- Ensuring each site maintains a “live” waste register as described in this WMP.

10.3 - TEP Liban Waste Coordinator (HSE Engineer)

The waste coordinator is one of the environmental advisors of the HSE Department. The waste coordinator is responsible for:

- Ensuring compliance with local and international regulations on waste;
- Regular updating of the WMP;
- Ensuring internal and external audits of the waste management processes, techniques and contractors/sub-contractors are conducted.

10.4 - TEP Liban Contract Engineer

The contract engineer responsible for the waste management contract/s is responsible for:

- The compliance of the contractual technical specification with this WMP, TOTAL Group referential and requirements specific to relevant regulations;
- Coordinating calls for tender to select competent Waste Management Contractors;
- Ensuring joint HSE reviews/service quality meetings with the Waste Management Contractors are held followed by respective feedback to the persons in charge;

10.5 - TEP Liban Logistics Superintendent / Fluids and Cementing Superintendent (Contract Owner)

The technical focal point for the different waste management contracts is the Base Superintendent / Fluids & Cementing Superintendent and responsible for:

- Ensuring appropriate waste management contracts are in place;

- Ensuring that contract clauses related to waste management are defined in line with Total Group, TEP Liban and legal requirements and that they are respected during the execution of the contract;
- Following the performances of waste management service contracts;
- Ensuring joint HSE reviews/service quality meetings with the Waste Management Contractors are held followed by respective feedback to the persons in charge;
- Coordinate and participate in internal audits, as well as annual external audits of waste management and transport companies to ensure their compliance with waste management requirements.

10.6 - TEP Liban Onshore or Offshore Waste Management Focal Point

The onshore or offshore Waste Management focal point is the TEP Liban TOTAL Group nominated signee for the WTN, as such they can be considered as the "waste producer". The Waste Management focal points are:

- On the logistics base: Logistics Base Superintendent or Logistics Base Supervisor
- On the drillship: RSES (Company Man) with support of Fluids & Cementing Supervisor

However, all personnel on site (as explained below) has a natural responsibility as producers of waste to ensure that the waste within their control and influence is handled appropriately.

The main responsibilities of the onshore or offshore Waste Management focal point are:

- Identify types of waste to be stored temporarily and advise on the segregation and storage of waste;
- Coordinate waste management;
- Ensure the Waste Management contractor provides suitable, appropriately marked containers at strategic locations throughout the site/installation;
- Ensure waste is being segregated into correct containers (e.g. carry out spot checks to ensure that waste is being segregated into correct containers);
- Ensure there are enough containers on site;
- When waste is due to be collected or back-loaded, ensure that container contents are checked for correct segregation;
- Ensure the Waste Management contractor schedules regular collection of waste;
- Verify and sign WTN for waste generated on site/installation;
- Retain a copy of the signed WTN and archive.

10.7 - All Site Personnel

All personnel on site have a natural responsibility as producers of waste to ensure that the waste within their control and influence is handled appropriately. Site personnel receive training so that they are aware of the importance of waste management. It is the responsibility of all personnel on site to:

- Dispose of waste in accordance with this procedure and report any findings of incorrect segregation of waste;
- Provide the necessary information to the Waste Management focal point to allow appropriate transportation and handling for any waste they wish to send to dispose of;
- Keep the workplace and site area clean;
- Segregate wastes;
- Inform ahead of time the Waste Management focal point and/or the HSE department on activities likely to generate wastes;

- Generate safety observation cards/anomaly cards for waste management handling on site (if necessary);
- Ensure adequate training has been delivered.

10.8 - Ship's Captain / Vessel Master

For wastes that are generated offshore, the ship's captain / vessel master has waste management responsibilities for:

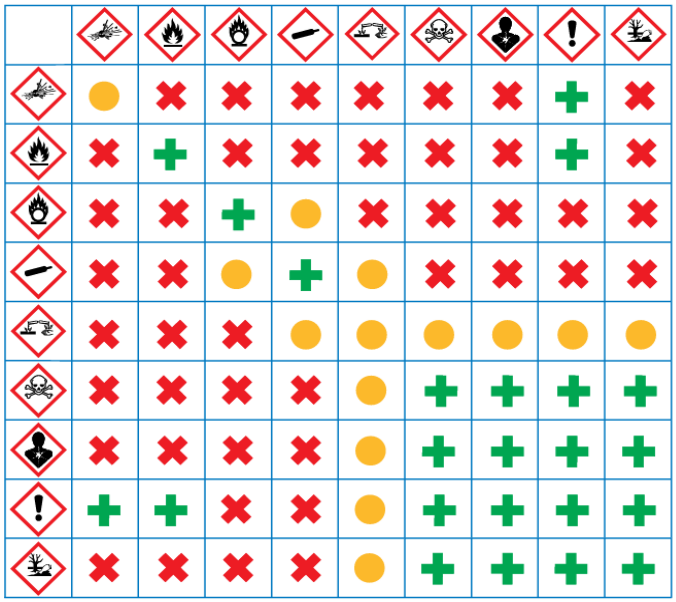
- Loading waste onto vessel, checking all documentation is in order (e.g. WTN…);
- Unloading waste from the vessel on arrival at quayside;
- Signing the WTN that accompanies TEP Liban's waste and archive;
  Implement WMP on vessel where applicable.

Appendix 1. Waste Segregation and Storage Requirements

Compatibility must be considered when collecting, segregating and storing waste. The matrix below summarizes which waste can be stored together or not according to their characteristics.

Hazard compatibility matrix (source: GM-EP-ENV-053)

- ✚ Can be stored together
- ✖ Cannot be stored together
- ● Can be stored together under specific conditions (MSDS)



Appendix 2. Site Waste Register

Below is an example of a site waste register template provided to TEP Liban.

WASTE SHIPMENT AND TRANSFER INFORMATION								FINAL WASTE REPORTING							
SEGREGATION STATUS (OK, BAD, OR N/A)	SKIP LABEL STATUS (OK, BAD, OR N/A)	WTN STATUS (OK OR BAD)	COLOR CODE	WASTE CODE	SKIP NO.	SERVICE / WASTE TYPE	QUANTITY SHIPPED OFFSITE (Ton)	STORED ON SITE (Ton)	TREATED					DATE DECLARATION OF WASTE RECEIVED	INVOICE NUMBER
									RECYCLING	DISCHARGED OFFSHORE	BIO-TREATMENT	INCINERATION	OTHER		

Site waste register example (part 1)

WASTE MANAGEMENT PLAN

AFFILIATE VERIFICATION								
CHECKER NAME	WTN Available in affiliate?	WTN Is signed by all parties?	Weight Control & Acceptance?	Anomaly Control & Acceptance?	Classification Control & Acceptance?	Costs Control & Acceptance?	WTN Declaration received & completed properly?	Comment on disagreement / anomaly

Site waste register example (part 2)

Appendix 3. Waste Transfer Note: Example

DATE OF EMISSION
To be filled by the Waste Producer

TOTAL COMMITTED TO BETTER ENERGY

REFERENCE NUMBER
Site - yymmdd - Daily rank of emission
To be filled by Waste Producer

WASTE TRANSFER NOTE

➔ THE WASTE PRODUCER FILLS THE DESCRIPTION, SELECTS THE WASTE CODE, LOCATION, EST. WEIGHT, AND TYPE AND ID OF CONTAINER

WASTE DESCRIPTION

FOR WET CUTTINGS: / FOR SLOP WATER:	EWC			WASTE TYPE
Specific Gravity			NON-HAZARDOUS	Organic Waste
				Rejects (Inorganic Waste)
				Paper & Cardboard
Specific Gravity				Metals
Retort Tests Results: % Oil / % Water / % Solids				Glass
pH:				Plastic
WASTE DESCRIPTION : Skips #				Chemical packaging
	13 02 05		HAZARDOUS	Hazardous Used Oil
	15 01 10			Hazardous Chemicals Packaging
	01 05 05			Contaminated Slop Water
	01 05 06			Centrifugation waste/Cuttings/NABM
	01 05 06			Cement/NABM

WASTE ORIGINATED ON:	QUANTITY (weight or/and volume)	CONTAINER TYPE	N° OF CONTAINERS & IDENTIFICATION
MODU / Logistics Base	…. Ton		

HANDLING & TRANSPORTATION

	COMPANY	NAME & POSITION	DATE & TIME STAMP / SIGN
A- PRODUCER			

➔ WASTE DISPATCHER SIGNS & PROVIDES THIS FORM TO THE TRANSPORTER TO FILL COMPANY INFORMATION, SIGN AND DATE

B- TRANSPORTER (1)			
C- HANDLER			
D- TRANSPORTER 2			
(1) Add VESSEL name or TRUCK identification			
E- WASTE RECIPIENT			

➔ FILL THE WEIGHT WHEN WASTE IS RECEIVED BY WASTE TREATMENT COMPANY & DETAILS OF PERSON THAT RECEIVED

WEIGHTING & DISPOSAL

COMPANY	LOCATION / DISPOSAL METHOD	WEIGHT	NAME & POSITION	DATE & TIME STAMP & SIGN
WASTE RECIPIENT				

Appendix 4. NORM Monitoring Register: Example

DATE

TOTAL COMMITTED TO BETTER ENERGY

REFERENCE NUMBER
Site - yymmdd

NORM Monitoring Report

This NORM Monitoring Report must be filled out for every transport of drilling cuttings leaving the rig.

Radiation Safety Officer			
RSO Name:		RSO Certificate Number:	
Signature:		Date:	

Monitor Identification					
Monitor type:		Serial Number:		Calibration Date:	
Probe Type:		Probe Serial Number:		Calibration Date:	
Comments:					

NORM Monitoring						
Waste Identification & Transfer Form #	Waste Transfer Note Ref. #	Container #	Values in CPS			
			Background Value	Container Sample	Container (Outside)	Container (Inside)

Appendix 5. Examples of Monthly Waste Contractor Reports

Depending on the Waste Management Contractor, the reporting templates and the specific waste information provided may vary.

Below are examples of:

- A drill cuttings Waste Management Contractor report to TEP Liban, and
- A general Waste Management Contractor report populated and provided to TEP Liban on a monthly basis.

Drill cuttings Waste Management Contractors reporting template

Indicator Definition				
Drill Cuttings - Low toxicity oil-based mud cuttings	Reference	Definition	%	Unit
Are you concerned by this item ?	CUTL100			
Gross tonnage (low toxicity oil-based mud)	CUTL001	Gross tonnage means "ex rig" and includes the cuttings plus the residual mud trapped in these ones		kt
On site TREATMENT (low toxicity oil-based mud)	CUTL012	Physico-chemical or thermal TREATMENT performed on site to separate and recycle the cuttings, or reduce their volume and/or their toxicity prior to their final disposal. The main treatments applied are : - Verti G cuttings dryer - code J - centrifugation of mud at the end of the outlet of cuttings dryer - code C - centrifugation of mud at the end of the well - code D - thermal desorption - code T - temporary storage in mud pits - code M - export to shore/out of the site for further treatment and/or final disposal - code S		
Complementary TREATMENT and ELIMINATION procedure (low toxicity oil-based mud)	CUTL013	Use the following code for the different ways of TREATMENT & ELIMINATION (several letters possible) : B = reuse / recycling as backfill (roads, platforms), C = thermal treatment (incineration or thermo desorption) D = energy utilization (cement plants), E = inerting / solidification, F = controlled external landfilling, G = internal controlled landfilling on site, H = deep re-injection into suitable layers or in disposal wells, I = landfarming and bio-degradation, J = washing or physico-chemical treatment (e.g. extraction by CO2), K = at sea disposal, L = other (to specify with a comment in the bubble) M = Discharge to the environment onshore (discharge to lake or river, or spreading on to soil surface or burying into non protected pits) Example : case of an affiliate that partly discharges its cuttings at sea, partly stabilizes/solidifies and then re-uses them as backfill : codes K, E, B		
Tonnage of cuttings discharged to the environment onshore (low toxicity oil-based mud)	CUNL007	Discharge to the environment onshore means discharge to lake or river, or spreading on to soil surface or burying into non protected pits. Note: Disposal in a controlled landfill, and spreading/reuse as backfill after treatment such as solidification, biodegradation or thermo-desorption, are not considered as a discharge to the environment onshore.		kt
Hydrocarbon residual content on cuttings discharged onshore (low toxicity oil-based mud)	CUNL002	HC content after treatment performed on the cuttings, to reduce their toxicity prior to their final discharge to the environment onshore.	%	
Tonnage of cuttings discharged to the environment offshore (low toxicity oil-based mud)	CUFL007	Discharge to the environment offshore means discharge at sea.		kt
Hydrocarbon residual content on cuttings discharged offshore (low toxicity oil-based mud)	CUFL002	HC content after treatment performed on the cuttings to reduce their toxicity prior to their final discharge at sea.	%	
Tonnage of cuttings disposed of by other elimination options	CUTL014	Tonnage of cuttings disposed of by other elimination options than discharge to sea and discharge to the environment onshore. Other elimination options include for example internal or external landfilling, deep well injection, incineration, etc... When several other elimination options are used, specify the tonnage for each one with a comment in the bubble.		kt

Tonnage of other solid effluents discharged to the environment onshore (low toxicity oil-based mud)	CUNL003	Other solid effluents are all solids generated by centrifugation of mud while drilling or at the end of the well. Discharge to the environment onshore means discharge to lake or river, or spreading on to soil surface or burying into non protected pits. Note: Disposal in a controlled landfill, and spreading/reuse as backfill after treatment such as solidification, biodegradation or thermo-desorption, are not considered as a discharge to the environment onshore.		kt
Hydrocarbon residual content on other solid effluents discharged onshore (low toxicity oil-based mud)	CUNL011	HC content of other solid effluents discharged to the environment onshore.	%	
Tonnage of other solid effluents discharged to the environment offshore (low toxicity oil-based mud)	CUFL003	Other solid effluents are all solids generated by centrifugation of mud while drilling or at the end of the well, discharged at sea.		kt
Hydrocarbon residual content on other solid effluents discharged offshore (low toxicity oil-based mud)	CUFL011	HC content of other solid effluents discharged at sea.	%	
Tonnage of other solid effluents disposed of by other elimination options	CUTL015	Tonnage of other solid effluents disposed of by other elimination options than discharge to sea and discharge to the environment onshore. Other elimination options include for example internal or external landfilling, deep well injection, incineration, etc... When several other elimination options are used, specify the tonnage for each one with a comment in the bubble.		kt
Drill Cuttings - Water-based mud cuttings	Reference	Definition	Percentage	Unit
Are you concerned by this item ?	CUTW100			
On site TREATMENT (water-based mud)	CUTW012	Physico-chemical or thermal TREATMENT performed on site to separate and recycle the cuttings, or reduce their volume and/or their toxicity prior to their final disposal. The main treatments applied are : - Verti G cuttings dryer - code J - centrifugation of mud at the end of the outlet of cuttings dryer - code C - centrifugation of mud at the end of the well - code D - thermal desorption - code T - temporary storage in mud pits - code M - export to shore/out of the site for further treatment and/or final disposal - code S - discharge to sea - code K		
Annual gross tonnage (water-based mud)	CUTW001	Gross tonnage means "ex rig" and includes the cuttings plus the residual mud trapped in these ones		kt

Complementary TREATMENT and ELIMINATION procedure (water-based mud)	CUTW013	Use the following code for the different ways of TREATMENT & ELIMINATION (several letters possible) : B = reuse / recycling as backfill (roads, platforms), C = thermal treatment (incineration or thermo desorption) D = energy utilization (cement plants), E = inerting / solidification, F = controlled external landfilling, G = internal controlled landfilling on site, H = deep re-injection into suitable layers or in disposal wells, I = landfarming and bio-degradation, J = washing or physico-chemical treatment (e.g. extraction by CO2), K = at sea disposal, L = other (to specify with a comment in the bubble) M = Discharge to the environment onshore (discharge to lake or river, or spreading on to soil surface or burying into non protected pits) Example : case of an affiliate that partly discharges its cuttings at sea, partly stabilizes/solidifies and then re-uses them as backfill : codes K, E, B		
Tonnage of cuttings discharged to the environment onshore (water-based mud)	CUNW005	Discharge to the environment onshore means discharge to lake or river, or spreading on to soil surface or burying into non protected pits. Note: Disposal in a controlled landfill, and spreading/reuse as backfill after solidification are not considered as a discharge to the environment onshore.		kt
Tonnage of cuttings discharged to the environment offshore (water-based mud)	CUFW005	Discharge to the environment offshore means discharge at sea.		kt
Tonnage of cuttings disposed of by other elimination options	CUTW014	Tonnage of cuttings disposed of by other elimination options than discharge to sea and discharge to the environment onshore. Other elimination options include for example internal or external landfilling, deep well injection, incineration, etc... When several other elimination options are used, specify the tonnage for each one with a comment in the bubble.		kt
Tonnage of other solid effluents discharged to the environment onshore (water-based mud)	CUNW007	Other solid effluents are all solids generated by centrifugation of mud while drilling or at the end of the well. Discharge to the environment onshore means discharge to lake or river, or spreading on to soil surface or burying into non protected pits. Note: Disposal in a controlled landfill, and spreading/reuse as backfill after solidification are not considered as a discharge to the environment onshore.		kt
Tonnage of other solid effluents discharged to the environment offshore (water-based mud)	CUFW007	Other solid effluents are all solids generated by centrifugation of mud while drilling or at the end of the well, discharged at sea.		kt
Tonnage of other solid effluents disposed of by other elimination options	CUTW015	Tonnage of other solid effluents disposed of by other elimination options than discharge to sea and discharge to the environment onshore. Other elimination options include for example internal or external landfilling, deep well injection, incineration, etc... When several other elimination options are used, specify the tonnage for each one with a comment in the bubble.		kt

WASTE MANAGEMENT PLAN

Example of monthly waste contractor report (non-drilling waste)

Monthly Waste Reporting

Note: Data sumbmitted shall be applicable to the TEPBG scope only (POL-1 drilling campaign)

Indicator Definition					Values				Additional Information
Hazardous Wastes - Main Data	Reference	Definition	%	Unit	Month	Month	Month	Month	Comments
Tonnage temporarily stored on site (Hazardous wastes)	GLHW004	Tonnage generated in the current year and temporarily stored on site in dedicated facilities before treatment and/or final disposal in the further years		t					
Quantity of energetically utilized Hazardous wastes	GLHW005	Quantity of Hazardous wastes from all categories industrially incinerated with energy recovery and utilization.		t					
Hazardous Wastes - In-house treatment	Reference	Definition	%	Unit	0	0	0	0	Comments
Eliminated tonnage in incinerator (Hazardous wastes)	HWIN001	Tonnage internally eliminated in incinerator including destocked tonnage and exceptional wastes,		t					
Tonnage inerted / stabilsed (Hazardous wastes)	HWIN007	Tonnage sent to the inerting / stabilisation unit including destocked tonnage and exceptional wastes (inerting products tonnage not to be included)		t					
In-house recycled tonnage (Hazardous wastes)	HWIN009	Essentially production recycling (used oils, ...) and occasional reuse for other purposes (except inerted or biodegraded products for instance used as embankments), including destocked tonnage and exceptional wastes.		t					
Tonnage permanently stored on site (Hazardous wastes)	HWIN011	Tonnage with no previous internal treatment, including destocked tonnage and exceptional wastes, permanently stored on site in dedicated facilities (internal landfill). Do not include the tonnage of products sent to internal landfill after inerting or biodegradtion.		t					
Other internal treatments (Hazardous wastes)	HWIN016	Use the following code for the different ways of elimination (several letters possible), (ex. T, S) : T : thermal treatment other than incineration or burning in burn pit; (example: sterilisation of medical wastes, ...) I : injection into suitable layers or disposal wells S : discharge to sea A : other ways (comment mandatory) NC : not concerned							
Total tonnage dedicated to other internal procedures (Hazardous wastes)	HWIN017	Tonnage of hazardous wastes dedicated to other internal procedures (including destocked tonnage and exceptional wastes)		t					

WASTE MANAGEMENT PLAN

Hazardous Wastes - External treatment	Reference	Definition	%	Unit	Month	Month	Month	Month	Comments
Incinerated tonnage (Hazardous wastes)	HWEX004	Part of the total exported tonnage (HWEX001), including destocked tonnage and exceptional wastes		t					
Tonnage dedicated to external recycling (Hazardous wastes)	HWEX006	Part of the total exported tonnage (HWEX001) : Any waste given/sold for further recycling : contaminated drums, used oils, batteries, printer cartridges, … Including the tonnage of waste temporarily stored in the previous years and destocked and recycled during the reported year		t					
Tonnage sent to external landfilling (Hazardous wastes)	HWEX008	Part of the total exported tonnage (HWEX001) including destocked tonnage and exceptional wastes		t					
Tonnage treated by biological treatment, landfarming, .. (Hazardous wastes)	HWEX010	Part of the total exported tonnage (HWEX001) : tonnage eliminated by biological treatment including destocked tonnage and exceptional wastes		t					
Other external procedures (Hazardous wastes)	HWEX012	Use the following code for the different ways of elimination (several letters possible) , (ex. A,H) : A = back to supplier, D = energy utilization (cement plants or other), E = inerting / solidification, H = deep re-injection into suitable layers , J = washing or physico-chemical treatment, L = elimination by specialist through specific treatment, NC = not concerned							
Total tonnage dedicated to other external procedures (Hazardous wastes)	HWEX013	Part of the total exported tonnage (HWEX001) including destocked tonnage and exceptional wastes		t					
Non Hazardous Wastes - Main Data	Reference	Definition	%	Unit	Month	Month	Month	Month	Comments
Non Hazardous Wastes - In-house treatment	Reference	Definition	%	Unit	0	0	0	0	Comments
Incinerated tonnage in incinerator (Non Hazardous wastes)	NHIN001	Tonnage eliminated by incineration in incinerator including destocked tonnage and exceptional wastes,		t					
Incinerated tonnage in burn pit (Non Hazardous wastes)	NHIN003	Tonnage eliminated by incineration in burn pit including destocked tonnage and exceptional wastes		t					
Internally recycled tonnage (Non Hazardous wastes)	NHIN009	Reuse for any other purposes (except inerted products used as embankment) including destocked tonnage and exceptional wastes.		t					
Permanently stored on site tonnage	NHIN011	Tonnage with no previous internal treatment, including destocked tonnage, permanently stored on site in dedicated facilities (internal landfill).		t					

Total tonnage dedicated to other internal procedures to be specified (Non Hazardous wastes)	NHIN017	Part of the total tonnage (NHIN001) dedicated to other internal procedures (including destocked tonnage and exceptional wastes) ; Comment on the type of treatment used.		t					
Non Hazardous Wastes - External treatment	Reference	Definition	%	Unit	0	0	0	0	Comments
Part coming from destocking	NHEX002	Tonnage of waste generated in the previous years, internally stored (temporary on site storage) and exported during the reported year		t					
Incinerated tonnage (Non Hazardous wastes)	NHEX004	including destocked tonnage and exceptional wastes		t					
Tonnage dedicated to recycling (Non Hazardous wastes)	NHEX006	Any waste given/sold to salvage companies for further recycling : clean drums, piping, scrap metals, packaging, etc. Including the tonnage of waste temporarily stored in the previous years and destocked and recycled during the reported year and exceptional wastes.		t					
Tonnage sent to external landfilling	NHEX008	including destocked tonnage and exeptional wastes		t					
Tonnage treated by biological treatment (Non Hazardous wastes)	NHEX010	Tonnage eliminated by biological treatment including destocked and exceptional tonnage		t					
Other external procedures	NHEX012	Use the following code for the different ways of elimination (several letters possible) , (ex. A,D) : A = back to supplier D = energy utilization J = washing or physico-chemical treatment O = other ways (comment mandatory) NC = not concerned							
Total tonnage dedicated to other external procedures (Non Hazardous wastes)	NHEX013	Including destocked tonnage and exceptional tonnage		t					

Appendix 6. Waste Management Contractor – Register of Observations

Below is an example of the Register of Observations (ROO) documenting observations or anomalies on TEP Liban waste management practices that have been identified by the Waste Management Contractor on waste they have received from TEP Liban.

Register of Observations

Waste Management Contractors : Register of Observations : TOTAL xxxx

Number	Date NC raised	Date NC distributed to TOTAL	Location	Observation / Anomaly noted	Status	Date comments received from site	Corrective action taken	Date response sent to Waste management contractor
18/013	28-03-18	28-03-18	xxxx	skip 15497 used old hazard waste codes.	Open	29-03-18	New waste codes provided to site	29-03-18
18/018	07-05-18	07-05-18	xxxx	OBM Skip mixed with misc waste	Closed	07-05-18	See Synergi case 123456	07-05-18
18/017	07-05-18	07-05-18	xxxx	No dangerous goods documentation for flammable waste	Closed	17-05-18	See Synergi case 897621	17-05-18

Appendix 7. Waste Management Inspection Checklist

Site personnel to perform waste management inspections on site use the checklist below.

Inspection checklist

No.	Description	Yes	No	Comments
Waste generation, segregation & storage on site				
1	Is the waste storage area clean and tidy?			
2	Is there a suitable number of waste skips/containers?			
3	Are the waste bins/skips/containers properly labeled according to the type of waste stored?			
4	Are containers kept closed to prevent odors and pests?			
5	Are skips equipped with net for transport?			
6	Is the area free of any evidence of leaks/spills?			
7	Is appropriate drainage provided in the waste storage area?			
8	Is the run off directed to a suitable sump?			
9	Are hazardous chemical waste correctly labeled? (including MSDS)			
10	Are personnel aware of the meaning of the labels and pictograms in the MSDS?			
11	Are personnel using PPE correctly?			
Waste traceability				
12	Is the Waste Transfer Note issued for each transfer of waste			
13	Is the WTN correctly filled?			
14	Does the completed WTN return to the affiliate?			
15	Are the WTNs stored?			
16	Have training sessions for waste management been performed on site?			

Appendix 8. Waste Management Contractor General Waste Skip Audit Report

As described in this WMP, the Waste Management Contractor conducts per site a general waste skip audit and reports to TEP Liban. Below is an example of the report that is issued.

Waste skip audit report

General Waste Skip Audit Report

The purpose of this audit was to identify waste composition and highlight any waste reduction opportunities. The audit also allows for the collection of data to measure performance and identify any segregation or consignment issues. The results below will highlight opportunities to improve environmental performance where applicable.

1) Audit Details

Client	Location	Date	Auditors	Container No.	Waste transfer note #	Weight (kg)
TOTAL	Platform xx	01/03/18	Paul Smith	XYZ-123	WTN-987654	480

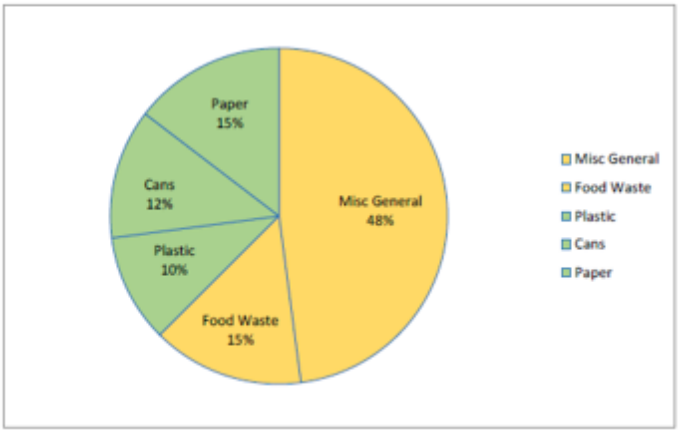
2) Audit Findings Summary

- No legal non-conformances were identified during this skip audit.
- Clear sacks were used, good segregation of waste

3) Audit breakdown

WASTE CATEGORY	TOTAL WEIGHT (KG)	TOTAL WEIGHT (%)	DESCRIPTION	WEIGHT (KG)
General	300	63%	Misc General Waste	230
			Food Waste	70
Recyclables	180	37%	Plastic	50
			Cans	60
			Paper	70

INSERT PHOTOS OF SKIP CONTENTS (WASTE CAN BE VIEWED AS CLEAR PLASTICS BAGS ARE USED)

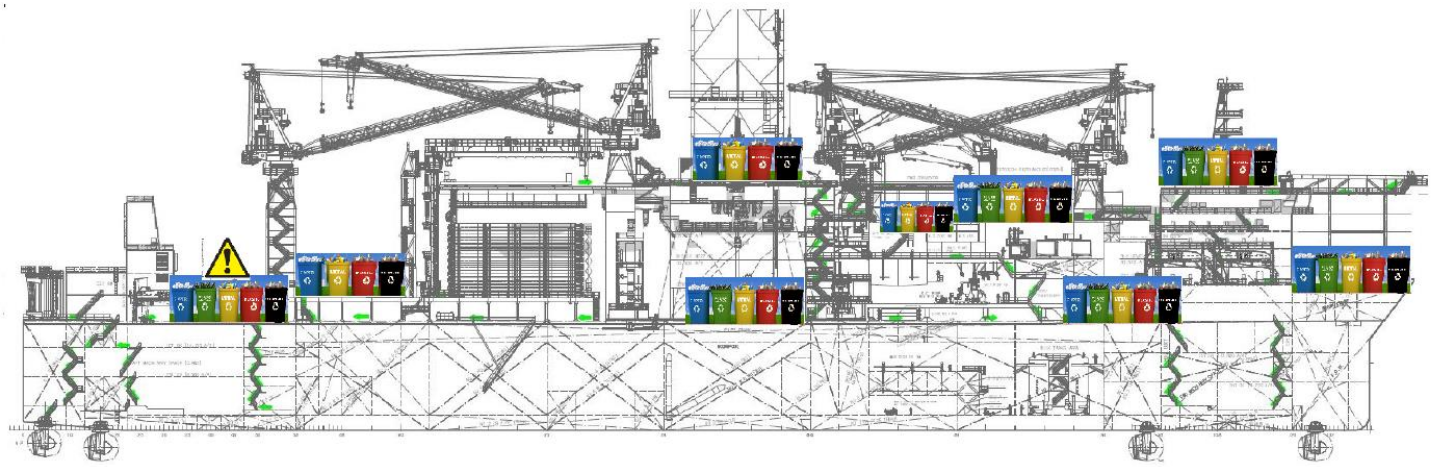


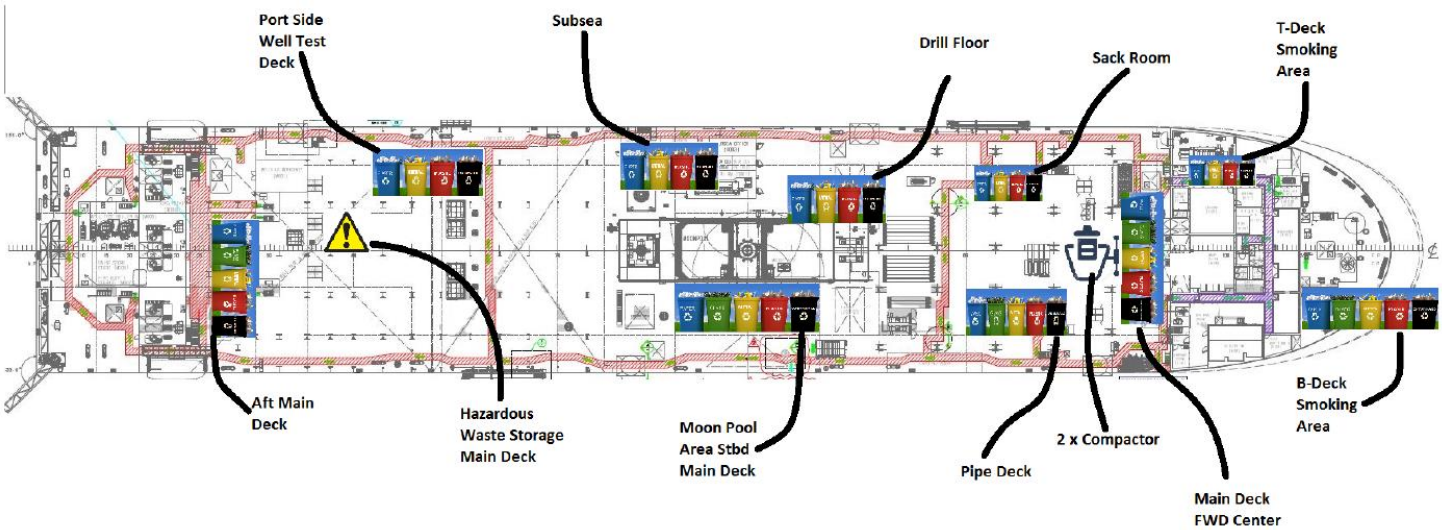
4) Audit Recommendations/conclusion

- Container XYZ-123 was consigned as general waste.
- General waste consisted mainly of used paper towels, wrapping/packaging, rubber, food waste, contaminated cardboard and tetra Pak.
- Many bags of segregated recyclable plastic, paper and cans were found. This shows that segregation is being carried out, but that the waste is then being mixed with general waste afterwards. This increases waste to landfill.
- Waste was bagged in clear sacks and rubber hose was coiled. This is good practice, as it prevents waste from snagging on the rigging when the skip is rotated.
- Continue to ensure that clear bags are always used; this allows waste to be easily identified.

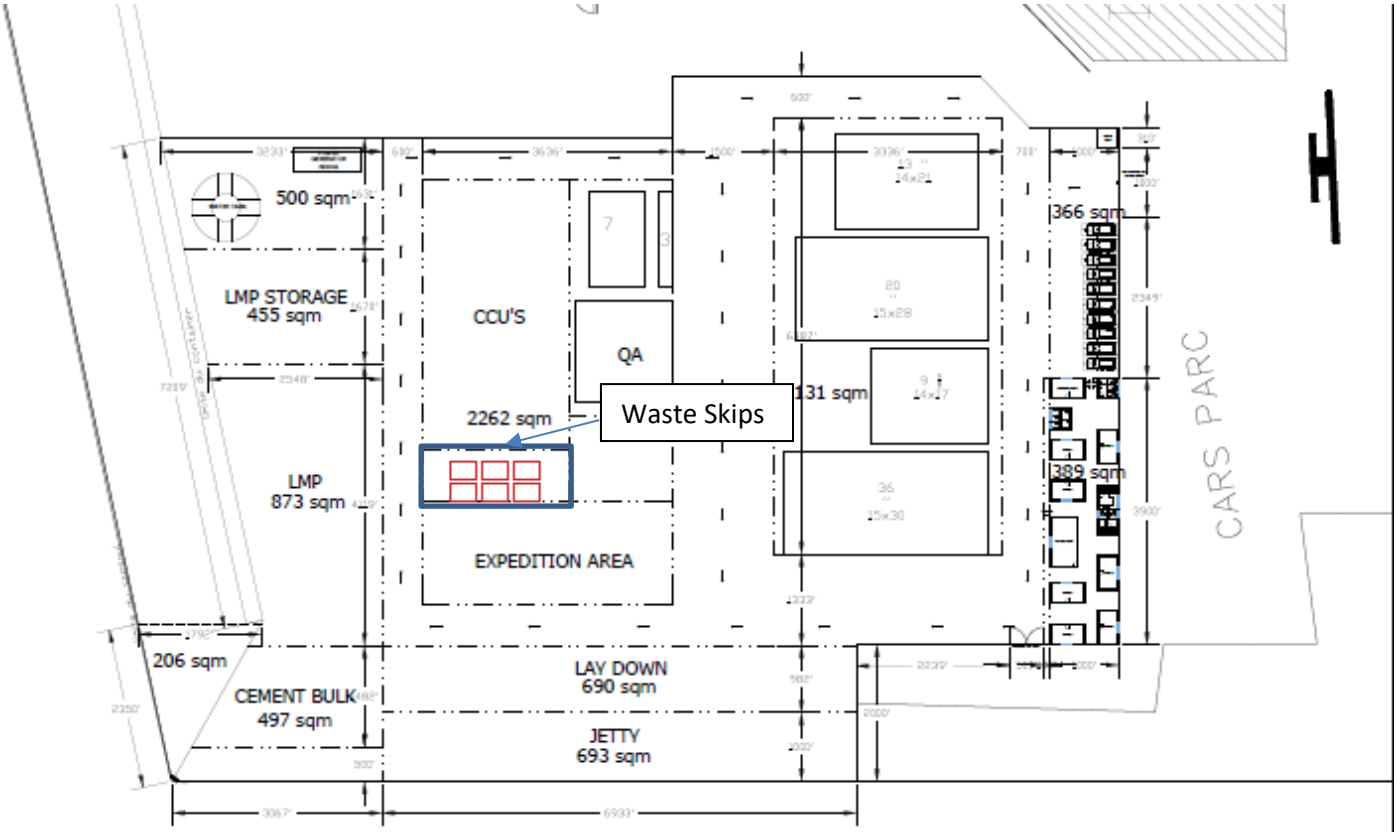
Appendix 9. TUX Waste Management Mapping

Existing Waste receptacles onboard the TUX.





Appendix 10. Logistics Base Waste Consolidation



CHEMICAL MANAGEMENT PLAN

	Name	Function	Date	Signature
Prepared by		HSE Engineer	28-Dec-2019	
Verified by		HSE Manager		
Verified by		Operations Manager		
Approved by		General Manager		

Revision	Date	Prepared by	Verified by	Verified by	Approved by
1	07-Feb-2020				

Métier: HSEQ	**Entity: EP**

CHEMICAL MANAGEMENT PLAN

Table of Contents:

1 - OBJECTIVES

This Chemical Management Plan (CMP) describes the methodology adopted by Company (TEPLB) to implement best practices regarding the management of chemicals associated with the exploration drilling activities being conducted by Company in Lebanon offshore Block 4. This plan has been prepared taking into consideration findings of the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment, Lebanese legislation and regulations, applicable international conventions, and TOTAL's corporate requirements.

The purpose of the plan is to safeguard the health of personnel working on the site, to protect the public, and to preserve the environment around the MODU and the support sites and facilities.

This CMP is a key component of TEPLB's Health, Safety and Environmental Management System (HSE MS).

TEPLB employees and Contractors are required to abide by the requirements in this CMP. Contractors chemical management procedures shall align with this CMP.

2 - SCOPE

The CMP applies to all exploration activities in Block 4, as well as support activities associated with the Project implementation. The principles and commitments specified in this Plan are applicable at well location, logistics base and supply vessels operating on behalf of the Project.
Each contractor handling chemicals is required to have their own chemical management plan or handling procedure.
The CMP brings together the chemical management mitigation commitments in the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment (EIA) to either elaborate on how the commitment will be implemented or provide reference to other documents where that detail is found. It includes the following:

- Chemical identification and selection
- Incompatibility of chemicals
- Chemicals management
- Chemicals protection and prevention measures.

To facilitate tracking of mitigation from the EIA commitments register (Appendix 8 of EIA) to this management plan the unique identifier (UID) from the commitments register is provided as appropriate.

This CMP will be updated as necessary to adapt to regulatory updates or changes in TOTAL corporate requirements, or if there is a significant change in TEPLB operations. For any future exploration / appraisal drilling in Block 4 (subsequent to well B4-1) a modified version of this plan will be prepared to reflect changes in contractors or processes.

3 - DEFINITIONS AND ACRONYMS

Bioaccumulation	The net outcome of the uptake, distribution, biodegradation and elimination of a compound in an organism caused by several routes of exposure, i.e., water, sediment or food.
Biodegradation	The decomposition of a substance via bacteria or other living organisms.
CFC - HCFC	Chlorofluorocarbon – Hydro Chlorofluorocarbon, widely used as refrigerants, propellants (in aerosol applications), and solvents. The manufacture of such compounds is being phased out by the Montreal Protocol because they contribute to ozone depletion. Their use is prohibited.
Company	Total E&P Liban
Contractor	All direct contractors of Total E&P Liban.
D&W	Drilling & Wells Department of TEPLB.
EIA	Environmental Impact Assessment
GHS	Globally Harmonized System of Classification and Labelling of Chemicals.
LOG	Logistics Department of TEPLB.
EC50	Is the median effect concentration in a toxicity test, i.e., the concentration that affects 50% of a test population after a specified exposure time.
FIFO	First In First Out
HSE	Hygiene Safety and Environment (HSE department of TEPLB).
IMDG	International Maritime Dangerous Goods Transportation: the IMDG code is the reference promulgated by the International Maritime Organization (IMO) for the transport of dangerous goods. It applies worldwide and is a binding international convention.
LC50	Lethal Concentration 50 is defined as the median lethal concentration in a toxicity test, i.e. the concentration that is lethal to 50% of the test organisms.
MODU	Mobile Offshore Drilling Unit
MSDS	Material Safety Data Sheet: a document produced by the manufacturer or a specialized service provider of a substance detailing information on the nature, components, and hazardous properties of the substance.

OCNS	Offshore Chemical Notification Scheme. Chemicals used in offshore oil and gas applications are registered in accordance with OSPAR for use in the UK and Netherlands waters.
Offshore Chemical	Chemical that is intended for use and discharge in the exploration, exploitation, and associated offshore processing of petroleum.
Operator	Total E&P Liban
OSPAR	Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic.
PCB	Poly Chlorinated Biphenyls –persistent organic pollutants, resistant to environmental degradation through chemical, biological, and photolytic processes
PEC	Predicted Environmental Concentration.
PFOS	Conjugate base perfluorooctanesulfonate
PLONOR	OSPAR List of substance/Preparations used and discharged offshore, which Pose Little or No Risk to the Marine Environment.
PNEC	Predicted No Effect Concentration.
Pow	Partitioning between Octanol and Water
PPE	Personal Protective Equipment
REACH	European Regulation for Registration, Evaluation, Authorization and Restriction of Chemicals
RSES	Responsible for Safety Environment on Site
SDS	Short Data Sheet: an extract from a full data sheet (MSDS) of a product showing type number(s) and title. A SDS is intended for quick reference only and should not be relied upon to contain detailed and full information. It is also called Mini SDS
TEPLB	Total Exploration & Production Lebanon
USER	Entity in charge of using the product

4 - RELATED DOCUMENTS

4.1 - Internal Documents

Reference	Title
0-PO-HSEQ-001	HSE Policy TEPLB
1-MA-HSEQ-001	HSE-MS TEPLB
2-PL-HSEQ-001	Waste Management Plan
2-PL-HSEQ-006	Pollution Prevention and Environmental Monitoring Plan
1-PL-HSEQ-003	Affiliate Emergency Response Plan
2-PL-HSEQ-004	Oil Spill Contingency Plan
RSK/H/P80754/04/01 Block 4 rev1	Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment

4.2 - Contractor Documents

Reference	Title
REP-001-2019	TUNGSTEN EXPLORER CHEMICAL MANAGEMENT PLAN
2-PR-LOG-004	Shore Base Instruction
Memo Ops Log 14/10/2019	Storage and Labelling
	Baker Hughes Chemical Management Plan
	Schlumberger Chemical Management Plan

4.3 - Total Group Documents

Reference	Title
GS-EP-ENV-001	Environmental Requirements for Projects Design and E&P Activities

4.4 - Regulatory Requirements

Ref No.	Title
National Requirements	
Law No. 444/2002	Environmental Protection Law
Law No. 64/1988	Preservation of the Environment against Pollution from Dangerous Waste and Hazardous Substances
Decree 10289/2013	Petroleum Activities Regulations (PAR)

Decree No. 3277/2016 amending Decree No. 2604/2009	Control of Materials that Deplete the Ozone Layer
International conventions applied in the area	
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships (ratified by Law 13/1983)
Rotterdam Convention	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (ratified by Law 728/2006)
Montreal Protocol	Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 (ratified by Decree 3277/2016 and 2604/2009)
Stockholm Convention	Stockholm Convention on Persistent Organic Pollutants (POPs) 2001 (ratified by Law 432/2002)
Barcelona Convention	Barcelona Convention (Convention on the Protection of the Marine Environment and the Coastal Region of the Mediterranean) 1976 amended 1995 (ratified by Decree 126/1977).
Other relevant conventions and recommendations	
OSPAR	Oslo and Paris Convention for the Protection of the Marine Environment and the North
OSPAR Recommendation 2017/1	OSPAR Recommendation 2017/1 on a Harmonized Pre-screening Scheme for Offshore Chemicals
REACH	Regulation (EC) N°1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals.
IMDG	International Maritime Dangerous Goods Code.

In line with the above, Operator is committed to preparing and keeping updated a Chemical Management Plan. In addition, Operator promotes the selection of chemicals that are less harmful for the environment and tries to substitute any product for a less harmful for the environment whenever possible.

Article 128 of PAR requires preferential use of materials and chemicals which are least hazardous or damaging offering improved safety elements and thus minimizing the risks to the health and safety of personnel, to the environment and to property.

Law No. 444/2002 requires a permit for the import, handling or disposal of dangerous / hazardous chemicals.

5 - PROCEDURE

5.1 - Chemicals Identification and selection process

Chemicals are selected in accordance with Total's General Specification document 'Environmental Requirements for Projects Design and E&P Activities' (GS EP ENV 001) which requires that chemicals are selected according to the following criteria: lowest toxicity, lowest bioaccumulation potential and highest biodegradation and are in compliance with applicable regulations such as Regulation (EC) No. 1907/2006 for Europe or Norwegian regulations.

GS EP ENV 001 also states that offshore chemicals will be selected according to a pre-screening scheme based on the OSPAR methodology in force (OSPAR Recommendation 2017/1 on a Harmonised Pre-screening Scheme for Offshore Chemicals) and provided with their material safety data sheet (MSDS). Although OSPAR rules do not apply in Lebanon, as it is not a member of OSPAR, they are a good indication of the environmental properties of a product.

For OSPAR purposes, hazardous substances are defined as substances which are persistent, liable to bioaccumulate and toxic (PBT substances), or which give rise to an equivalent level of concern as the PBT substances.

5.1.1 - OSPAR Recommendation 2017/1

OSPAR Recommendation 2017/1 applies to offshore chemicals intended to be used or already used and / or discharged as a result of the offshore activities.

The Harmonised Pre-screening Scheme for Offshore Chemicals provided in the Appendix 1 of OSPAR Recommendation 2017/1 to be applied. The process of chemical selection adopted by TEPL is provided in Figure 5.1, based on this OSPAR recommendation 2017/1.

5.1.2 - Nationally Restricted Chemicals

The list of banned and restricted chemicals identified at the national level shall be considered. It can be obtained from TEPLB HSE Department.

The use of PFOS (perfluorooctanesulfonic acid) in materials such as fire-fighting foam is forbidden. The fire-fighting foam on the TUX MODU will be Fomtec AFFF 3% which contains no PFOS, see Appendix 7.

5.1.3 - TOTAL Requirements

Based on Total General Specification GS-EP-ENV-001, these substances are prohibited to be used:

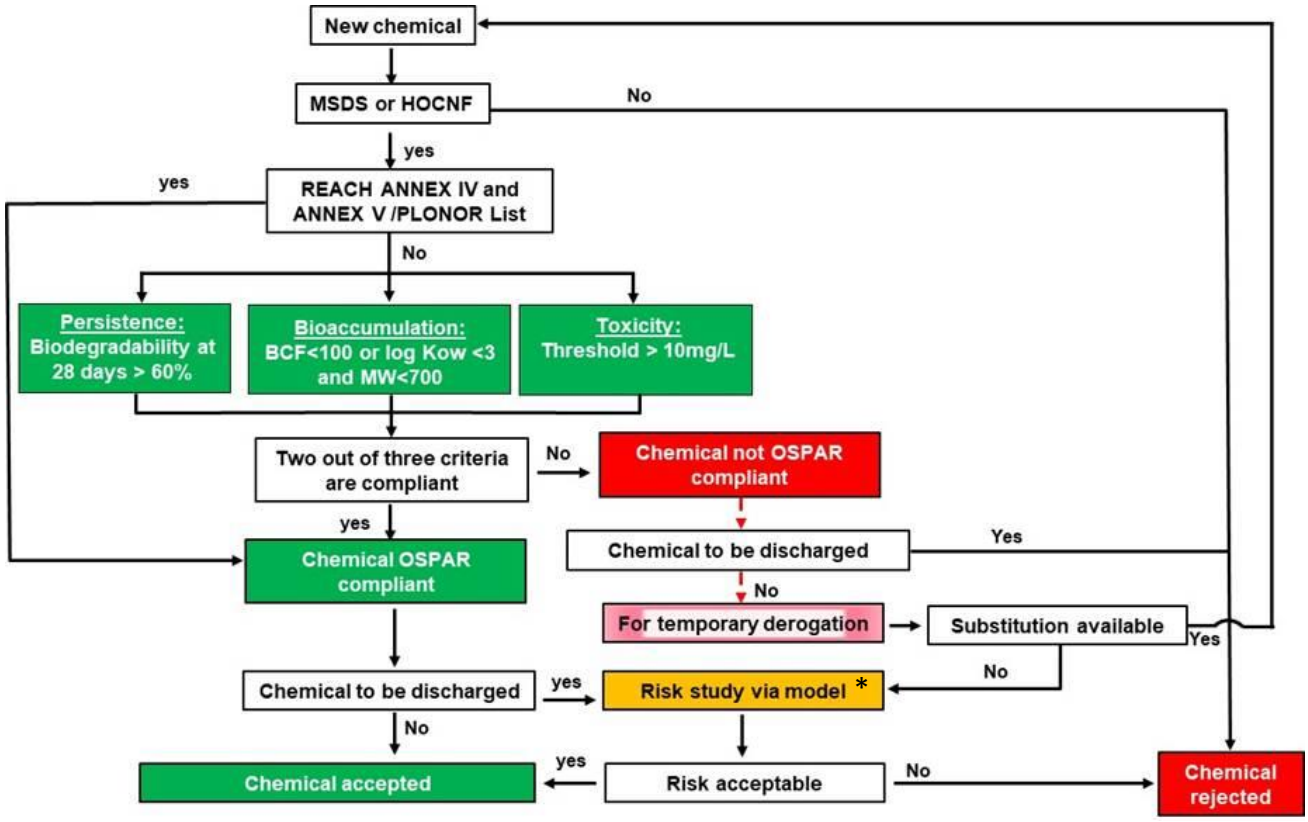
- Ozone depleting substances and all products listed in the Montreal Protocol: any use of CFC, HCFC and halons, which contribute to decreasing the ozone layer, are prohibited except for essential use, under derogation. Alternatives shall be used.

- The use of any transformers containing PCB-type fluids is forbidden.

- The use of glycol ether is prohibited.

Chemicals products shall also be selected according to the minimum danger criteria on the basis of the MSDS information.

Figure 5.1: TEPL diagram adapted from OSPAR Recommendation Chemicals Pre-Screening /Scheme on a Harmonised Pre-Screening Scheme for Offshore Chemicals



* The DREAM model (Dose related Risk and Effect Assessment Model) is a three-dimensional Lagrangian particle model for assessing the consequences of regular, planned releases to the marine environment. DREAM helps visualizing and analyzing releases occurring over extended time periods and in water column.

5.1.4 - Material Safety Data Sheets

Chemicals substances used in the drilling (or production) process are subject to normal manufacturer HSE notification requirements. The manufacturers, importers or vendors are obliged to inform the users of chemicals of all necessary data pertaining to potential health and safety effects. The MSDS will give at a minimum the following information:

- Identification of substance/ preparation and the name/ contact details of supplier
- Composition

- Hazards identification
- First aid measures
- Firefighting measures
- Accidental release measures
- Handling and storage
- Exposure control/ personal protection
- Physical and chemical properties
- Stability and reactivity
- Toxicological information
- Ecological information (biodegradation (in%), bioaccumulation, ecotoxicology (LC50, EC50, … in mg/l))
- Disposal considerations
- Transport information
- Regulatory information
- Other information

A MSDS list updated when needed will be available at the logistics base and on the MODU. MSDS will be displayed in storage and/or usage locations in the most spoken language on site.

The MSDS list is filed by HSE and available upon request. Any MSDS not yet available is to be submitted by the Operations department (LOG or D&W) to HSE for update.

5.1.5 - List of Block 4 chemicals

Offshore chemicals selected for use in the Block 4 exploration drilling programme are listed in Appendix 2.

MSDS for these chemicals are available upon request.

As stated in the EIA commitments register:

- Majority of chemicals proposed are HQ Band Gold; OCNS Group E; or PLONOR and have characteristics of: lowest toxicity, lowest bioaccumulation potential and highest biodegradation (UID CM-2).

- Barite will meet heavy metals concentration standards i.e. mercury <1 mg/kg and cadmium <3 mg/kg dry weight (total) (UID CM-1).

- A pipe dope product that is heavy metal free will be selected for the drilling operations (UID PP-4). MSDS provided in Appendix 8.

- Anti-scaling chemical will be an environmentally sound all-organic product based on biodegradable compounds (UID PP-63), information provided in Appendix 6. No discharge of antifouling chemicals in cooling water, a marine growth prevention system (MGPS) will be used (UID PP-64).

- Only sealed radioactive sources will be used (UID CM-11).

If additional offshore chemicals to those listed in Appendix 2 are proposed for the Block 4 drilling program, the information contained in Appendix 2 will be submitted for the new chemicals. If new product satisfies requirements of OSPAR regulation, no notification of the Ministry of Environment is needed.

5.2 - Incompatibility of Chemicals

Chemicals will be stored separately according to their potential hazard and compatibility (UID CM-8).

Incompatibility of chemicals is an issue that shall be considered for their storage since some of them could react between them leading to events such as fires, explosions or emission of hazardous gases.

To avoid so, the following matrix in Figure 5.2 will be applied for chemical storage (based on the GHS hazard pictograms indicated for each chemical in their MSDS, see Appendix 1).

If a chemical is assigned several GHS pictograms, the following priority order shall be taken account: explosive > oxidizing > flammable > corrosive > toxic > harmful > irritant.

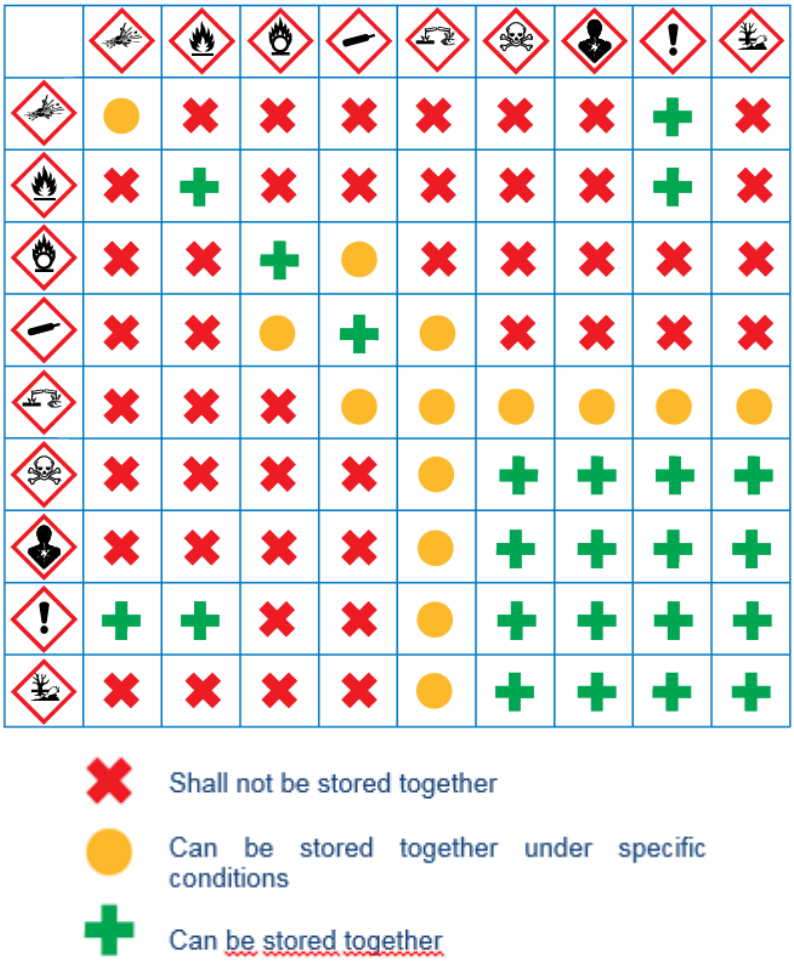


Figure 5.2: Table of compatibility between chemicals

5.3 - Chemicals Management

5.3.1 - Chemicals Purchasing

Direct purchase

In case of a new chemical type, the MSDS is to be submitted to HSE for:

1. environmental review and database updating;
2. to perform an occupational hazard analysis on the basis of the MSDS and Job Safety Analysis file.

If the chemical is defined as potentially discharged to sea as part of operational process (e.g. water-based drilling fluid), the chemicals must fulfill the offshore chemical criteria selection. OSPAR criteria for chemical selection will be included in the Technical Specification included in the procurement documents.

Indirect purchase

Most chemicals are not bought in through the Company supply chain system, but via a contractor.

In this case, all parties involved maintain the responsibility to provide the HSE plans developed by the contractor before the beginning of the activity and that such plans take into account all requirements established in this procedure.

5.3.2 - Transport of Chemicals

Transportation of chemicals is managed by Transporter and different TEPLB Contractors or subcontractors.

Chemical transportation will take into account the following:

- All chemicals will be packaged according to manufacturer's instructions (UID CM-3). The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is considered to be best practice (see Appendix 1). This will be verified at each load out from the logistics base.

- Labelling will comply with regulatory requirements in terms of format and composition (UID CM-4) and must be prominently posted on two or more sides of each container/package and must be suitably weatherproof.

- Chemical products that are required at the MODU (and haven't been pre-mixed onshore) will be packed into mini containers, or open cargo carrying units (CCUs), that are certified and appropriately color coded for safe transfer from jetty to supply vessel and supply vessel to MODU (UID CM-5). This shall be verified at each load out on the logistics base as per Shore Base Instruction (2-PR-LOG-004 and Memo).

- Suitable and certified CCUs (Cargo Carrying Unit) will be used for chemicals transfer; they will be checked visually for integrity at logistics base before transfer offshore (UID PP-44).

- All chemicals must be held in secure and leak-proof containers suitably labeled to indicate the nature of the substance and risk involved (UID PP-27).

- Tanks and containers must have suitable fixtures and fittings for the safe carriage of chemicals.
- MSDS will be present onboard the supply boat during transfer and on the MODU (UID CM-6). This must be verified at each load out at the logistics base and during HSE audits on the MODU.

5.3.3 - Warehousing of Chemicals

Responsibilities at operational sites, for receiving-shipping and warehousing of chemicals must be clearly defined.

Chemical products for the liquid mud plant (reception and storage) are under fluid contractor responsibility.

The person in charge must:

- Check the condition of packaging, the availability of mandatory documentation including MSDS (or SDS);
- Ensure that a contingency plan covering accidental spillage and/or fire is in place;
- Develop and update a warehousing plan and inventory for all chemicals, ensure that chemicals are being used within their lifetime to avoid expired products;
- Ensure First In First Out (FIFO) principle is applied;
- Ensure that operators are trained on the risks inherent to the in-store products with regards to safe operating procedures and contingency measures.

Two inventories will be kept for chemicals:

- An inventory onshore under the responsibility of the fluids and cementing contractors.
- An inventory at the MODU under the responsibility of the fluids and cementing contractors.

Both inventories will be centralized by the Fluid Superintendent in Beirut.

A full register of all chemicals inventory and consumption records shall be maintained on each site (UID CM-9).

5.3.4 - Storage of Chemicals

Chemical products of fluids and cementing operations will be stored at the service contractor's (Baker Hughes/Schlumberger) storage areas. When required by operations, the necessary quantity of chemicals will be transported from contractor's premises to the Logistics Base and used immediately for the drilling fluid/cement preparation.

There will be no permanent storage of chemicals on the Logistics Base, except for pipe dope which will be stored in the warehouse of Logistics Base contractor within Beirut Port. Chemical storage on board the MODU will be restricted (UID CM-10). A limited amount of chemicals (required to adjust properties of the drilling fluid during drilling) will be available offshore at the MODU. Any unused drilling chemicals will be exported once drilling operations are finished.

If chemicals are in place for an extended period instead of being used, they will be considered as temporarily stored. Any temporary chemical storage areas at the logistics base will be designed to avoid leak or spillage to the environment. They will have adequate ventilation and shall be protected from rainfall and direct sunlight (UID PP-38). A certified firefighting and fire alarm system will be installed at the logistics base chemical storage areas, with remote alarm control installed in the offices (UID MR-8). Chemicals must be stored separately according to their potential hazard and compatibility (refer to the compatibility matrix in Section 5.3). This will be checked at the time of receiving goods and then during weekly safety tour. The compatibility matrix will be available in the sack room onboard the MODU.

The following will be noted with respect to storage of chemicals:

- Access to chemicals storage areas should be restricted to authorized personnel where practicable.
- Circulation path must be large enough to allow safe handling.
- All containers, drums and tanks must be clearly labeled as to their contents and the nature of the hazards.
- If the container is damaged, the chemical must be transferred to another appropriate receptacle according to precautions required and relabeled.
- Dedicated chemical storage areas must be bunded and drained through valve drains to collection tanks.
- Chemicals shall be stored on retention pans.
- Incompatible chemicals should be stored with separate containment structures as per relevant regulation.
- Signs and instructions (in the most spoken language on site) must be posted identifying storage areas and advising of restrictions and potential hazards. At the logistics base signs will be in Arabic and English.
- Chemical containers must be closed at all times.
- Emergency equipment for recovering accidental spillage must be available onsite; at the minimum consist of: sorbent pad, sorbent boom, protective cover all, safety goggle, rubber gloves, disposal bag.
- Emergency equipment for personnel must be available (i.e.: emergency shower, eye washer).

- All SDS must be present at storage locations to be easily available at point of use in case of accident. The complete MSDS must be available on site for detailed reference.

5.3.5 - Handling and Use of Chemicals

The handling of chemicals is to be limited to authorized and appropriately trained personnel. Manufacturer's instructions should be carefully followed.

When receiving chemicals, contractors shall:

- Perform quantitative controls to ensure that received chemical quantities match exactly the ones detailed in the delivery note and purchase order.
- Carry out qualitative control in terms of conditions of packaging, availability of required certificates (including MSDS and proper labelling). Any anomaly in received materials shall be immediately reported and each material under claim shall be stored in a specific dedicated storage area.

When expediting chemicals, contractors shall ensure:

- Any exit from stock is authorized in the appropriate manner.
- Packaging prevents contents from moving and is properly labelled.
- Complete written information concerning loading and potential hazards of chemicals (including MSDS) is available and provided to the next person handling the chemical.

5.3.6 - Reporting of Effluents

There will be no direct discharge of chemicals to sea. Reporting of chemical discharge associated with routine operations will be carried out in line with TEPLB's Pollution Prevention and Environmental Monitoring Plan (2-PL-HSEQ-006). Reporting of any accidental releases will be reported in line with TEPLB's Oil Spill Contingency Plan (2-PL-HSEQ-004) and the Monthly Environmental Report presented in TEPLB's Pollution Prevention and Environmental Monitoring Plan (2-PL-HSEQ-006).

5.3.7 - Management of Chemical Waste

Management of waste / off-spec chemicals and packaging will be carried out in line with TEPLB's Waste Management Plan (2-PL-HSEQ-001).

5.4 - Chemical Protection and Prevention Measures

5.4.1 - Personal Protective Equipment

Standard PPE will be worn in relevant areas. This PPE consists of:

- Protection of head and eyes

- Hearing protection
- Bodily protection
- Hand protection
- Foot protection.

Additional or specific chemical PPE will be defined in conformity with MSDS relating to each chemical.

A set of MSDS will be available on all installations where chemicals are used and onboard vessels. Emergency instructions are provided in these documents.

All personnel whose duties involve a risk of exposure to potentially harmful chemicals must be aware of the potential hazards associated with such chemicals.

5.4.2 - Emergency Response

Accidental release of oil or chemicals to the environment will be responded to in line with the TEPLB's Emergency Response Plan (1-PL-HSEQ-003) and Oil Spill Contingency Plan (2-PL-HSEQ-004).

Oil spill kits and chemical spill kits will be made available at the logistics base, onboard the MODU and supply vessels and clearly marked. Any spillage must be immediately cleaned. Personnel will be trained in use of spill kits (UID PP-54 and PP-53).

Eye washers and emergency showers will be installed onsite and clearly indicated by signs and maps.

All accidental release of chemicals shall be reported by user to HSE.

5.4.3 - Information and Training

All personnel involved in the transfer and handling or all personnel who might be exposed to hazardous chemicals will be trained on the potential hazards involved through an awareness course or induction (UID CM-7).

Personnel will be trained in:

- Use of collective and personal protective equipment
- First aid measures
- Chemical emergency procedures.

In addition, all personnel on the MODU must be certified with Basic Offshore Safety and Induction and Emergency Training (BOSIET), or equivalent, which includes additional topics related to chemical management.

6 - RESPONSIBILITIES

6.1 - HSE

HSE Manager

HSE Manager ensures maintenance and revision of the Chemical Management Plan;

Keeps the Emergency Response Plan and Oil Spill Contingency Plan updated;

Ensures the MSDS list is up to date.

6.2 - LOGISTICS BASE

Logistics Base Supervisor

Ensures that the control, documentation and shipment of chemicals offshore are in accordance with regulations relating to IMDG for sea transportation;

Ensures that all tanks, containers and lifting equipment used in the offshore transport of chemicals comply with certification requirements and have appropriate test certificates available.

6.3 - DRILLING & WELLS

Fluids Superintendent

For all existing or new offshore chemicals, ensure that contractual arrangements with suppliers include requirements for the availability of complete MSDS, eco-toxicity parameters as defined in this procedure;

For procurement of new offshore chemicals:

- Inform HSE on the list of the chemicals completed with the MSDS;
- Inform HSE the decision to award the procurement.

Ensures that HSE plans are developed by the contractors in the context of drilling operations and that such plans take into account the requirements of the procedures;

Ensures that MSDS are available for all chemicals and maintain an updated list;

Ensures all requirements of the Waste Management Plan are followed with regards to the handling, packaging and disposal of waste chemicals;

Ensures that all pertinent information needed for the preparation of reports is provided to HSE.

Company Man (RSES)

Ensures inductions and awareness campaigns are regularly performed on MODU;

Ensures any chemicals present on MODU are properly stored and segregated.

6.4 - VESSEL CAPTAIN

Ensures that the control, documentation and shipment of chemicals offshore by sea comply with the requirements of regulations relating to IMDG and MARPOL regulations.

Ensures MSDS are available during shipment.

Ensures that chemicals are stored at dedicated place on the vessel.

APPENDICES

Appendix 1 – GHS Classification of Chemicals

No.	Hazards	GHS Pictograms	Signal Work Code
1	Explosive		GHS01
2	Flammability		GHS02
3	Oxidising		GHS03
4	Gases under pressure		GHS04
5	Corrosive		GHS05
6	Acute and Crossbones		GHS06
7	Certain health hazards		GHS07
8	Chronic health hazards		GHS08
9	Environmental hazard		GHS09

Appendix 2 – List of Chemicals Used by Service Companies in Block 4 Well 1

It should be noted that at the time of EIA submission, the drilling fluid contractor was not known so drilling fluid information was more generic (see fourth column in table below). Contracts are now awarded, therefore branded products have been identified (see equivalent chemicals in first column in tables below).

Schlumberger Chemicals:

CHEMICAL MANAGEMENT PLAN

Product Name	OCNS Classification	Type (Fluid / Powder)	Hazardous (UN regulated)	Package	Number of packages	Weight of empty package, kg	Waste Package (Ton)	Function	Type (Fluid / Powder)	Initially Mobilized Stock (Ton)	Estimated consumption (Ton)
Cement for Water Based Drillng Fluid											
D907	E (plonor)	Powder	No	1 MT Big Bag	400	3	1.20	Cement	Powder	1000	400
Sodium Chloride	E (plonor)	Powder	No	1 MT Big Bag	25	3	0.08	Salt	Powder	part of mud chemicals stock	25
D256	Silver	Liquid	No	1 IBC Tank	45	57	2.57	Fluid Loss Control	Powder	64	45
D206	Gold	Liquid	No	20 kg can	90	3	0.27	Defoaming agent	Powder	3	1.8
D155	E	Liquid	No	1 IBC Tank	119	57	6.76	Stabilizing agent	Liquid	164.3	118.6
D230	Gold	Liquid	No	1 IBC Tank	6	57	0.34	Anti settling agent	Powder	10.3	6
B275	Gold	Liquid	No	200 kg drum	1	18	0.02	Fluorescein tracer	Powder	0.4	0.2
Cement for Non-Aqueous Drilling Fluid SECTIONS											
D907	E (plonor)	Powder	No	1 MT Big Bag	280	3	0.84	Cement	Powder	1000	280
Sodium Chloride	E (plonor)	Powder	No	1 MT Big Bag	7	3	0.02	Salt	Powder	part of mud chemicals stock	7
D256	Silver	Liquid	No	1 IBC Tank	8	57	0.46	Fluid Loss Control	Powder	64	8
D206	Gold	Liquid	No	20 kg can	25	3	0.08	Defoaming agent	Powder	3	0.5
D155	E	Liquid	No	1 IBC Tank	24	57	1.35	Stabilizing agent	Liquid	164.3	23.6
D230	Gold	Liquid	No	1 IBC Tank	2	57	0.09	Anti settling agent	Powder	10.3	1.6
D075	E (plonor)	Liquid	No	200 kg drum	37.5	18	0.68	Extender	Powder	12.5	7.5
D081	Gold	Liquid	No	20 kg can	25	3	0.08	Retarder	Powder	0.8	0.5
D110	Gold	Liquid	No	200 kg drum	3.5	18	0.06	Retarder	Powder	2.7	0.7
D500	Gold	Liquid	No	200 kg drum	37.5	18	0.68	Anti gas migration	Powder	13.3	7.5
D077	E (plonor)	Liquid	No	200 kg drum	41.5	18	0.75	Accelerator	Liquid	11.5	8.3
SPACER FOR NADF SECTIONS											
Barite	E (plonor)	Powder	No	1 MT Big Bag	30	3	0.09	Spacer weighting agent	Powder	part of mud chemicals stock	30
U066	Gold	Liquid	No	200 kg drum	58	18	1.04	Spacer solvent	Liquid	15	11.6
F103	Gold	Liquid	Yes	200 kg drum	60	18	1.08	Spacer emulsifier	Powder	15.6	12
D182	Gold	Powder	No	25 kg sack	140	0.5	0.07	Spacer viscosifier	Powder	4.8	3.5
CONTINGENCY FOR NADF SECTIONS											
D801	E (plonor)	Liquid	No	20 kg can	75	3	0.23	Retarder	Powder	1.5	0
D095	E	Powder	No	25 kg sack	36	0.5	0.02	Lost Circulation Material	Liquid	0.9	0
D600G	Gold	Liquid	No	200 kg drum	41	18	0.74	Anti gas migration	Powder	8.2	0
D111 Used only as a contigency if heavy losses are faced (well integrity)	C	Liquid	Yes	200 kg drum	25	18	0.45	Thixotropic agent	Liquid	5	0

***EIA 6.2.2 Cementing discharges**

After drilling each hole section, cement is pumped down the casing and up the annulus formed between the casing and the well bore. During this process, some excess cement will be displaced into the water column and onto the seabed (20" casing only). The approximate quantity of cement discharge per well will **be 1 m3, up to a maximum of 10 m3** depending on the actual hole size. During the drilling of the subsequent sections, a small amount of solid cement will be drilled out from the top of each interval and comingled with the drill cuttings.Any leftover cement from the drilling operations will be pumped downhole during the well plug and abandonment activities therefore no waste cement to be managed on project.

CHEMICAL MANAGEMENT PLAN

Baker-Hughes Chemicals:

Product Name	OCNS Classification	Function	Hazardous (UN regulated)	Initially Mobilized Stock (Ton)	Estimated consumption (Ton)	Package	Number of packages	Estimated Weight of empty package, kg	Waste Package (Ton)	HQ Band	Type (Fluid / Powder)	Estimated Quantities (Ton)	Comments
Water Based Drilling Fluid (riserless section)													
Barite	E (plonor)	Weighting material	No	2000	140	1 MT Big Bag	140	3	0.42	E (PLONOR)	Powder	100	
Bentonite	E (plonor)	Viscosifier	No	63	30	1 MT Big Bag	30	3	0.09	E (PLONOR)	Powder	60	
Caustic_soda	E	pH & Hardness Treatment	Yes	6.4	3.8	20 kg can	190	3	0.57	E	Powder	8	
MIL BIO SEA 98	Gold	Prevent Bacterial Degradation	No	1.3	0.7	20 kg can	35	3	0.11	Gold	Liquid	8	
NaCl	E	Salt	No	900	650	1 MT Big Bag	650	3	1.95	E	Powder	2000	
XAN-PLEX DSP	Gold	Viscosifier	No	10	4	25 kg sack	160	0.5	0.08	Gold	Powder	10	
MIL PAC / MIL STARCH	E	Fluid Loss reducer	No	10	5.5	25 kg sack	220	0.5	0.11	E	Powder	15	
Soda_Ash	E	Alkalinity Control	No	10	4	25 kg sack	160	0.5	0.08	E(PLONOR)	Powder	8	
Sodium_bicarbonate	E	Treating Cement out	No	2	0.2	25 kg sack	8	0.5	0.00	E	Powder	5	
Guar Gum	E	Viscosifier	No	5.3	2.4	25 kg sack	96	0.5	0.05	E(PLONOR)	Powder	10	
Potassium_chloride	E	Shale Stabilizer	No	40	37	1 MT Big Bag	37	3	0.11	E(PLONOR)	Powder	60	
Non-Aqueous Drilling Fluid													
Barite	E (plonor)	Weighting material	No	2000	1000	1 MT Big Bag	1000	3	3.00	E (PLONOR)	Powder	900	
Calcium_chloride	E (plonor)	Brine for water phase salinity	No	160	130	25 kg sack	5200	0.5	2.60	E (PLONOR)	Powder	200	
DELTA MOD	Gold	Rheology Modifier (Viscosifier)	No	9	2	200 kg drum	10	18	0.18	Gold	Liquid	15	
DELTA-GEL	E	Primary Viscosifier (Viscosifier)	No	59	56	25 kg sack	2240	0.5	1.12	E	Powder	75	
Ecco-Blok	E	Shale Stab./HTHP filtration Control	No	27	23	25 kg sack	920	0.5	0.46	C	Powder	30	
Ecco-Mul_E	D	Emulsifier	No	102	102	200 kg drum	510	18	9.18	B	Liquid	90	
EDC 170 SE	E	Base Oil	No	2000	1300	19 MT Flexitank	68	40	2.74	D	Liquid	2000	
MAGMA-GEL SE	E	Primary Viscosifier	No	29	27	25 kg sack	1080	0.5	0.54	E	Powder	35	
Mil-lime OR Lime	E	Alkalinity Control	No	100	90	25 kg sack	3600	0.5	1.80	E(PLONOR)	Powder	110	
CONTINGENCY*													
KWIK-SEAL F/M/C	E	Loss Circulation Material	No	0	0						Powder	20	
LC-LUBE_PLUS	E	Bridging Material	No	9.1	0	25 kg sack	364	0.5	0.18		Powder	8	
Chek-Loss_Plus	E	Bridging Material (LCM)	No	6.3	0	25 kg sack	252	0.5	0.13		Powder	10	
MIL SPOT II	A	Stuck Pipe Spot	Yes	3.1	0	200 kg drum	16	18	0.28		Liquid	8	used only if equipment is stuck in the well. Not part of the drilling fluid recipe.
Mil-Carb_150	E	Bridging Material (LCM)	No	80	0	25 kg sack	3200	0.5	1.60		Powder	8	
Mil-Carb_50	E	Bridging Material (LCM)	No	80	0	25 kg sack	3200	0.5	1.60		Powder	8	
WALNUT PLUG F/M OR Mil-Plug	E	Loss Circulation Material	No	15	0	25 kg sack	600	0.5	0.30		Powder	20	
MD	Gold	Reduce Bit Balling, lower T & D	No	3.3	0	200 kg drum	17	18	0.30		Liquid	8	
MICA F/M/C	E	Loss Circulation Material	No	0	0						Powder	5	
Seal or Mil-Seal	E	Loss Circulation Material	No	15	0	25 kg sack	600	0.5	0.30		Powder	20	
Citric Acid	E	Alkalinity Control	No	2	0	25 kg sack	80	0.5	0.04		Powder	5	
WO DEFOAM	Gold	Prevent Foaming	Yes	1.7	0	200 kg drum	9	18	0.15		Liquid	8	
Super Sweep	Gold	Fiber Sweep	No	0.1	0	6 kg box	17	0.5	0.01		Fibers	2	used only for the pills to improve the hole cleaning. Recovered over the shaker and mixed with cuttings. Not part of the drilling fluid recipe.
Perma-lose_HT	B	Fluid Loss reducer	No	10	5.5	25 kg sack	220	0.5	0.11		Powder	15	
DELTA-LIFT	B	Rheology Modifier (Viscosifier)	No	18	4	200 kg drum	20	18	0.36		Liquid	20	
Mil Gard XPR	Gold/Silver	H2S Scavenger	Yes	3.3	0	200 kg drum	17	18	0.30		Powder	10	Waste Management chemical. It will be mixed in waste tank in case of H2S to protect personnel health. Not part of the drilling fluid recipe

*As per EIA any contingency chemicals shall be OSPAR compliant

** The scheme (OCNS) does not apply to chemicals that might otherwise be used on a ship, helicopter or other offshore structure. Products used solely within domestic accommodation areas - such as additives to potable water systems, paints and other coatings, fuels, lubricants, fire-fighting foams, hydraulic fluids used in cranes and other machinery - are also exempt (https://www.cefas.co.uk/cefas-data-hub/offshore-chemical-notification-scheme/)

*** NADF is not discharged in the environment, only cuttings from riserless section (no potential for the recovery) drilled with Water Based Fluid will be deposited on the sea bed directly by the drill bit

Water Drilling Fluid (riserless section)

Appendix 3 – MODU Tungsten Explorer REACH Compliance Report

It should be noted that at the time of EIA submission the MODU had not been selected therefore information on maintenance chemicals onboard the rig could not be provided. They are provided here in the CMP for completeness. It should be noted that these chemicals will not be discharged to the environment.

No.	Product Characteristics				Quantity	Compnents characteristics			
	Name	Components	Base / Contingency	Function	Maximum quantity stored onboard possibly above 1 Ton? (Y/N)	CAS No.	REACH (EC 1907/2006)		
							REACH status	GHS hazard pictograms	GHS hazard statements (H phrases)
1	3-In-One Professional White Lithium Grease Lubricant	Petroleum distillates, hydrotreated heavy paraffinic		Lubricating Grease	N	64742-54-7	Registered	2,4,7,8	Extremely flammable aerosol, Contains gas under pressure; may explode if heated, May cause an allergic skin reaction, May be fatal if swallowed and enters airways
2	3-In-One Professional White Lithium Grease Lubricant	titanium dioxide		Lubricating Grease	N	3463-67-7	Registered	2, 4, 7, 8	Extremely flammable aerosol, Contains gas under pressure; may explode if heated, May cause an allergic skin reaction, May be fatal if swallowed and enters airways
3	3-IN-ONE Anti-Seize Copper Grease	Hydrocarbons, C6, isoalkanes, <5% nhexane, C7, nalkanes, isoalkanes, cyclics		Anti-Seize Grease	N 24 x 500g pots and 3 x 250g cans	64742-49-0	Registered	2, 8	Extremely flammable aerosol, May be fatal if swallowed and enters airways, Harmful to aquatic life with long lasting effects, Pressurized container: may burst if heated
4	WD-40 Bulk Liquid	Distillates (petroleum), hydrotreated light		Lubricating Spray	N 24 x 450ml aerosol cans	64742-47-8	Registered	4, 1	Combustible liquid, May be fatal if swallowed and enters airways

5	Mystik JT-6 Synthetic Blend Grease	Distillates (petroleum), hydrotreated heavy paraffinic		Lubricating grease; CITGO Material Code: 665051002; Former Name: Mystik SX-6 Synthetic Blend Extreme range Multi-Purpose Grease, No.2	N	64742-54-7	Registered	8	May cayse long lasting harmful effects to aquatic life
6	Mystik JT-6 Synthetic Blend Grease	1-Decene, tetramer, mixed with 1-decene trimer, hydrogenated		Lubricating grease; CITGO Material Code: 665051002; Former Name: Mystik SX-6 Synthetic Blend Extreme range Multi-Purpose Grease, No.2	N	64742-54-7	Registered	8	May cayse long lasting harmful effects to aquatic life
7	MOBILGREASE XHP 222	Naphthenic acids, zinc salts		Base oil and additives, grease	N	12001-85-3	Registered	2	Combustible liquid, May be fatal if swallowed and enters airways
8	MOLYKOTE 55 ORING GREASE	Lithium stearate		Lubricants and lubricant additives	N	26544-38-7	Registered	7	May cause an allergic skin reaction
9	MOLYKOTE 55 ORING GREASE	dihydro-3-(tetrapropenyl)furan-2,5-dione		Lubricants and lubricant additives	N	26544-38-7	Registered	7	May cause an allergic skin reaction
10	Shell Gadus S3 V220C 2	ZINC NAPHTHENATE		Automotive and industrial grease	N	12001-85-3	Registered	7, 7	Causes serious eye irritation, may cause an allergic skin reaction
11	Automotive Diesel Fuel	Hydrocarbons and Additives		Diesel engine fuel	Yes 7931m3 @ 85% capacity	68334-30-5	Registered	7, 8	Flammable liquid, Acute inhalation toxicant, Skin irritation, Carcinogen, Specific target organ toxicant (repeated exposure), Aspiration toxicant:
12	AMEROID OWS	Fuel oil, no. 2		Degreaser	N 100 L	68476-30-2	Registered	5, 7, 8	Combustible liquid, Causes serious eye damage, Suspected of causing cancer., May cause respiratory irritation; or; May cause drowsiness or dizziness, May be fatal if swallowed and enters airways, Harmful to aquatic life with long lasting effects

13	NALCOOL 2000	Sodium metasilicate		Enginer water treatment	No 750 L	6834-92-0	Registered	7, 8	Causes skin irritation, Causes serious eye irritation, May cause an allergic skin reaction, Causes damage to organs (Blood) if swallowed.
14	NALCOOL 2000	sodium nitrate		Enginer water treatment	No 750 L	7631-99-4	Registered	7, 8	Causes skin irritation, Causes serious eye irritation, May cause an allergic skin reaction, Causes damage to organs (Blood) if swallowed.
15	NALCOOL 2000	Sodium mercaptobenzothiazole		Enginer water treatment	No 750 L	2492-26-4	Registered	7, 8	Causes skin irritation, Causes serious eye irritation, May cause an allergic skin reaction, Causes damage to organs (Blood) if swallowed.
16	NALCOOL 2000	sodium nitrite		Enginer water treatment	No 750 L	7632-00-0	Registered	7, 8	Causes skin irritation, Causes serious eye irritation, May cause an allergic skin reaction, Causes damage to organs (Blood) if swallowed.

Appendix 4 – Anti-Scaling Agent Utilized on MODU Tungsten Explorer

HATENBOERWATER
Fresh in water since 1906.

HDC-ASI-ECO

Biodegradable antiscalant for Reverse Osmosis

General

HDC-ASI-ECO 1 & 2 are an antiscalant based on biopolymers and is intended for the treatment of membrane installation. HDC-ASI-ECO is a product of the all-organic type and is based on biodegradable compounds. Based on OECD-testing HDC-ASI-ECO can be classified as inherently biodegradable (20-60%). The origin and biodegradability of the raw materials makes HDC-ASI-ECO a very environment-friendly product. HDC-ASI-ECO disperses inorganic deposits, so that an optimal water flow is guaranteed.

HDC-ASI-ECO conforms to the requirements of NSF/ANSI Standard 60 - Drinking Water Treatment Chemicals - Health Effects.

Properties

	HDC-ASI-ECO1	HDC-ASI-ECO2
Appearance	clear liquid	clear liquid
Colour	brown	brown
Density (20 °C) approx.	1.09 g/cm³	1.02 g/cm³
pH	7 - 10	10 - 13

Application

HDC-ASI-ECO can be used in water with a maximum Langelier Index of +2.5. The required dose of HDC-ASI-ECO is dependent on the system parameters.

Safety

HDC-ASI-ECO is classified as a non-hazardous product. The standard precautionary measures when handling chemicals are to be observed. HDC-ASI-ECO must be protected from frost. Reference is made to the relevant material safety data sheet for more detailed information.

GREEN THINKING

Appendix 5 – Fire Fighting Foam Utilized on MODU Tungsten Explorer

fomtec
Fire Fighting Foams & Equipment

Fomtec® AFFF 3% A
foam concentrate

Description

Fomtec AFFF 3% A is an aqueous film forming foam concentrate (AFFF) consisting of fluorocarbon and hydrocarbon surfactants blended with various solvents, preservatives and stabilisers.
The foam forms an aqueous film that rapidly cuts off the oxygen supply and knocks down the fire. The expanded foam, from which the film is drained, forms a stable blanket that suppresses the release of flammable vapours and cools down the fuel surface extinguishing the fire and preventing reignition.
The low surface tension of the water-foam solution enables the aqueous film, although heavier than the burning liquid, to float on top of the liquid surface.
Fomtec AFFF 3% A should be used at 3% proportioned solution (3 part concentrate in 97 parts of water) in brackish, fresh or sea water. It may also be stored as a premix solution in fresh water.

Application

Fomtec AFFF 3% A is intended for use on class B hydrocarbon fuel fires such as oil, diesel and aviation fuels. It can be used with both aspirating and non-aspirating discharge devices.
Fomtec AFFF 3% A is especially suited whenever rapid fire knock-down is essential. It is compatible with all dry chemical powders and can be used in powder/foam twin agent systems.

Fire Performance & Foaming

The fire performance of this product has been measured and documented according to "International Approvals" stated in this document. The foaming properties are depending on equipment used and other variables such as water and ambient temperatures. Average expansion 7:1, average ¼ drainage time 02:00 minutes using UNI 86 test nozzle.

Proportioning

Fomtec AFFF 3% A can easily be proportioned at the correct dilution using conventional equipment such as:

- Inline inductors
- Balanced pressure, variable flow proportioning systems
- Bladder tanks
- Around the pump proportioning systems
- Water turbine driven foam proportioners
- Self inducting branch pipes and nozzles

The equipment should be designed to the foam type.

Compatibility

Contact one of the Fomtec sales team with questions.

Technical data

Appearance	Clear yellowish liquid
Specific gravity at 20°C	1,015 +/- 0.01 g/ml
Viscosity at 20°C	≤ 20 mPas
pH	6,5 – 8,5
Freezing point	-5°C
Recommended storage temperature	-5 – 55°C
Suspended sediment (v/v)	Less than 0,2%
Surface tension	≤ 19,0 dynes/cm

Environmental impact

Fomtec AFFF 3% A is formulated using raw materials specially selected for their fire performance and their environmental profile. Fomtec AFFF 3% A is biodegradable. The handling of spills of concentrate or foam solution should however be undertaken according to local regulations. Normally sewage systems can dispose foam solution based on this type of foam concentrate, but local sewage operators should be consulted in this respect. This product contains NO PFOS or PFOA.

Full details will be found in the Material Safety Datasheet (MSDS).

Storage / Shelf life

Stored in original unbroken packaging the product will have a long shelf life. Shelf life in excess of 10 years will be found in temperate climates. As with all foams, shelf life will be dependent on storage temperatures and conditions. If the product is frozen during storage or transport, thawing will render the product completely usable.
Synthetic foam concentrates should only be stored in stainless steel or plastic containers. Since electrochemical corrosion can occur at joints between different metals when they are in contact with foam concentrate, only one type of metal should be used for pipelines, fittings, pumps, and tanks employed in the storage of foam concentrates. We recommend following our guidelines for storage and handling ensuring favourable storage conditions.

Packaging

We supply this product in 25 litre cans and 200 litre drums. We can also ship in 1000 litre containers or in bulk.

Litres per piece	Packaging	Part no
25 litres	Can	10-3004-01
200 litres	Drum	10-3004-02
1000 litres	Container	10-3004-04
Bulk	Special request	

International Approvals

- EN 1568, part 3

Fomtec® is a trademark of Dafo Fomtec AB — Revised: 11.12.2013

The independent alternative | Dafo Fomtec AB | P.O. Box 683 | SE-135 26 Tyresö | P: +46 8 506 405 66 | F: +46 8 506 405 29 | www.fomtec.com

Appendix 6 – Pipe Dope Utilized on MODU Tungsten Explorer

KOPR-KOTE®

TOOL JOINT & DRILL COLLAR COMPOUND

DESCRIPTION

KOPR-KOTE® drill collar and tool joint compound is a premium-quality, unleaded compound containing copper flake, graphite, and other natural extreme pressure and anti-wear additives. **KOPR-KOTE's** solids package is formulated to prevent excessive circumferential makeup by increasing the coefficient of friction under compressive forces. As stress levels rise above 50% of yield, the friction factor increases, limiting downhole makeup. Full hydraulic joint efficiency is maintained allowing joint shoulder faces to mate completely without standoff or deformation. **For invert or high-pH muds, use Jet-Lube EXTREME™. For wedge-type thread connections, use NCS-30™ ECF for best thread-wear protection.**

- **Not classified as a marine pollutant - DOT Approval CA2004080025**
- Contains no lead or zinc.
- Extreme-pressure additives provide additional protection against seizing and galling and allow consistent make-up.
- Aluminum-complex grease base protects against rust and corrosion.
- Sticks to wet joints.
- Unequaled resistance to makeup downhole.
- Available in Arctic, Thermal, and Specialty grades.
- Approved by NAM/Shell for under-balanced drilling applications.

For optimum performance on API drill string connections, **KOPR-KOTE** should be utilized with the torque charts in API RP7G or by contacting the drill pipe and connection manufacturer.

Premium drill string connections such as HI-TORQUE®(HT), eXtreme® Torque (XT®), and XT-M™ connections, etc., utilize make-up torques based upon thread compound friction factors of 1.0. Therefore, use the torque provided by the premium connection manufacturer. Adjusting make-up torque based on thread compound friction factor may still be advised.

SERVICE RATING:
0°F (-18°C) TO 450° (232°C)

PRODUCT CHARACTERISTICS

Thickener	Aluminum Complex
Fluid Type	Petroleum
Dropping Point (ASTM D-2265)	450°F (232°C)
Specific Gravity	1.15
Density (lb/gal)	9.6
Oil Separation (ASTM D-6184) Wt. % Loss @ 212°F (100°C)	<3.0
Flash Point (ASTM D-92)	>430°F (221°C)
NLGI Grade	1
Penetration @ 77°F (ASTM D-217)	310 - 330
Copper Strip Corrosion (ASTM D-4048)	1A, typical
4-Ball (ASTM D-2596)	
Weld Point, kgf	800, typical
Friction Factor*	1.15 (standard service)
(Relative to API RP 7G)	1.25 (very severe service)

*** Many factors such as pipe size, thread geometry, drilling mud contamination, etc. affect the friction factor. This is a relative number and in all applications experience and prior knowledge should be used to adjust make-up torque accordingly. Contact your drill pipe manufacturer for torque and friction-related specifications.**

PACKAGING

Code No.	Container Size	Shipping Wt.
10123	1 gal.	5 kg.
10113	2½ gal.	11.8 kg.
10193	20 kg.	22 kg.
10115	5 gal.	23.6 kg.
10117	5 gal.	23 kg.
10124	15 gal.	68.9 kg.
10129	50 gal.	233.1 kg.

LIMITED WARRANTY

Jet-Lube, Inc. makes the Limited Express Warranty that at the date of delivery, this product shall be free from defects in Jet-Lube, Inc. materials and workmanship.

This Limited Express Warranty is expressly in lieu of any other express or implied warranties, including any implied warranty of merchantability or fitness for a particular purpose, and of any other obligation on the part of Jet-Lube, Inc.

The sole remedy for breach of the Limited Express Warranty shall be the refund of the purchase price. All other liability is negated and disclaimed, and Jet-Lube, Inc. shall not be liable for incidental or consequential damages.

CORPORATE LOCATIONS

Houston, Texas–World Headquarters

Maidenhead, England — **Edmonton, Canada**

JET-LUBE

JET-LUBE, INC.
4849 HOMESTEAD RD.,
P.O. BOX 21258 (77226-1258)
HOUSTON, TX 77028

WATS: 800-538-5823
PHONE: 713-674-7617
FAX: 713-678-4604
E-MAIL: sales@jetlube.com
www.jetlube.com

OILFIELD OILFIELD OILFIELD OILFIELD OILFIELD

JET-LUBE, INC.
MATERIAL SAFETY DATA SHEET

I

Product Name: KOPR-KOTE®
Chemical Family: Petroleum based lubricating grease
Use: Tool joint and drill collar compound/anti-seize (MIL-PRF-907E)/ jacking lubricant

Manufacturer/Supplier: JET-LUBE, INC.
Address: 4849 Homestead Rd., Ste. #200 Houston, TX, 77028 USA **Phone:** 713-674-7617
Emergency Phone: 713-674-7617 **Fax:** 713-678-4604
Chemtrec 24 hours (USA): 800-424-9300

II

Hazardous Components	CAS No.	Wt%	OSHA PEL	ACGIH TLV	Other Limits of Exposure
Lubricating Grease	74868219	60	N/A	N/A	STEL:
Nonhazardous Blend	7782435/1317335 13776744/471341	20-30	UN	UN	STEL: UN STEL: UN
Metallic Copper	7440508	10	N/A	1mg/M³	STEL: 2mg/M³

III

Main Hazards–Health Effects
Eyes: May cause irritation. **Inhalation:** Viscous nature may block breathing passages if inhaled. **Ingestion:** May cause diarrhea.
Skin: For hypersensitive persons, may irritate the skin after prolonged periods of contact.

IV

Eyes: Flush with water until all residual material is gone. If irritation persists, seek medical help. **Inhalation:** Clear air passage. If respiratory difficulty continues, seek medical help. **Ingestion:** Wash out mouth immediately. Consult physician. **Skin:** Wash thoroughly with hand cleanser, followed by soap & water. Contaminated clothing should be dry cleaned before reuse.

V

Extinguishing Media: Foam, dry powder, Halon®, carbon dioxide, sand, earth & water mist. **Unsuitable Extinguishing Media:** Water jet.
Protective Equipment for Fire fighting: Self-contained breathing apparatus.

VI

Personal Precautions: Wear gloves & protective overalls. **Environmental Precautions:** Do not allow it to enter drains. **Spillage:** Scrape up bulk, then wipe up remainder with cloth. To prevent walking hazard, pick up remaining residue with diatomaceous earth.

VII

Handling: No special handling precautions necessary. **Storage:** Do not store at elevated temperatures.

VIII

Respiratory Protection: None needed. **Hand Protection:** Protective gloves for hypersensitive persons.
Eye Protection: Glasses, if applied to parts in motion. **Body Protection:** Overalls.

IX

Physical State: Semisolid paste **Color:** Copper/Bronze **Odor:** Petroleum **pH:** Neutral **Boiling Range/Point °F (°C):** <600 (316)
Melting Point °F (°C): 500 (260) **Flash Point (COC) °F (°C):** 430 (221) **Autoignition Temperature °F (°C):** >500 (260)
Explosive Properties: **LEL:** 0.9% **UEL:** 7% **Evaporation Rate (Butyl Acetate):** <0.01 **Partition Coefficient (Log Pow):** N/A
Vapor Pressure (kPa): <0.01 **Percent Volatiles:** Nil **Density (g/cm³):** 1.15 **Flammability:** Not flammable at ambient temperature.
OAR Value: N/A **Oxidizing Properties:** None **Water Solubility:** Nil **Vapor Density:** >5

X

Stability: Chemically stable under normal conditions. No photoreactive agents. **Conditions to Avoid:** Powerful sources of ignition & extreme temps. **Materials to Avoid:** Strong inorganic & organic acids, oxidizing & copper reactive agents. **Hazardous Decomposition Products:** Burning generates smoke, airborne soot, hydrocarbons & oxides of carbon, sulfur & nitrogen. Residue mainly comprised of soot & mineral oxides.

XI

Acute Toxicity: Not known. **Irritancy–Skin:** Very mild. **Skin Sensitization:** Not known. **Subacute/Sub-chronic Toxicity:** Not known.
Genotoxicity: None known. **Chronic Toxicity:** None known. **California Prop 65:** N/A **Carcinogen:** **NTP:** No **IARC:** No **OSHA:** No
EC Classification (67/548/EEC): No **Allergens:** None known. **LC-50:** 1.96gm/l—actual test data - mysidopsis bahia. **LD-50:** N/A

XII

Possible Effects: In extreme cases, may gernerate oil fractions that could act as a marine pollutant. Occurrences of this nature are highly unlikely. **Behavior:** Relatively well behaved. Bioaccumulation potential nil.
Environmental Fate: Highly unlikely to cause widespread contamination. Nontoxic to marine or land organisms.

XIII

Product Disposal: Do not incinerate. Contact waste disposal company or local authority for advice.
Container Disposal: Pails without liner–see Product Disposal section above. Pails with plastic liner–pail may only be disposed of via standard waste disposal services, recycled or reused. Liner–see Product Disposal section above.

XIV

D.O.T.: Nonhazardous D.O.T. exception CA2004080025 **UN No.:** Nonhazardous **Air Transport (ICAO & IATA):** Nonhazardous
Sea Transport (IMO & IMDG): Nonhazardous **Road & Rail Transport (ADR/RID):** Nonhazardous

XV

Labeling Information: None needed **EC Annex 1 Classification:** Not Applicable. **R Phrases:** R22—harmful if swallowed.
S Phrases: N/A, as known. **Ozone Depleting Chemicals:** N/A **TSCA:** All components are listed. **TSCA 12B Components:** None
WHMIS (Canada): Not controlled. **Canadian DSL:** All components listed. **40 CFR Part 372 (SARA Section 313):** This product contains in part raw material components subject to reporting. **SARA 311/312:** None **CERCLA:** Nonhazardous **RCRA Hazard Class:** Nonhazardous

XVI

SDS first issued. SDS data revised. **New Jersey Right To Know:** See Section II

HMIS SYMBOL

HEALTH	1
FLAMMABILITY	1
REACTIVITY	0
PPI	B

NFPA SYMBOL

Signature:
Prepared by: Donald A. Oldiges
Date Issued: June 25, 2008

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LEGEND

I. Identification of the substance/preparation and company
II. Composition information on ingredients
III. Hazards identification
IV. First aid measures
V. Fire fighting measures
VI. Accidental release measures
VII. Handling and storage
VIII. Exposure controls/personal protection
IX. Physical and chemical properties
X. Stability and reactivity
XI. Toxicological information
XII. Ecological information
XIII. Waste Disposal
XIV. Transport information
XV. Regulatory Information
XVI. Other information

Appendix 7 – OCNS Protocol

	Criteria	Substance level NL HMCS category
4.1	Substance: • On PLONOR list, • Listed under REACH Annex IV or • Complies with relevant exclusions under REACH (EC 1907/2006) Annex V*	P
4.2	Substance on List of Chemicals for Priority Action, List of Chemicals of Possible Concern, the Authorisation List (Annex XIV) or relevant restrictions under Annex XVII to REACH**	A
4.3	Inorganic substances with LC50 less than 1mg/l	B
4.4	Inorganic substances with LC50 greater or equal to 1mg/l	E
4.5	Organic substances with biodegradation less than 20% or REACH half lives greater than 60 days (marine water)/180 days (sediment)	C
4.6	Organic substances meeting 2 out of 3 PBT criteria (i) biodegradation: less than 60% in 28 days (OECD 306 or any other OSPAR-accepted marine protocol); or in the absence of valid results for such tests: less than 60% (OECD 301B, 301C, 301D, 301F, Freshwater BODIS); or less than 70% (OECD 301A, 301E); (ii) bioaccumulation: BCF > 100 or log P_{ow} ≥ 3 and molecular weight <700; or if the conclusion of a weight of evidence judgement under Appendix 3 of OSPAR Agreement 2012-5 is negative; or (iii) toxicity: LC_{50} < 10mg/l or EC_{50} < 10mg/l; if toxicity values <10 mg/l are derived from limit tests to fish, actual fish LC_{50} data should be submitted;	D
4.7	Other organic substances	R

POLLUTION PREVENTION AND ENVIRONMENTAL MONITORING PLAN

	Name	Position	Date	Signature
Prepared by		HSEQ Engineer		
Verified by		HSEQ Manager		
Verified by		Operations Manager		
Approved by		General Manager		

Revision	Date	Prepared by	Verified by	Verified by	Approved by
1	06-Feb-2020				

Métier: HSEQ	**Entity:** Exploration & Production

Table of Contents:

1. OBJECTIVES

This Pollution Prevention and Environmental Monitoring Plan (PPEMP) describes the methodology adopted by Company (TEP Liban) to implement good practices regarding management of emissions and discharges associated with exploration drilling activity conducted by Company in Lebanon offshore Block 4.

This plan has been prepared taking into consideration findings of the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment, Lebanese legislation and regulations, applicable international conventions, and TOTAL's corporate requirements.

This PPEMP is a key component of TEP Liban's Health, Safety and Environmental Management System (HSE MS).

TEP Liban employees and Contractors are required to abide by the requirements in this PPEMP. Contractors' environmental management procedures shall align with this PPEMP.

2. SCOPE

The PPEMP applies to all exploration activities in Block 4, as well as support activities associated with the Project implementation. It is applicable to offshore and onshore, including the MODU, logistics base, helicopters and support / supply vessels operating on behalf of the Project.

The PPEMP brings together the emissions and discharge management mitigation commitments in the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment (EIA) to either provide greater detail about how the commitment will be implemented or provide reference to the section of the HSE MS where that detail is found. It includes the following:

- Air emissions
- Drilling discharges from MODU
- Routine wastewater discharges from the MODU and support / supply vessels
- Physical presence of MODU
- Underwater noise from MODU / vessels and vertical seismic profile
- Logistics base, PSV's and helicopters operational emissions and discharges
- Energy efficiency
- Accidental events

To facilitate tracking of mitigation from the EIA commitments register (Appendix 8 of EIA) to this management plan the unique identifier (UID) from the commitments register is provided as appropriate.

This PPEMP will be updated as necessary to adapt to regulatory updates or changes in TOTAL corporate requirements, or if there is a significant change in TEP Liban operations. For any future exploration / appraisal drilling in Block 4 (subsequent to well B4-1) an updated version of this plan will be prepared to account for any differing contractors and processes.

3. DEFINITIONS & ACRONYMS

3.1-Definitions

Ballast Water:	Seawater typically found in ballast and preload tanks and spuds cans
Bilge Water:	Water collected in the lowest compartment of a ship (below the waterline)
Brine:	Saline liquid (water based) used in drilling operations for its high-density property and the low solids content
Operational discharges:	Controlled release of solid, liquid and gaseous effluents from routine operations.

3.2-Acronyms

EIA	Environmental Impact Assessment
GHG	Green House Gas
HSE	Health, Safety and Environment
IADC	International Association of Drilling Contractors
IMDG	International Maritime Dangerous Goods
KPI	Key Performance Indicator
MARPOL	International Convention for the Prevention of Pollution from Ships
MODU	Mobile Offshore Drilling Unit
MSDS	Material Safety Data Sheet
NADF	Non-Aqueous Drilling Fluid
PPE	Personal Protective Equipment
PPEMP	Pollution Prevention and Environment Monitoring Plan
RSES	Responsible for Safety & Environment on Site
TPH	Total Petroleum Hydrocarbon
TUX	Tungsten Explorer
WBDF	Water Based Drilling Fluid
WMP	Waste Management Plan

4. RELATED DOCUMENTS

4.1- Internal Documents

Reference	Title
0-PO-HSEQ-001	HSE Policy TEP Liban
1-MA-HSEQ-001	HSE-MS TEP Liban
2-PL-HSEQ-002	TEP Liban Chemical Management Plan
2-PL-HSEQ-001	TEP Liban Waste management Plan
2-PL-HSEQ-004	Oil Spill Contingency Plan
2-PR-DRI-001	Drilling Rig Bridging Document
2-PR-LOG-001	Logistics Base Bridging Document
2-PR-LOG-002	Bridging Document Helicopter services
2-PR-LOG-003	Bridging Document Vessel services
RSK/H/P80754/04/01 Block 4 rev1	Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment

4.2-Contractor Documents

Reference	Title
TU-EN-001	Vantage - Environmental Aspects & Impacts Register
RS/SOPEP/TUX	Vantage Tungsten Explorer – Shipboard Oil Pollution Emergency Plan
TU-HC-001	Vantage Tungsten Explorer - HSE Case
115VSK3D-1	Tungsten Explorer Ballast Water Management Plan (treatment)

4.3-Total Group Documents

Reference	Title
CH GR HSE 001	Safety Health Environment Quality Charter
GS EP ENV 001	Environmental requirements for projects design and E&P activities

4.4-Regulatory Requirements

Ref No.	Title
National Requirements	
Law No. 444/2002	Environmental Protection Law
Law No. 78/2018	Law for Protection of Air Quality
Ministerial Decision No. 52/1 of 1996 (amended by MoE Decision 8/1 of 2001)	Specification and Standards for Environmental Quality and Emission Limit Values into the Air Water and Soil
Decision 99/1 of 2013	Guidelines for submitting information on greenhouse gas (GHG) emissions by companies and industrial and commercial institutions in order to obtain a declaration from the MoE
Decree No. 3277/2016 amending Decree No. 2604/2009	Control of Materials that Deplete the Ozone Layer
Law No. 80/2018	Integrated Solid Waste Management
Decree No. 5606/2019	Determination of the Fundamentals of Hazardous Waste Management
National Documents	
NOSCP	National Oil Spill Contingency Plan in Lebanese Waters (2017)
International conventions applied in the area	
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships (ratified by Law 13/1983)
ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Sea (ACCOBAMS, 1996)
BWM Convention	IMO Ballast Water Management Convention, 2004
Montreal Protocol	Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 (ratified by Decree 3277/2016 and 2604/2009)
Kyoto Protocol	Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC)
Stockholm Convention	Stockholm Convention on Persistent Organic Pollutants (POPs) 2001 (ratified by Law 432/2002)

5. PROCEDURE

5.1-AIR EMISSIONS FROM MODU, VESSELS AND HELICOPTERS

Air emissions from the Block 4 exploration drilling program are estimated in Section 4.6.1 of the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment.

Commitments relating to pollution prevention and monitoring of air emissions are included in the Table 5.1.

It should be noted that commitments relating to incineration and well testing are not applicable to Well B4-1 as there is no incinerator on the selected MODU and no well testing of this first exploration well is planned.

5.2-DRILLING DISCHARGES FROM MODU

5.2.1 Drill Cuttings and Fluids

Drilling fluids and chemicals selected for the Well B4-1 are presented in the TEP Liban Chemical Management Plan (2-PL-HSEQ-002).

During drilling of the upper well sections of B4-1 (36'' and 26'') the drilling operations will be conducted without a riser. As a consequence, the discharge of cuttings with associated water-based drilling fluid (WBDF) will be directly onto the seabed adjacent to the well (around 1520 m deep – i.e. in anoxic zone), see Figure 5.1 (left hand figure). Quantities of cuttings and fluids discharged are estimated in Section 4.6.2.1 of the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment.

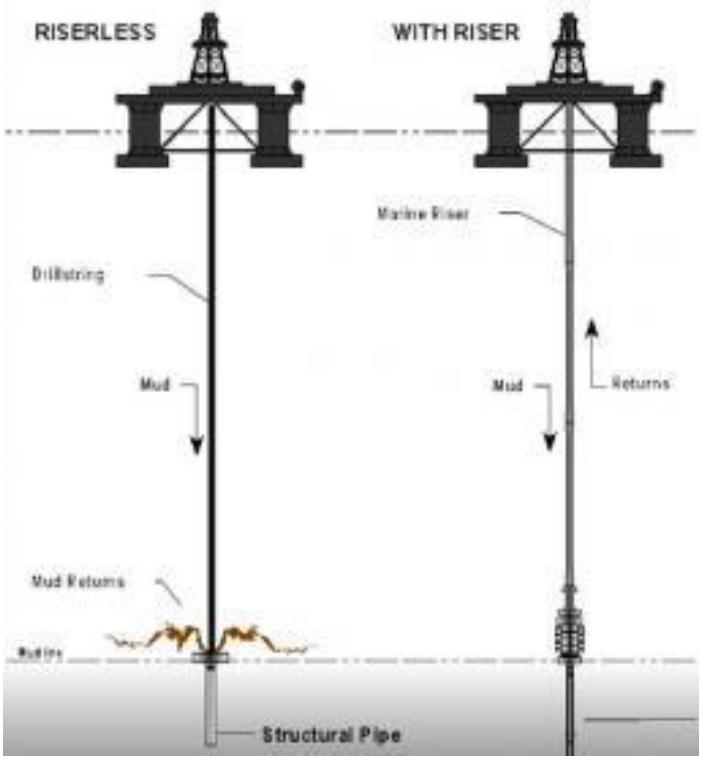

Figure 5.1 - Riserless and Riser Drilling Principle

For the lower well sections of well B4-1, non-aqueous drilling fluids (NADFs) will be used and cuttings from these well sections will not be discharged to the marine environment, they will be contained and shipped to shore for treatment and disposal. More information is provided in TEP Liban's Waste Management Plan (2-PL-HSEQ-001).

Commitments relating to pollution prevention and monitoring of cuttings and drilling fluid discharge are included in Table 5.1.

5.2.2 Cementing discharges

Cement discharges from the Block 4 exploration drilling program are estimated in Section 4.6.2.2 of the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment.

Commitments relating to pollution prevention and monitoring of cement discharge are included in Table 5.1.

5.2.3 Pipe dope

Before any drilling activities, the rig crew will apply pipe dope to the drilling equipment joints to prevent thread damage. Pipe dope is a lubricating grease that seals the joints to stop them rubbing and wearing. A small amount of this lubricating grease will enter the water column during drilling.

The drilling programme will use a heavy-metal free pipe dope, see Table 5.1 and Appendix 7.

5.2.4 BOP discharges

The blowout preventor (BOP) is the main safety device for avoiding a well blow out. As part of routine BOP testing operations, the subsea BOP stack elements will vent small quantities of hydraulic fluid into the sea at the seafloor.

No mitigation measures for BOP discharges were presented in the Block 4 (Lebanon) EIA as the environmental and safety benefits of routine BOP testing outweigh the potential environmental impacts of hydraulic fluid release. Monitoring requirements are included in Table 5.1.

5.3-OFFSHORE ROUTINE WASTEWATER DISCHARGES

5.3.1 Sanitary wastewater

Onboard sanitary wastewater consists of two main streams: black water and grey water. Grey water as defined in MARPOL 73/78 Annex IV is drainage from dishwater, galley sink, shower, laundry, bath and washbasin drains and does not include drainage from toilets, urinals, hospitals and animal spaces, and does not include drainage from cargo spaces. Black water is a term often used for sewage. Black water, which comes from onboard toilets, consists of faecal matter, urine, toilet paper and flush water.

On the MODU black water drains from various sources such as toilet units, urinals, hospital waste water etc and is collected into a common header that discharges to the holding tank in the sewage treatment plant (STP). Grey water is discharged to sea (without treatment), although the galley wastewater is filtered by a grease trap.

Discharge of sanitary wastewater will comply with MARPOL 73/78. Commitments relating to pollution prevention and monitoring of sanitary discharges are included in Table 5.1.

5.3.2 Food waste

In MARPOL 'special areas', such as the Mediterranean Sea, food waste may only be discharged to sea following grinding in onboard macerators and providing the vessel/ MODU is more than 12 Nm from nearest land.

Food waste will only be discharged beyond 12 Nm from nearest land for all vessels (MODU and PSV's) after being macerated to particles smaller than 25 mm.

As the B4-1 well site is only 11 Nm from nearest land, macerated food waste will not be discharged from the MODU during drilling operations. In this case, it will be shipped to shore for treatment and disposal.

If future well sites in Block 4 are further offshore, discharge of macerated food waste will be permitted.

Commitments relating to pollution prevention and monitoring of food waste generated are included in Table 5.1.

5.3.3 Desalination unit discharges

Residual brine from desalination will be mixed with other, treated, on-specification wastewater and discharged to sea.

Commitments relating to pollution prevention and monitoring of desalination unit discharges are included in the Table 5.1.

5.3.4 Drainage (including deck drainage, bilge water, slop water and fire water)

Deck drainage consists of wastewater resulting from rainfall, sea spray, deck and equipment cleaning, rig washing and fire drills.

Bilge water is defined in MARPOL 73/78 Annex I as water that may be contaminated by oil resulting from issues such as leakage or maintenance work in machinery spaces. Any liquid entering the bilge system including bilge wells, bilge piping, tank top or bilge holding tanks is considered oily bilge water.

MODU Slop water is made up of contaminated drilling and completion fluids, cleaning residue from the rig pits, tanks, pipes and decking and contaminated rain and wash water. Slop water will be treated onboard the MODU in a slop treatment unit. In the treatment unit, flocculants will be used to coagulate the drilling fluid from the mixture. The separated slops will be sent to shore for treatment/disposal (see TEP Liban Waste Management Plan (2-PL-HSEQ-001)) and the separated water discharged to sea providing the oil in water content does not exceed 15 ppm.

The MODU will be equipped with a firewater distribution system, and the firewater pumps will be tested on a weekly basis. A foam concentrate system may be in place to enhance the effectiveness of the fire system's deluge water spray. The foam concentrate system, carbon dioxide firefighting equipment and dry powder extinguishers will only be discharged in emergency situations.

Commitments relating to pollution prevention and monitoring of drainage discharges are included in Table 5.1.

5.3.5 Cooling water

The cooling water system on the MODU consists of separate pairs of fresh / sea water loops. Each system consists of two pumps, one open loop sea water and one closed loop treated fresh water with expansion tank. The sea water pumps are fitted with suction strainers.

Commitments relating to pollution prevention and monitoring of cooling water discharges are included in Table 5.1.

5.3.6 Ballast water

Discharge of ballast water from the MODU during the B4-1 drilling program is not anticipated as it will carry out internal ballasting (UID PP-10). It should be noted, however, that the Tungsten Explorer MODU has a Ballast Water Management Plan (prepared by DNV GL AS Maritime) and a Ballast Water Record Book in accordance with Regulations B-1 and B-2, respectively, of the Annex to the International Convention for the Control and Management of Ship's Ballast Water and Sediments, as well as referring to the International Maritime Organization (IMO) Resolution A.868 (20).

Commitments relating to pollution prevention and monitoring of ballast water discharges are included in Table 5.1.

5.4-PHYSICAL PRESENCE OF MODU

5.4.1 Light Spill

The MODU and support/supply vessels will use lighting during the hours of darkness for navigation, safety and security which may attract marine fauna.

Commitments relating to pollution prevention and monitoring of light spill are included in Table 5.1.

5.5-UNDERWATER NOISE FROM MODU / VESSEL OPERATIONS AND VERTICAL SEISMIC PROFILE

Drilling activities and vessel transfers will also be a source of continuous lower levels of underwater noise from operation of the MODU. If vertical seismic profiling of the Block 4 wells takes place, it will introduce impulsive underwater noise to the area for a very short period of time that may affect marine fauna.

Commitments relating to pollution prevention relating to underwater noise and monitoring of marine fauna are included in Table 5.1.

5.6-LOGISTICS BASE OPERATIONAL EMISSIONS AND DISCHARGES

A logistics base for the Block 4 exploration drilling campaign will be established within the Port of Beirut.

Commitments relating to pollution prevention and monitoring of air emissions, wastewater discharges, airborne noise and waste management at the logistics base are included in Table 5.1.

6. ENERGY EFFICIENCY & GREENHOUSE GASES

Energy efficiency in TOTAL is the key to the ongoing reduction of direct greenhouse gas (GHG) emissions. Initiatives to date have resulted in GHG emissions that are already 25% lower in our operated activities than they were in 2010.

TOTAL's two priority focuses to keep improving are:

- Reduce routine flaring in our production facilities
- Optimizing the energy efficiency of our facilities.

Although these goals are more applicable to operations than projects, the same principles can be applied to the Block 4 exploration drilling project.

Total General Specification 'Environmental Requirements for Projects Design and E&P Activities' (GS-EP-ENV-001) requires the following:

- To keep as low as possible GHG emissions. This includes temporary flaring and venting minimisation, and optimization of fuel gas and energy efficiency.
- To monitor directly or indirectly the flows and characteristics of significant GHG emission sources.
- Minimisation of GHG emissions and optimization of energy efficiency shall be considered in the selection of the development scheme and main equipment.

Well testing

Flaring of gas during well testing is the key source of GHG emissions on a project such as this (see emission estimates in Table 4.10 of the Block 4 (Lebanon) Offshore Exploration EIA).

In order to minimize impacts, well testing of the Block 4 exploration wells is not currently planned.

If a future appraisal well is drilled in Block 4 there is an option to carry out well test for this one well only. In this case the pollution prevention commitments relating to well test flaring will apply (see UID PP-22, PP-23 and PP-34 in Table 5.1).

Energy efficiency of facilities

One of the criteria used for selecting the TUX MODU was energy efficiency. For instance, while the fuel consumption of a standard drillship was estimated in the Block 4 (Lebanon) Offshore Exploration EIA at 92 t/day during mobilization and demobilization, and 40 t/day during drilling activities, the fuel consumption of the TUX as per its IADC[1] specifications is 80 t/day during mobilization and demobilization, and 25 t/day during drilling activities.

Other initiatives undertaken proactively onboard the TUX MODU to minimize the ecological footprint of activities and reduce GHGs include a planned maintenance schedule and hourly visual inspections to aid efficient operation; switching off lights and all other electrical appliances when not in use; not using disposable cups and cutlery; using energy efficient appliances, minimising water usage where possible, keeping doors/windows closed to retain heat or cool air, and raising awareness to all personnel onboard the MODU about these measures during weekly HSE meetings.

For PSV movement, a transport speed is set that optimizes the fuel efficiency of the vessel. When on standby, the PSV is also required to drift without starting its engine. This will also help minimize running time of the engine and thus emissions from fuel consumption.

The logistics base contractor will be requested to minimise energy consumption, emissions to the natural environment, production of waste, use of natural resources and impact on biodiversity and to enhance energy efficiency process and equipment.

Marine Gasoil (MGO)

Another method of minimizing pollutant emissions to the air is by selecting a high quality Marine Gasoil (marine fuel) with low contents of sulfur. MARPOL Annex 6 Regulations 14 & 18 limit the sulfur content to 0.5%. However, the selected drillship Tungsten Explorer requires no more than 0.1% m/m (mass by mass)

[1] International Association of Drilling Contractors

sulfur content. The Marine Gasoil (MGO) must also be ISO 8217:2017 Category ISO – F – DMA, as per the MGO contract requirements.

7. ACCIDENTAL EVENTS

Unplanned or accidental events are considered separately from planned routine activities, as they only arise as a result of a technical failure, human error or natural phenomena such as a seismic event.

Representative scenarios of accidental events that may occur during the Block 4 exploration drilling campaign were assessed in Section 6.5 of the Block 4 (Lebanon) Offshore Exploration Drilling Environmental Impact Assessment.

Commitments relating to pollution prevention and monitoring of accidental events are included in the table in Section 5.9.

8. SUMMARY OF POLLUTION PREVENTION AND MONITORING COMMITMENTS / MEASURES

Table 5.1: Pollution Prevention and Monitoring Commitments / Measures

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
AIR EMISSIONS – MODU AND VESSELS						
MR-2	Air emissions data (including GHG information) emissions data will be submitted to the authorities.	Drilling Contractor; Supply Vessel Contractor; Logistics Base Contractor	Atmospheric emissions calculated empirically from fuel consumption	Air emissions calculation will be done at the end of the Project	TEP Liban will submit data to regulator at the end of the Project	
PP-15	Atmospheric emissions on the MODU and support / supply vessels will be controlled in accordance with MARPOL 73/78 Annex VI (R).	Drilling Contractor; Supply Vessel Contractor;	Certificate demonstrating compliance – International Air Pollution Certificate. +Atmospheric emissions calculated empirically from fuel consumption	Atmospheric emissions calculated empirically from fuel consumption records every month	TEP Liban will submit data to regulator at the end of the Project	
PP-16	Sulphur content of marine fuel oil used onboard vessels will not exceed 0.5% by mass (unless vessels have scrubbers fitted) in line with	Drilling Contractor; Supply Vessel Contractor;	Sulphur content in fuel less than 0,5% by mass	MGO certificate of quality required prior to each fuel delivery.	TEP Liban will collect MGO certificates before the start of operations.	Tungsten Explorer requires less than 0.1% sulphur content.

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
	MARPOL 2020 requirements (R).					
PP-17	All machinery, equipment and installations will comply with generally accepted standards in the international petroleum industry, will be of proper construction, and kept in good working order.	Drilling Contractor; Supply Vessel Contractor;	% of non-compliance identified during audits	Review of equipment against relevant standards prior to spud / use; review of maintenance schedule against manufacturer's recommended maintenance; verification of maintenance activity as per schedule.	OVID inspection of MODU, PSVs before operations.	
PP-20	Ozone depleting substances and all products listed in the Montreal Protocol - CFCs, HCFCs and Halons, will be prohibited except for essential use, under derogation (R).	TEP Liban; Drilling Contractor; Supply Vessel Contractor	List of identified products	Review of the list of chemicals before operations.	Identification of products listed in the Montreal Protocol and their use on MODU/PSVs.	

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-52	Planned, preventive maintenance as per manufacturer's recommendation will be mandatory for all equipment.	TEP Liban; Drilling Contractor; Logistics Base Contractor; Helicopter Contractor;	% of noncompliance with manufacturer's recommended maintenance schedule.	Documentation check prior to spud, other checks as per manufacturer's recommendations throughout the duration of the operation		Equipment containing refrigerant gases (air conditioning, fridge, etc.) will be properly maintained in order to prevent any leakage of chlorinated gas in the environment. Records of maintenance and refilling will be kept onboard.
PP-61	The MODU and support/supply vessels (more than 400 gross tonnage) will obtain an International Air Pollution Prevention Certificate in accordance with MARPOL 73/78 Annex VI	Drilling Contractor; Supply Vessel Contractor;	See PP-15			
DRILLING DISCHARGES						
Drill cuttings and fluids						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-1	Seawater used for drilling the 36" well section.	TEPL, Drilling Fluids Supervisor	Quantity of sea water used for drilling operations	Use of seawater monitored on daily basis. Recorded in Daily Drilling Report.	Daily Drilling Reports	
Additional monitoring	Estimated volume of drill cuttings and WBDFs discharged will be recorded.	TEPL, Drilling Fluids Supervisor		Once at the end of the 26" well section.	Records kept by drilling fluids services contractor and reported to TEP Liban as part of End of Well Report. The quantity of cuttings discharged to seabed with associated WBDF will be recorded on a daily basis in the Daily Mud Report (DMR) and Daily Drilling Report (DDR).	Volume of cuttings based on volume of the hole section drilled, calculated using equation V=πr2h. Drilling fluids adherent to cuttings calculated.
CM-1	Barite will meet heavy metals concentration standards i.e. mercury <1 mg/kg and cadmium <3 mg/kg dry weight (total).	TEP Liban; Drilling Fluids Contractor	% of noncompliance	Review of supply chain documentation with each new batch of barite.	Records kept by drilling fluids contractor and reported to TEP Liban as part of Well End Report. Barite Toxicity record provided in Appendix 6, showing 0 presence of mercury and cadmium	Control standard ISO 11895 API standard procedure for density and size to be conducted by drilling fluids services provider, combined with heavy metal analysis every new batch of barite as per vendor testing procedures. Batches of barite supplied for use in WBDF formulations will

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
						meet applicable heavy metals concentration standards.
Additional monitoring	Estimated volume of cuttings and NADF returned to shore will be recorded.	Drilling Fluids Supervisor	Estimated volume of cuttings and NADF returned to shore	Each time cuttings produced are shipped to shore.	The quantity of NADF used during the operation, as well as the number of filled cuttings skips and their weight will be recorded and reported on a daily basis in the Daily Mud Report (DMR). Volume of unused drilling fluids sent to shore for disposal recorded via Waste Transfer Note.	
Additional monitoring	An inventory of drilling fluids and additives and their volumes / mass in the drilling fluid system will be maintained	Drilling Fluids Supervisor	An inventory of drilling fluids and additives and their volumes / mass in the drilling fluid system	Per well section (end of each phase)	Records kept by drilling fluids services provider and reported to TEP Liban as part of End of Well Report.	
Cementing discharges						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-2	Discharge of cement to seabed only from 20" casing.	TEP Liban, Drilling Fluids Supervisor	The quantity of released excess cement slurry	Daily during cementing phase	The quantity of released excess cement slurry will be estimated and recorded in the DMR and DDR.	
PP-3	Careful monitoring of cement discharges using an ROV to ensure discharges are kept to a minimum.	TEP Liban, Drilling Fluids Supervisor	N/A	ROV monitoring throughout cement job.	Any discharges to be reported in the DMR and DDR.	
Additional monitoring	An inventory of drilling and cementing chemicals and their volumes / mass used will be maintained	Drilling Fluids Supervisor	Inventory of cementing chemicals	Upon completion of each hole section and cementing job.	Records kept by drilling fluids services provider and reported to TEP Liban as part of End of Well Report.	
Pipe dope discharges						
PP-4	A pipe dope product that is heavy metal free will be selected for the drilling operations.	TEP Liban; TRS Contractor	Compliance/Non-Compliance	Review of supply chain documentation for pipe dope.	Pipe Dope MSDS / Specs Sheet (Appendix 7)	

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
BOP fluid discharges						
Additional monitoring	Quantity of BOP fluid (hydraulic control fluid) discharged will be recorded.	Drilling contractor	Quantity of BOP fluid	During BOP testing.	Records kept by TEP Liban drilling supervisor	
ROUTINE WASTEWATER DISCHARGES FROM MODU AND SUPPORT / SUPPLY VESSELS						
PP-13	All operational discharges from MODU will be in accordance with the requirements of MARPOL 73/78 (R).	Drilling Contractor; Supply Vessel Contractor;	This commitment is addressed in WM-6 and PP-57			
Sanitary waste						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
WM-6	Sanitary waste will be managed in accordance with MARPOL 73/78 Annex IV. Grey water will be discharged to sea (without treatment) as long as no floating matter or sheen is observable. Black water will be treated in accordance with MARPOL 73/78 Annex IV prior to discharge.	Drilling Contractor; Supply Vessel Contractor;	Compliance/Non-Compliance	Sheen monitoring undertaken twice daily during discharges.	Records of discharges	
PP-57	Both the MODU and support / supply vessels will have an International Sewage Pollution Prevention Certificate in line with MARPOL 73/78 Annex IV.	Drilling Contractor; Supply Vessel Contractor	Available certificates for MODU & vessels	Certificates in place before operations.	International Sewage Pollution Prevention Certificate	

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
Additional monitoring	Estimated volume of sanitary waste discharged will be recorded.	Drilling contractor	Volume of sanitary waste discharged	Estimated volume and quality reported on a monthly basis.	Register kept by drilling contractor for attention of TEP Liban HSE Department. Any non-compliances reported to Drilling Supervisor.	
Food waste						
WM-7	Discharge of any food waste from the MODU and support/supply vessels will only be carried out more than 12 nm from the nearest land and all food waste will be macerated in order to pass through a 25 mm mesh before discharge, in line with MARPOL 73/78 Annex V (Mediterranean Sea 'special area' requirement).	Drilling Contractor; Supply Vessel Contractor	N/A	Recorded for each discharge, inspected biweekly	Garbage Management Book on PSV's	Not relevant for MODU less than 12 nm from shore so no discharge of food waste from MODU.
Desalination unit discharges						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-63	Anti-scaling chemical will be an environmentally sound all-organic product based on biodegradable compounds.	Drilling Contractor	Compliance/Non-Compliance	Once before operations	MSDS of anti-scaling chemical	
Drainage discharges (deck drainage, bilge water, slop water and fire water)						
PP-5	Drainage water from process areas will go to closed drains and only water from non-process areas to open drains.	Drilling Contractor; Supply Vessel Contractor	Compliance/Non-Compliance	Initial check prior to mobilisation, during the Rig Acceptance Audit.		
PP-6	Deck drainage (clean drains) will only be discharged to sea as long as no visible sheen is observable (sea surface monitored during discharge).	Drilling Contractor; Supply Vessel Contractor	Compliance/Non-Compliance	Sheen monitoring twice daily throughout discharging operations.	Case of sheen are recorded and reported to Drilling Supervisor. Registers kept by Drilling Contractor for the attention of TEP Liban HSE Department.	Oil content detector in line with IMO resolution MEPC 108 (49) to check oil in water content. If hydrocarbon concentration detected above 15ppm effluents will be recirculated

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-7	Bilge water will be treated and discharged in accordance with MARPOL 73/78 Annex I, with discharge automatically stopped if effluent exceeds 15 ppm of oil (special area requirements for Mediterranean Sea, ships of >400 gross tonnage).	Drilling Contractor; Supply Vessel Contractor	15ppm	Continuous monitoring of wastewater from bilge and engine rooms to ensure compliance with MARPOL 73/78	All bilge water discharges will be recorded in the MODU Oil Record Book. Registers kept by Drilling Contractor for the attention of TEP Liban HSE Department.	back through oily water separation system. The MODU and support/supply vessels (more than 400 gross tonnage) will have an International Oil Pollution Prevention Certificate
PP-8	Slop water will be treated onboard the MODU in a slop treatment unit. The separated slops will be sent to shore for treatment / disposal and the separated water discharged to sea providing the oil in water content does not exceed 15 ppm.	Drilling Contractor; Supply Vessel Contractor	15 ppm	Monitoring of oil in water content before each discharge.	Registers kept by Drilling Contractor for the attention of TEP Liban HSE Department.	Oil content detector in line with IMO resolution MEPC 108 (49)
Cooling water						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-9	Discharge of cooling water will comply with allowable limits in Decision No. 8/1/2001 (maximum temperature of wastewater discharge to sea 35 °C) and TOTAL / World Bank requirement that temperature increase shall not exceed a maximum of 3 °C, 100 m away from the discharge point.	Drilling Contractor	35 °C	Daily Mechanical rounds	Daily Engineer checks kept by Drilling Contractor for the attention of TEP Liban HSE Department.	
PP-64	No discharge of antifouling chemicals in cooling water, a marine growth prevention system (MGPS) will be used.	Drilling Contractor	Compliance/Non-Compliance	Prior to operations.	Confirmation documents from MODU	No use of anti-fouling chemical on MODU
PHYSICAL PRESENCE OF MODU						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
Light spill						
PP-25	Light spill will be reduced by shielding lights and pointing lights directly at the work area (directional alignment).	Drilling Contractor; Supply Vessel Contractor	N/A	During rig visit by HSE department	Will be integrated in the HSE induction/awareness campaign on the Rig	
PP-26	Area and work lighting will be limited to the amount and intensity necessary to maintain worker safety.	Drilling Contractor; Supply Vessel Contractor				
UNDERWATER NOISE FROM MODU / VESSEL OPERATION AND VSP						
BIO-2	Use of soft start procedures for VSP airguns.	Drilling and Acquisition Contractor	Number of signs and compliance with ACCOBAMS	If VSP, check during all VSP operation.	MMO Reports	

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
BIO-3	Use of trained MMOs during VSP operations for monitoring of mitigation exclusion zone (radius 500 m) and delay in start-up of airguns if cetaceans (or turtles)	Drilling and Acquisition Contractor	Number of signs and compliance with ACCOBAMS	If VSP, check during all VSP operation.	MMO Reports	
BIO-4	Use of PAM devices for cetacean detection prior to VSP operations during hours of darkness / reduced visibility.	Drilling and Acquisition Contractor	Number of signs detected	If VSP, check during all VSP operation.	MMO Reports	
MR-3	Reporting of marine mammal monitoring results and findings of real-time mitigation to ACCOBAMS.	TEP Liban; Drilling Contractor;	Number of signs detected.	If VSP Logging takes place, reports from MMO will be issued following VSP operations.	MMO Reports	
LOGISTICS BASE OPERATION						
Air emissions						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
MR-2	Air emissions data (including GHG information) emissions data will be submitted to the authorities.	Drilling Contractor; Supply Vessel Contractor; Logistics Base Contractor	Atmospheric emissions calculated empirically from fuel consumption	Reporting to TEP Liban on the fuel consumption will be done on a monthly basis. Air emissions calculation will be one empirically on a monthly basis	TEP Liban will submit data to the regulator at the end of the project.	
MR-5	Logistics base operator will monitor consumption of fuel in order to calculate air emission quantities.	TEP Liban; Logistics Base Contractor	Fuel consumption reports.	Every month regarding calculating emissions.	TEP Liban will submit data to the regulator at the end of the project	
PP-31	Generators at the logistics base will be operated according to manufacturer's instructions to operate in most energy efficient manner.	Logistics Base Contractor	N/A	QHSE monthly report to include number of hours and fuel quantities. Operation against manufacturer's instructions to be included in weekly HSE tour, or following maintenance or service operation.		

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-32	Low sulphur fuel to be used at the logistics base where practicable.	TEP Liban; Logistics Base Contractor	less 0.5%	MGO certificate of quality required prior to each fuel bunkering.		
PP-52	Planned, preventive maintenance as per manufacturer's recommendation will be mandatory for all equipment.	TEP Liban; Drilling Contractor; Logistics Base Contractor; Helicopter Contractor	N/A	Documentation check prior to spud, other checks as per manufacturer's recommendations throughout the duration of the operation	TEP Liban monthly audit.	
PP-40	Any transfer of dry bulk from the drilling fluids mixing plant dry bulk silos will be carried out with the use of a dust collector unit to minimise dust migration to the surrounding environment	TEP Liban; Logistics Base Contractor;	N/A	Initial check at logistics base final set up. Monitoring to document that dust collectors are used during each bulk transfer.		
Site drainage						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-33	Site drainage from the logistics base will only be permitted from non-contaminated areas.	Logistics Base Contractor;	Specified and provided for in relevant management plans and site verification; zero noncompliance	Initial check at logistics base final set up. Daily site verification.		
PP-34	For areas at the logistics base where there is the potential for spillages, and contaminated runoff, containment will be in place.	Logistics Base Contractor;	Specified and provided for in relevant management plans and site verification; zero noncompliance	Initial check at logistics base final set up. Daily site verification.		
Airborne noise						
PP-35	Equipment at the logistics base will be well maintained and individual mitigation measures applied if noise levels are higher than maximum allowable noise levels (where feasible).	Logistics Base Contractor	Specified and provided for in relevant management plan/s and; zero noncompliance with manufacturer's recommended maintenance schedule; zero nonconformance with fenceline noise limit.	Fenceline noise monitoring on a bi-weekly basis during logistics base operational period.		

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-41	At present the layout of the logistics base is not finalised. During the final design of the layout equipment which has the highest source noise levels will be located as far from the closest residential properties as possible.	TEP Liban; Logistics Base Contractor	Specified and provided for in relevant management plan/s and; zero noncompliance with manufacturer's recommended maintenance schedule; zero nonconformance with fenceline noise limit.	Initial check at logistics base final set up.		
PP-42	Noise monitoring will be carried out at the logistics base to determine if noise mitigation measures shall be applied (where feasible).	TEP Liban; Logistics Base Contractor	Noise assessment records; implementation of findings.	Fenceline noise monitoring on bi-weekly basis during logistics base operational period. If attentuation is required then monitoring of performance of attenuation on a weekly basis.		

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-43	Airborne noise levels from the logistics base will comply with Lebanese maximum allowable noise levels (Decision 52/1/96) at the Logistics base fenceline.	TEP Liban; Logistics Base Contractor;	Specified and provided for in relevant management plan/s and; zero noncompliance with manufacturer's recommended maintenance schedule; zero nonconformance with fenceline noise limit.	Fenceline noise monitoring on a bi-weekly basis during logistics base operational period.		
PP-62	Compliance with the regulatory requirements, including, but not limited to requirements of PAR, OPRL, EPA and MoE decision No. 52/1/1996, National maximum allowable noise levels and the permissible noise exposure standards.	Logistics Base Contractor;	Zero nonconformance with fenceline noise limit.	Fenceline noise monitoring biweekly (every 2 weeks).		
ENERGY EFFICIENCY						

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-18	Fuel efficiency measures shall be taken into account in the selection of MODU, support / supply vessels and helicopters.	Drilling Contractor; Supply Vessel Contractor;	**See section ENERGY EFFICIENCY & GREENHOUSE GASES of this document**			
PP-19	Supply vessels transfers to the MODU will be optimised and the support vessel will drift around the MODU to minimise engine use.	Drilling Contractor; Supply Vessel Contractor;				
ACCIDENTAL EVENTS						
PP-45	BOP auto shear function will be in place in order to reduce volume of drilling fluids released from the well during accidental event.	TEP Liban; Drilling Contractor	N/A	Verified during BOP certification. Surface test during acceptance. Constant function availability monitoring.		

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-46	Riser emergency disconnect sequence will be tested.	TEP Liban; Drilling Contractor	N/A	Once during acceptance test. Constant function availability monitoring during riser activities.		
PP-47	Any dispersant usage will be approved in advance by the MoE.	TEP Liban; Drilling Contractor	N/A	Approval of dispersant application in case of accident by the MoE.		
PP-48	Helicopter transportation will be restricted to daylight hours except for possible Medevac	TEP Liban; Helicopter Contractor;	N/A	Airport Civil Aviation Authority provides authorisation for each flight. Any accident is reported as per Emergency Response Plan.		
PP-49	Marine diesel transfer will start in daylight hours only.	Drilling Contractor; Supply Vessel Contractor;	N/A	Prior to each request for refuelling. Site verification during all transfer activity.		Integrated in the contract of the MGO supply.

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-50	Transfer hoses will be self-floating or equipped with floating device to limit the risk of sinking and potential rupture with vessel's propeller.	Drilling Contractor; Supply Vessel Contractor;	N/A	Prior to each request for refuelling. Site verification during all transfer activity.		
PP-51	Vessels will have a Shipboard Oil Pollution Emergency Plan (SOPEP) in line with MARPOL requirements.	Drilling Contractor; Supply Vessel Contractor	Specified and provided for in relevant management plan/s and; site verification zero noncompliance	SOPEPs collected from PSVs		
PP-53	Oil spill kits and chemical spill kits will be available on the logistics base and clearly marked.	Logistics Base Contractor		Initial check at logistics base final set up, during HSE audit and during daily tour and weekly HSE tour.		
PP-54	Spill kits will be available onboard MODU and supply vessels; personnel will be trained in use of spill kits.	Drilling Contractor; Supply Vessel Contractor; Logistics Base Contractor	Specified and provided for in relevant management plan/s and; site verification zero noncompliance; 100% training coverage.	Prior to spud for spill kit. Inspection records of the sitebased spill kits to ensure presence and useability.		

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
PP-55	An Oil Spill Contingency Plan (OSCP), Blowout Contingency Plan (BOCP), and Emergency Response Plan (ERP) will be developed and implemented for project. The OSCP will align with the 'National Oil Spill Contingency Plan (NOSCP) in Lebanese Waters' (2017) and will be communicated to the LPA.	TEP Liban; Drilling Contractor; Supply Vessel Contractor; Helicopter Contractor	Approved OSCP; BOCP and ERP.	Various plans developed and implemented prior to spud.		TEP Liban Oil Spill Contingency Plan submitted to the LPA.
PP-58	The MODU and support/supply vessels (more than 400 gross tonnage) will have an International Oil Pollution Prevention Certificate, will maintain an Oil Record Book, and will have an	Drilling Contractor; Supply Vessel Contractor;	Specified and provided for in relevant management plan/s and; site verification zero noncompliance	Certificates in place before mobilisation. Oil record book updates on a monthly basis.		

UID	Mitigation	Responsible Party	Performance Indicator	Monitoring Frequency	Reporting / Audit	Additional notes
	approved Shipboard Oil Pollution Emergency Plan (SOPEP) in accordance with MARPOL 73/78 Annex I (R).					

9. AUDIT

AHSE inspections and site visits planning will be finalized before operations

10. REPORTING AND FOLLOW UP

Environmental reporting ensures early detection of conditions that might require preventive or corrective actions and approach to initiating those actions.

All environmental reporting coming from the MODU, supply vessels, helicopters and logistics base submitted (See Appendix 1 for MODU and Appendix 2 for other contractors) will be subject to analysis by the TEP Liban HSE department. All anomalies, near misses and incidents will feed the ATR (Action Tracking Register) of TEP Liban. An extract of this ATR is shown in Appendix 5.

Further to the submission and analysis of the monthly reporting by Contractors, follow-up meetings will be organized between the Contractor management and TEP Liban HSE department and Operations Department in order to follow-up the necessary preventive or corrective actions to be implemented and their efficiency.

At the end of the exploration drilling campaign all offshore and onshore environmental data will be compiled and analyzed at headquarters level in order to assess the environmental performance of the project.

As part of the contractual strategy of Total E&P, before the contract close-out, Contractor's HSE overall performance is jointly assessed by the Affiliate and the Contractor after which a final report is issued covering positives aspects, deficiencies, difficulties encountered, and gaps regarding the initial HSE Plan, effective solutions, among others.

11. AWARENESS

The present Plan shall be communicated to all concerned personnel and regular refresher shall be given during tool box meeting on specific general subjects.

Specific awareness campaign shall be organized for the people involved in the present plan execution and management. It shall cover the following:

- Evaluation of release in order to protect the environment
- Discharge management and responsibilities
- Obligation for each employee to report any abnormal situation and non-compliant monitoring results.

12. RESPONSIBILITIES

12.1- TEP Liban Drilling Superintendent

- Ensures the proper implementation of this Plan during the drilling campaign of Block 4 Well-1;
- Ensures proper functioning of effluent treatment technology and monitoring devices that guarantee compliance with the respective legislation and corporate standards;
- Ensures that operational discharges are recorded and reported in due time to TEP Liban HSE Department;

- Monitor the performance of Drilling Services Contractor;
- Communicate relevant procedures and requirements to the rig.

12.2- TEP Liban Drilling Supervisor (Rig based)

- Implements requirements related to discharges management and monitoring on the rig site;
- Ensures that planned discharges operations are properly prepared and monitored;
- Conducts quality assurance review of the reports being generated by contractors as part of these procedure requirements;
- Ensures that operational discharges are recorded and reported to TEP Liban Drilling Superintendent and consistent in different reports and logs;
- Communicate any non-compliance/non-conformance results of monitoring to TEP Liban Drilling Superintendent.

12.3- TEP Liban Fluids Superintendent

- Ensure the implementation of the requirements stated in this plan by Fluids Services Contractor;
- Monitors the performance of Fluids Services Contractor.

12.4- TEP Liban Fluids Supervisor (Rig based)

- Responsible for the monitoring, use and control of drilling fluids, cement slurries, additives and cuttings;
- Collects data on drilling fluids and drilling cuttings as required;
- Reports all requirements to the Drilling Supervisor.

12.5- TEP Liban HSE Manager

- Prepares the Plan;
- Reports and flags up the issues related to this plan implementation;
- Gathers and records required information coming from Drilling department and any other entities (e.g. Logistics department);
- Reports to the authorities in accordance with the legislation;
- Ensures that this plan is reviewed accordingly and implements any modifications to the Plan;
- Audit the implementation of this plan on site.

12.6- Contractors – Rig Contractor

- Ensures that this Plan is implemented properly on board of the TUX;
- Ensures compliance with the key performance indicators and frequencies in Table 5.1 pertaining to MODU operations
- Ensures that all discharges into the sea are properly managed in accordance with the present procedure and applicable legislation;
- Ensures that adequate treatment of effluents is applied in accordance with applicable legislation;

- Ensures that adequate lock out / tag out procedure is implemented on board for every valve implying a risk of accidental release of pollutant into the natural environmental so that discharges are properly monitored (quantity and quality of effluent);
- Ensures that treatment and monitoring equipment is properly maintained and calibrated;
- Ensures that all necessary documents, including plans, relevant to the ship systems effluents (e.g. ballast waters, cooling wasters drainage etc.) are available;
- Submit monthly environment monitoring form to TEP Liban HSEQ team in a timely manner;
- Ensures that any accidental or unplanned discharges are avoided, recorded and reported.

12.7- Contractors – Fluids and Cement Services Providers

- Ensure that the quality and the volume of drilling fluids and cement slurries needed for the drilling/completion operations are in line with required standards;
- Ensure that adequate treatment of the drilling fluids is implemented during the drilling operations;
- Ensure that the cutting management system (equipment and personnel) is implemented during the drilling operations
- Ensure that fluids and cuttings performance indicators are monitored and reported to TEP Liban Fluid Superintendent
- Perform necessary tests and lab analyses to ensure the quality of fluids and associated cuttings
- Ensure that maximum concentrations of additives based on manufacturer or label recommendations are not exceeded, report the rates and concentrations used, and document each additive's concentration in the End-of-Well Report
- Ensure compliance with the key performance indicators and frequencies in Table 5.1 applicable to their services

12.8- Contractors – Logistics Base, Helicopter, and PSV Contractors

- Ensure compliance with the key performance indicators and frequencies in Table 5.1 applicable to their services

12.9- All TEP Liban and Contractors Personnel

- Responsible to report any spills or observed visible sheen or suspended solids on sea surface around the TUX.

All responsible persons listed above and involved in implementing this PPEMP shall verify its adequacy end efficiency and report to TEP Liban HSE Manager any element which should be revised.

13. APPENDIX 1 – MODU Monthly Environmental Report

MONTH OF EMISSION
To be filled by Contractor

TOTAL
COMMITTED TO BETTER ENERGY
TOTAL E&P LIBAN

REFERENCE NUMBER
Site - yymmdd - rev
To be filled by Contractor

Rig Monthly Environmental Report

Objective: The monthly environmental monitoring report aims to collect the data regarding the main environmental parameters and is used to fulfill the reporting committments of TEPLB internally and externally to the Lebanese authorities.

Information to be sent before the 7th day of each month to TEPLB HSE/OPS

Parameter	Reference	Unit	Month			Total
			Feb	Mar	Apr	
Fuel Usage / Air Emissions						
Fuel Usage (tons)	ATTR001b	ktons				
Sulfur content of fuel	ATTS001	%				
Natural Gas Usage		tons				
CO2/FM20 Releases		N/A				
CO2/FM200Releases		kg				
CFC/HCFC Releases		N/A				
CFC/HCFC Releases		kg				
CFC/HCFC Inventory		kg				
HFC R125 consumption	ATVE077	tons				
HFC R134a consumption	ATVE078	tons				
HFC R143a consumption	ATVE079	tons				
HFC R407c consumption	ATVE080	tons				
HFC R410a consumption	ATVE081	tons				
HFC R404a consumption	ATVE100	tons				
HFC R507 consumption	ATVE101	tons				
HCFC R22 consumption	ATVE082	tons				
Waste Oils/Helifuel		L				
Spills						
Number of primary confinement losses of Hydrocarbons > 1 bbl	SPIL040	N/A				
Volume of primary confinement losses of Hydrocarbons	SPIL041	m^3				
Number of HC Spills 0.16 < x < 1.6 m3 (10 bbl)	SPIL003	N/A				
Volume of HC spills 0.16 < x < 1.6 m3 (10 bbl)	SPIL004	m^3				
Number of HC spills 1.6 < x < 16 m3 (100 bbl)	SPIL005	N/A				
Volume of HC spills 1.6 < x < 16 m3 (100 bbl)	SPIL006	m^3				
Number of HC spills > 16 m3 (100 bbl)	SPIL007	N/A				
Volume of HC spills > 16 m3 (100 bbl)	SPIL008	m^3				

Total recovered HC volume from HC spills	SPIL011	m^3				
Number of primary confinement losses of chemical products > 100 L	CHEM040	N/A				
Volume of primary confinement losses of chemical products	CHEM041	m^3				
Number of Chemical Spills (>100 kg)	CHEM032	N/A				
Chemical Spills (>100 kg)	CHEM033	m^3				
Total volume of chemicals recovered after a spill	CHEM034	m^3				
Fresh Water Consumption by Source						
Water supplied by public utilities	WATS003	x1000 m^3				
Fresh Water Consumption by Use						
For Domestic purpose	WATC001	m^3				
For Drilling purpose	WATC002	m^3				
Other Water Consumption by Source						
Water from sea	WATS007	x1000 m^3				
Other Water Consumption by Use						
For Domestic purpose	WATC006	m^3				
For Drilling purpose	WATC007	m^3				
Slop Water						
Treatment unit in place and working?		Yes/No				
Volume discharged		m^3				
Drilling effluents discharged to the environment	WADN009	x1000 m^3				
Oil Content	WADN010	mg/L				
Number of discharges		N/A				
Visual observation results during the discharge						
Bilge Water						
Treatment unit in place and working?		Yes/No				
Volume discharged		m^3				
Oil Content		mg/L				
Number of discharges						
Visual observation results during the discharge						
Cooling Water						
Volume OUT		m^3				
Temperature IN		°C				
Temperature OUT		°C				
Chlorine content at discharge		mg/L				
Food Waste (if applicable)						
Food wastes discharged w/ size < 25 mm?		Yes/No				
Quantity		kg				
Estimated POB?		N/A				
Recovered grease		L				

Cuttings & Oily Water						
Cuttings - Non-aqueous	CUTL001	tons				
Cuttings - Water-based	CUTW001	tons				
Oily Water		bbls				
Chemical - Oil						
Rigwash		L				
BOP Control Fluid		L				
Hydraulic Oil Top Up's (All Systems)						
Pipe Dope		kg				
MEG (contained in BOP fluid)		L				
System Cleaner G (Biocide)		N/A				
Notes						

Filled by		**Date**	
Position		**Signature**	

*In addition to this Environmental Report, a Monthly Waste Report shall be provided as per Waste Management Plan 2-PL-HSEQ-001

14. APPENDIX 2 – Contractor Environmental Report

The document below is applicable to: Logistics Base, Helicopter, and PSV contractors.

MONTH OF EMISSION		REFERENCE NUMBER
To be filled by Contractor	TOTAL COMMITTED TO BETTER ENERGY TOTAL E&P LIBAN	Site - yymmdd - rev *To be filled by Contractor*

Monthly Environmental Report

Objective: The monthly environmental monitoring report aims to collect the data regarding the main environmental parameters and is used to fulfill the reporting committments of TEPLB internally and externally to the Lebanese authorities.

Information to be sent before the 7th day of each month to TEPLB HSE/OPS

Parameter	Reference	Unit	Month			Total
			Feb	Mar	Apr	
Fuel Usage / Air Emissions						
Land Transport diesel / gasoline	ATTR004b	tons				
Supply boat diesel	ATTR003b	tons				
Helifuel/jet fuel	ATTR005b	tons				
Purchased Electricity (if applicable)	ENCO009	kWhr				
HFC R125 consumption	ATVE077	tons				
HFC R134a consumption	ATVE078	tons				
HFC R143a consumption	ATVE079	tons				
HFC R407c consumption	ATVE080	tons				
HFC R410a consumption	ATVE081	tons				
HFC R404a consumption	ATVE100	tons				
HFC R507 consumption	ATVE101	tons				
HCFC R22 consumption	ATVE082	tons				
Spills						
Number of primary confinement losses of Hydrocarbons > 1 bbl	SPIL040	N/A				
Volume of primary confinement losses of Hydrocarbons	SPIL041	m^3				
Number of HC Spills 0.16 < x < 1.6 m3 (10 bbl)	SPIL003	N/A				
Volume of HC spills 0.16 < x < 1.6 m3 (10 bbl)	SPIL004	m^3				
Number of HC spills 1.6 < x < 16 m3 (100 bbl)	SPIL005	N/A				
Volume of HC spills 1.6 < x < 16 m3 (100 bbl)	SPIL006	m^3				
Number of HC spills > 16 m3 (100 bbl)	SPIL007	N/A				
Volume of HC spills > 16 m3 (100 bbl)	SPIL008	m^3				
Total recovered HC volume from HC spills	SPIL011	m^3				
Number of primary confinement losses of chemical products > 100 L	CHEM040	N/A				
Volume of primary confinement losses of chemical products	CHEM041	m^3				
Number of Chemical Spills (>100 kg)	CHEM032	N/A				

Chemical Spills (>100 kg)	CHEM033	m^3				
Total volume of chemicals recovered after a spill	CHEM034	m^3				
Fresh Water Consumption by Source						
Water supplied by public utilities	WATS003	x1000 m^3				
Fresh Water Consumption by Use						
For Domestic purpose	WATC001	m^3				
For Drilling purpose	WATC002	m^3				
Other Water Consumption by Source						
Water from sea	WATS007	x1000 m^3				
Other Water Consumption by Use						
For Domestic purpose	WATC006	m^3				
For Drilling purpose	WATC007	m^3				
Consumption of Chemicals						
Name of Chemical:						
1-		L or kg				
2-		L or kg				
3-		L or kg				
4-		L or kg				
5-		L or kg				
PSV ONLY						
Slop Water						
Treatment unit in place and working?		Yes/No				
Drilling effluents discharged to the environment	WADN009	x1000 m^3				
Oil Content	WADN010	mg/L				
Number of discharges		N/A				
Visual observation results during the discharge						
Bilge Water						
Treatment unit in place and working?		Yes/No				
Volume discharged		tonnes				
Oil Content		mg/L				
Number of discharges						
Visual observation results during the discharge						
Cooling Water						
Volume OUT		tonnes				
Temperature IN		°C				
Temperature OUT		°C				
Chlorine content at discharge		mg/L				
Food Waste						
Food wastes discharged w/ size < 25 mm?		Yes/No				
Quantity		kg				

Estimated POB?		N/A				
Recovered grease		L				

Notes

Filled by		**Date**	
Position		**Signature**	

* contracted companies in charge of waste management (Fast Bolloré, Baker Hughes, Schlumberger), in addition to this report shall provide Monthly Waste Report as per Waste Management Plan 2-PL-HSEQ-001

15. Appendix 3 - Daily Drilling Report Example

Daily Drilling Report

TOTAL E&P

Field :N/A **Rig :** **Well Name:**

Platform :

BOP Test

Type	Last Date	Next Date
BOP's Function test	4/13/2019	4/20/2019
BOP's Pressure test	4/13/2019	5/4/2019

Daily Summary :
Work string from 4081 m to 4071 m. String free. RIH to 4130 m. Pump & circulate out His-vis pill. Perform SDFIT to 1.17sg. Ream down to 4160m. Drill formation to 4161.5 m: confirm no obstruction on bottom hole. POOH to 4076 m, excess of drag. Work string free. Retrieve PS. Install BA. RIH to 4130 m. Ream down to 4161 m. Drill 12 1/4" section 4161 m to 4214 m.

6:00 am Status :
Drill 12 ¼" section at 4262 m.

Planned Operation :
Drill 12 ¼" section.

Survey Data

Branch: Etzil-1SON

MD (mKB)	TVD (mKB)	Incl (°)	Azm (°)
4 056.00	4 055.97	0.20	321.77
4 097.00	4 096.97	0.28	343.52
4 125.00	4 124.97	0.17	337.58
4 179.00	4 178.97	0.41	21.81

Expected TD
5 765

Time Log

Start Time	Dur (hr)	Comments	Code	Secondary code	Cum Dur (hr)
00:00	2.00	Work pipe w. 30 - 50 RPM / 6 - 11 - 19 kN.m, 50 mt drag, progress from 4081m to 4071m, no circulation. B/O, rack SES, PU & M/U 1 single DP. Observe string free up & down. Recover circulation w. 500 lpm / 21 bar. Stage up pumps to 3200 lpm / 230 bar / 30 rpm. Circulate BU to BOP while reciprocating string.	NODP1		2.00
02:00	0.50	RIH 12 ¼" BHA from 4071m to 4130m, while boosting riser w. 2750 lpm boost + kill lines combined.	NODP1		2.50
02:30	4.00	Pump and circulate out 10 m3 of His-vis pill. w. 3000 - 3400 lpm / 168 - 230 bar, boost + kill lines combined w. 2000 lpm (stop boosting riser when pill pass across BOP). Note: shakers not holding more than 5100 - 5200 lpm flow out. When pill at surface observe some traces of LCM, cement debris and small pieces of rubber. Stable ECD = 1.102 sg throughout circulation.	NODP1	CIRC	6.50
06:30	2.00	M/U side entry assembly and connect test line. Break circulation with cement unit w. 1.08 sg NABM at 160 lpm / 10 bar. Pressure test surface line to 69 bar / 10 min. Good test. Line up cement unit down MKL and pressure test same against MIK fail safe to 69 bar / 10 min. Good test. Line-up for down the string and kill line for SDFIT. Meanwhile monitor the well on the trip tank, well static.	LOT	LOT	8.50
08:30	0.50	Space out for MPR. Record ESD (min/avg/max) = 1.092/1.101/1.104 sg, ECD = 1.102sg. Send downlink to set PWD tool in FIT mode (memory recording).	LOT	LOT	9.00
09:00	2.00	Close MPR and perform SDFIT w. Resato pump at 16 lpm to 31.1 bar (281ltrs pumped). Stop pump, observe same pressure signature as during dummy SDFIT, final pressure after 30 min 24.8 bar. Bleed off. Volume pumped/recovered = +/- 281 ltr. Stage up MP's to 2660 lpm / 165 bar and circulate out SDFIT data. EMW on bottom achieved: 1.17 sg. Break out and R/B SES assembly.	LOT	LOT	11.00
11:00	1.00	Wash down 12 ¼" BHA from 4130m to 4156m and tag at 4156 m w. 5 mt / 2660 lpm / 170 bar / 30 rpm. Ream down to 4160 m w. 8 mt / 30 rpm / 4 - 6 kNm. Drill formation down to 4161.5 m (1.5 m): confirm no obstruction on bottom hole.	NODP1	NETDRL	12.00
12:00	0.50	Pump out 12 ¼" BHA from 4161.5m to 4130m w. 2660 lpm / 170 bar and circulate BU to BOP w. same parameters reciprocating string.	NODP1		12.50
12:30	2.25	POOH 12 ¼" BHA from 4130m to 4076m. At +/- 4078 m observe drag increasing up to 25 mt, attempt to go down, observe same drag. Work pipe w. 30 RPM / 6 - 8 kN.m, 50 mt drag, progress from 4076m to 4044m, string free. RIH from 4044m to 4096m, confirm no restriction. POOH from 4096m to 4020m prior to remove PS. No restriction.	NODP1		14.75
14:45	1.25	M/U and RIH w. PSRT. With CMC open, set down 15 mt on PS, lock PSRT in place by CW turn and verify w/ 11 mt overpull. Unlock RCD latches, pull PRST free of RCD, no over pull observe. POOH PSRT w. PS and R/back same (bit depth: 4020 m).	MPD	SET	16.00

Parameters

BHA #	Bit Run	TFA (incl Noz) (in²)	Bit and Core Head Inventory	Param Type	Start Depth (mKB)	Int Depth (m)	Drill Time (hr)	Int ROP (m/hr)	Cum Depth (m)	Cum Drill Time (hr)	WOB (tonnef)	SPP (bars)	Flow Rate (L/min)	RPM (rpm)	Drill Tq (daN-m)	Off Btm Tq (daN-m)	PUW (tonnef)	SOW (tonnef)	FRW (tonnef)
5	5	0.95	12 1/4in, MM66DH, 13163942	Drill Formation	4 160.00	54.00	4.00	13.5	59.00	4.50	2	183.0	2 600	60	600	500	283	279	280

Bit Dull

Bit Dull

Drill String Runs

BHA #	BHA
5	HDBS MM66DH, 9-5/8" RSS (Geo-Pilot 9600 Duro), 8" Directional Module (Dummy), 8" XO, 8" LWD (EWR-M5 Collar), 8" LWD (ALD Collar), 8" Porosity sensor (CTN Collar), 8" LWD (GEO-TAP), 8" PM Collar w. PCDC sonde, 8" Stab, 8" Telemetry (JetPulse), 8" NM DC, 8" x 12-1/8" Stab, 8" Float Sub, 1 x 8-1/4" DC, 8" Float Sub, 7 x 8-1/4" DC, 8" Jar, 4 x 8-1/4" DC, 6-5/8" XO, 1 x 5-4/8" HWDP, XO Sub, 23 x 5-4/8" HWDP

Date	Type
4/13/2019	Abandon Drill
4/14/2019	Weekly Safety Meeting
4/15/2019	Loss of position Drill

Supervisor
DSV: A.
DCASV:
FLSPV:

Days wo LTI/RI: 93/39

Stop Cards

Parent Company	Quantity
Contractor	10
MI Swaco	10
Weatherford	9
Others	6
Others	5

Safety Incidents

Date	Type

12"1/4, DRILLING

Daily progress	54.00
Drilling Hours	4.00
Midnight depth	4 214.00

Date	4/17/2019
Report number	93
Water Depth	3 276.50
Activity Type & N°	EXP 1

Casing Summary

Csg Des	Rel Btm (mKB)
36"	3 373.90
20"	3 901.50
13"3/8	4 143.88

Next : 9"5/8 Liner @ 4760 m TVDRT

Formations

Top Depth (mKB)	Top Depth (TVD) (mKB)	Formation Name
3 301.00	3 301.00	Plio-Pleistocene
3 975.00	3 974.97	MM3

Remarks
Operations 17-April-2019:
00:00 - 00:45: Continue to drill 12 ¼" section 4214 m to 4217 m w. 2600 lpm / 380 bar / WOB 2 - 2.5 mt / 60 rpm / 5 - 7 kN.m & ROP 10 m/hr (re-asses ECD), MPD in "AP" mode holding constant BHP w/ ECD = 1.13 sg, BGG = 0.3 %.
00:45 - 01:00: M/U connection. Increase mud pumps gradually to 2600 lpm w. 10 RPM and observe SPP spike to 397 bar. Increase RPM to 50 (5 kN.m) and observe SPP decreasing to 380 bar. Miss survey.
01:00 - 04:40: Resume drilling 12 ¼" section 4217 m to 4257 m w. 2600 lpm / 380 bar / WOB 2 - 2.5 mt / 100 rpm / 6 - 9 kN.m & ROP 15 m/hr MPD in "AP" mode holding constant BHP w/ ECD = 1.13 sg, BGG = 0.5 %.
At 4255 m observe junk catcher plugged. Set MPD control systems to "SBP mode". By-pass MPD Coriolis & junk catcher. Open junk catcher: observed screen plugged w. rubber.
04:45 - 05:00: At 4257 m kelly down, wash up/down 1 x single, Meanwhile clean and attempt to reinstall the screen w/o success: unable to reach bottom of junk catcher due to debris inside. Close junk catcher without screen to recover "AP mode" for connection purpose. Take SCRs at 4255 m.
05:00 - 06:00: Resume drilling 12 ¼" section 4257 m to 4262 m w. 2600 lpm / 380 bar / WOB 2 - 2.5 mt / 100 rpm / 6 - 9 kN.m & ROP 15 m/hr MPD in "AP" mode holding constant BHP w/ ECD = 1.13 sg, BGG = 0.5%.
Note: at 05h00 By-pass Junk catcher/Coriolis. Open and continue cleaning junk catcher.

Remarks:
R1: Rig: 34 empty skips. PSV Sabalo:16 empty skips. Punta Delgada: 20 empty skips. Punta Jerez: 20 empty skips.
R2: RGH hydraulic regulator leaking at 5K supply fitting at 3 - 4 bar/min.

Mud Volumes

Additions...	Losses (m³)	Active Vol...	Cum Add...
1.1	4.8	3 114.6	2 034.3

Mud Check

Mud Type	Density (sg(...	ECD (sg(h2...
NABM	1.08	

OW Ratio	Solids (...	Sand (%)	LGS (%)	HGS (%)
71.7/28.3	8.0		1.52	4.47

PV OR (cP)	YP OR (lb...	YS Calc (l...	Marsh vis...
29	16.0	9.0	67.00

Filtrate (mL/30min)	HTHP Filtrate (m...	Oil Cutti...
	3.0	

Mf (mL)	Pf (mL)	Pm (mL)	pH

Gel 0 (lbf/...	Gel 10 (lbf...	Ca (mg/L)	Chlor (m...
14	27		

Comment
Bleed 20m3 of premix into active system in one full circulation at 111ltr/min. Notice slight improve on mud properties. Repeat same and observe mud back on spec : YP at 17,LSRV at 10, stability hold at 320 kg/m3. Fluid loss tighten at 3ml/30min.

Safety Stocks

Main Stock Des	Unit	Consumed	Stock
Baryte	tons	0.0	545.3
Base Fluid	m³	0.0	302.4
Diesel	m³	56.5	3 421.1
Drilling Water	m³	66.0	2 386.0
Helifuel	L	0.0	6 447.0
Potable Water	m³	27.0	1 161.1
Total cement	tons	0.0	336.2

Weather Conditions

Wave Dir (°)	Wave Period (s)	Wave Ht (m)
110.00	6.00	1.00

Wind Spd (kn...	Wind Dir (°)	Visibility (km)
23.0	138	10

Current Speed (knots)	Current Direction (°)
1.2	180.00

Roll (°)	Pitch (°)	Heave (m)	T Low (°C)
0.10	0.10	0.10	24.0

Var. deck load/support vessels

Var Load (tonnef)	Max Var Load (ton...
15922	25 000

Vessel Name	Vessel Type
	Supply
	Supply

POB

Type	Count
Drlg Contractor	131
Service Cies	37
Operator - D&C	10

Cumul POB :178

Daily Drilling Report

TOTAL E&P

Field :N/A

Platform :

Rig :

Well Name:

Days wo LTI/RI: 93/39	**12"1/4, DRILLING**		
	Daily progress	54.00	
	Drilling Hours	4.00	
	Midnight depth	4 214.00	
	Date		4/17/2019
	Report number		93
	Water Depth		3 276.50
	Activity Type & N°		EXP 1

Daily Summary :
Work string from 4081 m to 4071 m. String free. RIH to 4130 m. Pump & circulate out His-vis pill. Perform SDFIT to 1.17sg. Ream down to 4160m. Drill formation to 4161.5 m: confirm no obstruction on bottom hole. POOH to 4076 m, excess of drag. Work string free. Retrieve PS. Install BA. RIH to 4130 m. Ream down to 4161 m. Drill 12 1/4" section 4161 m to 4214 m.

6:00 am Status :
Drill 12 ¼" section at 4262 m.

Planned Operation :
Drill 12 ¼" section.

Expected TD
5 765

Next : 9"5/8 Liner @ 4760 m TVDRT

Time Log

Start Time	Dur (hr)	Comments	Code	Secondary code	Cum Dur (hr)
16:00	1.50	M/U and RIH M-BART with BA. With CMC open, land BA in RCD housing w. 13 mt. Close RCD latch, correct gallon count and amperage. Apply 11 mt overpull, observe no movement of drill string, confirming BA locked in RCD housing. Release M-BART from BA. POOH and R/back same (bit depth: 4020 m).	MPD	SET	17.50
17:30	0.50	RIH 12 ¼" BHA from 4020m to 4130m.	TRIP	DP.IN.R	18.00
18:00	0.50	Ream down 12 ¼" BHA from 4130 m to 4161 m, w. 2600lpm / 380 bar / 60 rpm / 5 - 7 kN.m, MPD in "AP" mode holding constant BHP w/ ECD = 1.13 sg. Note: tag restriction at 4158 m and ream down to bottom w. 5 - 8 mt.	REAM	REAM	18.50
18:30	5.50	Drill 12 ¼" section 4161 m to 4214 m w. 2600 lpm / 380 bar / WOB 2 - 2.5 mt / 60 rpm / 5 - 7 kN.m, MPD in "AP" mode holding constant BHP w/ ECD = 1.13 sg, BGG = 0.3 %. Notes: - Limit ROP to 10 m/hr from 4162 m to 4194 m (enter into reservoir). - Increase ROP to 15 m/hr from 4194 m to 4214 m. AUX: 00:00 - 10:00: Assist MAIN. 10:00 - 17:00: P/U, M/U & rack 9 5/8" shoe track. R/D TRS equipment. 15:00 - 00: Assist MAIN.	DRL	NETDRL	24.00

Date	Type
4/15/2019	Choke Drill / Stripping Drill

Weather Conditions

Cumul POB :178

16. Appendix 4 – Drilling Mud Report Example Template

ADVANTAGE Daily Drilling Fluids Report -1

Rpt Date 15/Mar/2019	Well Name/No	Section Name/No 8 1/2" Hole #9	Mud System DELTA-TEQ
Job# 1	Spud Date 26/Sep/2018	MD 4600.00 m	Progress 430.00 m	Present Activity Tripping
Operator	Company Rep	Contractor	Contractor Rep
Field/Lease	Blk/Co/Parish	Area Mediterranean Sea	Ctry/State Egypt	Rig

Drilling Assembly

Bit Gauge in	Mfr	Bit Model
0		

Drill Collars			Drill Pipe		
OD in	ID in	Length m	OD in	ID in	Length m
			5	4.276	3316.58
			3 1/2	2.992	301.42

Casing

OD in	ID in	Depth m
20	19.378	321.00
9 7/8	8 5/8	3374.00
9 5/8	8.535	4756.00
	8 1/2	4600.00

Volumes

m^3	
Total Hole	209.618
Active Pits	122.2
Tot Active	331.818
In Storage	1411.8

Pump Information

Model	Liner in	Stroke in	Eff %	Vol/Stk l	Stk Rate SPM	Circ Rate l/min
F-2200HL	5 1/2	14.00	97.00	15.86	0	
F-2200HL	5 1/2	14.00	97.00	15.86	0	
F-2200HL	5 1/2	14.00	97.00	15.86	0	
F-2200HL	6	14.00	97.00	18.88	0	

Circulation Times

Surface to Bit	min/stks	Total System	min/stks
Bottoms Up	min/stks		

Mud Properties

Property	Fluid Spec	1	2	3
Sample From		Active Pit		
Check Time		23:59		
MD m		4600.00		
TVD m		4599.69		
Bit Depth m		3619.00		
Inc deg		0.72		
Density sg				
Funnel Visc. sec/quart				
Circ BHTdegF				
Test Temp degF				
Rheol Temp degF				
PV cP				
YP lbf/100ft^2				
10 Sec Gel lbf/100ft^2				
10 Min Gel lbf/100ft^2				
30 Min Gel lbf/100ft^2				
API Filtrate cc				
HTHP Filtrate cc				
in/32				
HTHP Cake in/32				
HTHP Temp degF				
HTHP Pressure psi				
pH				
Pm				
Pf				
Mf				
Excess Lime lb/bbl				
Hardness mg/l				
Chlorides mg/l				
K mg/l				
NaCl mg/l				
KCl mg/l				
MBT lb/bbl				
Retort Water %				
Lubricant %				
Retort Solids %				
Corrected Solids %				
KCL %:-				
Calcium mg/l				
CaCO3 Mud Test				

Max Ann Velocity

AV Riser	ft/min
AV Casing	ft/min
AV Open Hole	ft/min
Vc Open Hole	ft/min
Vc Drill Pipe	ft/min

Min Ann Velocity

AV Riser	ft/min
AV Casing	ft/min
AV Open Hole	ft/min

Bit Information

Size	
Hours On Bit	
Bit Number	
BHA Number	
Depth In	
Bit RPM	
WOB	
Nozzles	

Bit Hydraulics

Nozzle Vel	ft/sec
Bit Press Loss	psi
HHP / Area	HP/in^2
HHP	%
TFA	

Hole Information

Standpipe Pressure	psi	Water Depth	295.00 m
Hole Flow	l/min	Riser Booster Rate	l/min

Solids Analysis

Property	1	2	3	4
LGS %	2.07			
LGS g/cc	0.054			
HGS %	19.08			
HGS g/cc	0.801			
Bentonite %	0.07			
Bentonite g/cc	0.002			
Drill Sol %	2.00			
Drill Sol g/cc	0.052			
Avg Dens Sol lb/gal	33.7			

Rheology

600 RPM	89
300 RPM	56
200 RPM	43
100 RPM	27
6 RPM	9
3 RPM	7

Hydraulic Analysis

Behavior Index (n)	
Consistency Index (k)	#sec'n/100ft'2
ECD @ Bit Depth	sg
ECD @ Casing Shoe	sg

Fluid Comments/ Recommendations

Drilling Comments

BHDF Fluids Rep	BHDF Rep Phone	Warehouse	Warehouse Phone	Coordinator	
	+20-12 7 66 4 99 17	Port Said	+20 122 10 35614		Page 1

ADVANTAGE Daily Drilling Fluids Report -1

Rpt Date 15/Mar/2019	**Well Name/No**	**Section Name/No** 8 1/2" Hole #9	**Mud System** DELTA-TEQ
Job# 1 **Spud Date** 26/Sep/2018	**MD** 4600.00 m	**Progress** -430.00 m	**Present Activity** Tripping
Operator **Company Rep**		**Contractor**	**Contractor Rep**
Field/Lease **Blk/Co/Parish**	**Area** Mediterranean Sea	**Ctry/State** Egypt	**Rig**

Solids Control Equipment

Name	#	Mfr	Hours hours	Screen Sizes	Act Volume Lost m^3	Res Volume Lost m^3	Comments
CENTRIFUGE	1	SWACO	0.0		0.000	0.000	
CENTRIFUGE	2	SWACO	0.0		0.000	0.000	
DEGASSER	1	SWACO	0.0		0.000	0.000	
DESILTER	1	SWACO	0.0		0.000	0.000	
DESILTER	2	SWACO	0.0		0.000	0.000	
SHALE SHAKER	1	Axiom Process, Ltd.	4.0	6X API 20/ 6X API 200/ 6XAPI 200	0.100	0.000	
SHALE SHAKER	2	Axiom Process, Ltd.	4.0	6 XAPI 20/ 6X API 200/ 6X API 200	0.100	0.000	
SHALE SHAKER	3	Axiom Process, Ltd.	0.0	6X API 60/ 6 X API270/ 6 X API 270	0.000	0.000	
SHALE SHAKER	4	Axiom Process, Ltd.	0.0	6 X API 60/ 6 X API 270/6 X API 270	0.000	0.000	
SHALE SHAKER	5	Axiom Process, Ltd.	4.0	6 X API 20/6 X API 200/6 X API 200	0.100	0.000	
				Total Volume Lost	0.3	0	

Volumes

Additions m^3			Losses m^3			Total Volumes m^3			
Mud Added	Weight Materials		Downhole		Left In Pit	Starting Volume	1745	Riser w/o Pipe	61.077
Brine	Water		Cased Off		Trip Losses	Daily Additions	14.8	Casing w/o Pipe	160.334
Base Fluid	Product		Left In Hole	15.8	Injected	Daily Losses	16.1	Open Hole w/o Pipe	
Recycled	Other	14.8	Discharged		Spill To Environment	Ending Volume	1743.700	String Displacement	11.793
			SCE	0.3	Onshore Disposal	Net Change	-1.300	String Capacity	32.104
			Evaporation		Returned			Total Hole w/ Pipe	209.618
			Other Losses					Total Active	331.818
								Total Reserve	1411.800

IADC Hours

Tripping	13	Cementing	2	Rig Repair	6.5	Stuck Pipe	2.5

BHDF Fluids Rep	BHDF Rep Phone	Warehouse	Warehouse Phone	Coordinator	
	+20-12 7 66 4 99 17	Port Said	+20 122 10 35614		Page 2

ADVANTAGE Daily Drilling Fluids Report -1

Rpt Date 15/Mar/2019	**Well Name/No**		**Section Name/No** 8 1/2" Hole #9
Job# 1 **Spud Date** 26/Sep/2018	**MD** 4600.00 m	**Progress** -430.00 m	**Present Activity** Tripping
Operator **Company Rep**		**Contractor**	**Contractor Rep**
Field/Lease **Blk/Co/Parish**	**Area** Mediterranean Sea	**Ctry/State** Egypt	**Rig**

Primary Currency USD		Secondary Currency		Totals USD		
Daily Product Cost		**Daily Product Cost**	0.00	**Primary Product**		
Daily Tax	0.00	**Daily**		**Product**	0.00	
Debit/Credit	0.00	**Debit/Credit**	0.00	**Primary Engineering**	0.00	
Daily Engineering Cost		**Daily Engineering Cost**	**Secondary**	**Engineering**	0.00	
Total Daily Cost		**Total Daily Cost**	0.00	**Primary Total**		
Total Inventory Value		**Total Inventory**		**Total**	0.00	
				Deck Load	641.48	Ton

Products and Services

Product	Units	Start	Transferred In	Received	Returned	Lost	Daily Use	Final	Unit Price USD	Daily Cost USD	Active Ending Concentrations lb/bbl	Reserve Ending Concentrations lb/bbl
Bulk												
BARITE	1500kg	98					4	94			157.89	167.06
BARITE BULK	1000 kg	82					2	80			139.01	50.87
MIL-CARB 150	1000 kg	20						20			2.64	15.46
POTASSIUM CHLORIDE	1000 kg	60						60			16.11	22.87
SALT	1000 kg	13						13			3.54	6.55
Water Based Product												
ALL-TEMP	25 lb											
AQUA-MAGIC	55 USgal											
BASE FLUID (KCL/BRINE)	1 m^3	219						219				
Base Fluid (NaCl Brine)	1 m^3	37						37				
BIO-PAQ	50 lb	70						70				
BIO-SPOT	55 USgal	11			11							
CAUSTIC SODA	25 kg	122						122				
CITRIC ACID MONOHYDRATE	25 kg	115						115				
ECCO-TEMP	200 L	9			9							
KEM-SEAL	50 lb											
LATIRATE	55 USgal	4			4							
LC-Lube	50 lb	97						97				
LIGCO	50 lb											
LIME	25 kg	40						40				
MAX-GUARD XPR	55 USgal	8						8				
MAXTROL	50 lb	65						65				
MD	55 USgal	4						4				
MIL-BIO SEA 98	25 ltr	17						17				
MIL-GARD	25 kg											
MIL-PAC LV	25 kg	140			72			68				
NANO-SHIELD	50 lb											
NEW DRILL LV	25 kg											
NEW-THIN	5 USgal											
NOXYGEN L	55 USgal	8						8				
POTASSIUM CHLORIDE	25 kg											
PROTECTOMAGIC M	50 lb	15						15				
SODA ASH	25 kg	40						40				
SODIUM BICARBONATE	25 kg	55						55				
W.O. DEFOAM	55 USgal	6			6							
XAN-PLEX D	25 kg	125			40			85				
LCM												
CALCIUM CARBONATE M	25 kg	150						150				
CHEK-LOSS	25 lb	87						87				
MICA COARSE	25 kg											
MICA FINE	25 kg											
MICA MEDIUM	25 kg											
MIL-SEAL COARSE	25 kg											
MIL-SEAL FINE	25 kg											
MIL-SEAL MEDIUM	25 kg											
NUT PLUG COARSE	25 kg											
NUT PLUG FINE	25 kg											
NUT PLUG MEDIUM	25 kg											
SOLUFLAKE F	50 lb											
SUPER SWEEP	1 lb											
Other												
IEOC Pipe Lax	55 USgal	4			4							

BHDF Fluids Rep	BHDF Rep Phone	Warehouse	Warehouse Phone	Coordinator	Page 3
	+20-12 7 66 4 99 17	Port Said	+20 122 10 35614		

17. Appendix 5 – Action Tracking Register

ACTION TRACKING REGISTER

status
Closed
open
Rejected
Deleted

LAST UPDATE ON : 08/01/2020

Item	ITEM	ACTION DESCRIPTION	Person In charge	Recommended Action / comments	Status	Date opened	Target date	Date closed	Closed by
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
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39									
40									
41									
42									

18. Appendix 6 – Barite Toxicity Tests

CMRDI CENTRAL METALLURGICAL RESEARCH AND DEVELOPMENT INSTITUTE

Name of the company: شركة مصر لتكنولوجيا النانو Date of receiving samples: 4/11/2019

Number of the samples: 1 sample Code: 19/3759 File 1269

Type of analysis: Chemical analysis Data delivery: 11/11/2019

Chemical Analysis

Item	Result %
CdO	0.00
HgO	0.00
PbO	0.08

- نتائج الاختبارات تمثل العينة المقدمة للمركز فقط ولا تمثل الانتاج أو اى كميات اخرى طرف جهه التقديم .
- التقارير التى يصدرها المركز سرية وتخص الجهه الطالبة وحدها ولا يجوز اعطاء صورة منها لاى جهه اخرى . تنقضى مسئولية المركز عن تسليم باقى العينات له خلال ٣٠ يوما من صدور التقرير او استنفاذ العينة فى الاختبارات . فى حالة عدم مطابقة العينة للمواصفات يكون من حق المركز الاحتفاظ بالعينة وبواقيها

Ore Evaluation Lab.
Prof. Mervat Said Hassan

Head of TSD
Eng. Nasser Gomah

EGYPT NANO TECHNOLOGIES CO.
S.A.E

شركة مصر لتكنولوجيا النانو
ش.م.م.

Certificate of Analysis for Barite Order

API Specification 13 A

Customer : Baker Hughes EHO LTD **Order No. : 4510696678**

Product : Barite API **Quantity : 1950 Ton**

Packing : Big Bag 1.5 Ton **Material number : 10196044**

Batch No.	Batch Production Date	Expiry date	Batch Quantity/ ton	Representative Batch Sample Results				
				Test	Density	Residue greater than 75 µm	Particles less than 6 µm in equivalent spherical diameter	Total soluble alkaline earth metal, as calcium
				Unit	g/cm^3	%	%	mg./kg.
				API 13 A specifications	4.2 min.	3% max.	30% max.	250 max.
19/473	NOVEMBER 2019	NOVEMBER 2024	750	Results	4.20	1.81	25.5	139
19/474	NOVEMBER 2019	NOVEMBER 2024	600	Results	4.20	1.85	26	128
19/475	NOVEMBER 2019	NOVEMBER 2024	600	Results	4.20	1.9	26.5	130

Lab Chemist.

Khaled Aly

QC Manager

Mohamed Hefny

(MQC-5.7.7-07-04)

Factory : 2nd Industrial zone – Block 21 – part 1 /B&2
Head Quarters: 2nd Industrial zone – Block 20 – part 5
Borg-el - Arab New City – Alexandria
P.O. Box : 34 Borg – el - Arab New
Phone : + (203) 45 99
Fax: + (203) 45 99

www.egyptnanotech.com

المصانع : المنطقة الصناعية الثانية –بلوك 21 قطعة 1/ب،2
الإدارة : المنطقة الصناعية الثانية – بلوك 20 – قطعة 5
مدينة برج العرب الجديدة – الاسكندرية – جمهورية مصر العربية
صندوق بريد : 34 برج العرب الجديدة
تليفون :+ 4599655 (203) (4 خطوط)
فاكس : 446 45 99 (203)

ENGINEERING & MANAGEMENT

ARAB SWISS ENGINEERING COMPANY " ASEC "
CERTIFICATE OF ANALYSIS
(BARITE)

Company Name : Egypt Nano Technologies Co.
Product : Barite sample Ref. New Turkish Dtd.10/11/2013
Ref.Let.Dtd. : 11/11/2013

Chemical Analysis

Item	Result %
L.O.I	0.56
SiO_2	1.77
Al_2O_3	0.89
Fe_2O_3	0.46
CaO	0.14
MgO	0.10
SO_3	32.22
K_2O	0.08
Na_2O	0.67
BaO	61.30
SrO	1.62
P_2O_5	0.00
MnO_2	0.02
TiO_2	0.00
ZnO	0.02
MoO_3	0.01
Cl	0.09
Cd	0.00
Hg	0.00
Pb	0.03
Total	99.98
$BaSO_4$	93.29

ARAB SWISS ENGINEERING COMPANY " ASEC "

ASEC ENGINEERING
LABORATORIES
13 NOV 2013

Eng. Bassam Gabr
Central Laboratory Manager

19. Appendix 7 – Rig Pipe Dope Spec Sheet

KOPR-KOTE®
TOOL JOINT & DRILL COLLAR COMPOUND

DESCRIPTION

KOPR-KOTE® drill collar and tool joint compound is a premium-quality, unleaded compound containing copper flake, graphite, and other natural extreme pressure and anti-wear additives. **KOPR-KOTE's** solids package is formulated to prevent excessive circumferential makeup by increasing the coefficient of friction under compressive forces. As stress levels rise above 50% of yield, the friction factor increases, limiting downhole makeup. Full hydraulic joint efficiency is maintained allowing joint shoulder faces to mate completely without standoff or deformation. **For invert or high-pH muds, use Jet-Lube EXTREME™. For wedge-type thread connections, use NCS-30™ ECF for best thread-wear protection.**

- **Not classified as a marine pollutant - DOT Approval CA2004080025**
- Contains no lead or zinc.
- Extreme-pressure additives provide additional protection against seizing and galling and allow consistent make-up.
- Aluminum-complex grease base protects against rust and corrosion.
- Sticks to wet joints.
- Unequaled resistance to makeup downhole.
- Available in Arctic, Thermal, and Specialty grades.
- Approved by NAM/Shell for under-balanced drilling applications.

For optimum performance on API drill string connections, **KOPR-KOTE** should be utilized with the torque charts in API RP7G or by contacting the drill pipe and connection manufacturer.

Premium drill string connections such as HI-TORQUE®(HT), eXtreme® Torque (XT®), and XT-M™ connections, etc., utilize make-up torques based upon thread compound friction factors of 1.0. Therefore, use the torque provided by the premium connection manufacturer. Adjusting make-up torque based on thread compound friction factor may still be advised.

SERVICE RATING:
0°F (-18°C) TO 450° (232°C)

PRODUCT CHARACTERISTICS

Thickener	Aluminum Complex
Fluid Type	Petroleum
Dropping Point (ASTM D-2265)	450°F (232°C)
Specific Gravity	1.15
Density (lb/gal)	9.6
Oil Separation (ASTM D-6184) Wt. % Loss @ 212°F (100°C)	<3.0
Flash Point (ASTM D-92)	>430°F (221°C)
NLGI Grade	1
Penetration @ 77°F (ASTM D-217)	310 - 330
Copper Strip Corrosion (ASTM D-4048)	1A, typical
4-Ball (ASTM D-2596)	
Weld Point, kgf	800, typical
Friction Factor*	1.15 (standard service)
(Relative to API RP 7G)	1.25 (very severe service)

*** Many factors such as pipe size, thread geometry, drilling mud contamination, etc. affect the friction factor. This is a relative number and in all applications experience and prior knowledge should be used to adjust make-up torque accordingly. Contact your drill pipe manufacturer for torque and friction-related specifications.**

PACKAGING

Code No.	Container Size	Shipping Wt.
10123	1 gal.	5 kg.
10113	2½ gal.	11.8 kg.
10193	20 kg.	22 kg.
10115	5 gal.	23.6 kg.
10117	5 gal.	23 kg.
10124	15 gal.	68.9 kg.
10129	50 gal.	233.1 kg.

LIMITED WARRANTY

Jet-Lube, Inc. makes the Limited Express Warranty that at the date of delivery, this product shall be free from defects in Jet-Lube, Inc. materials and workmanship.

This Limited Express Warranty is expressly in lieu of any other express or implied warranties, including any implied warranty of merchantability or fitness for a particular purpose, and of any other obligation on the part of Jet-Lube, Inc.

The sole remedy for breach of the Limited Express Warranty shall be the refund of the purchase price. All other liability is negated and disclaimed, and Jet-Lube, Inc. shall not be liable for incidental or consequential damages.

CORPORATE LOCATIONS

Houston, Texas–World Headquarters

Maidenhead, England — **Edmonton, Canada**

JET-LUBE

JET-LUBE, INC.
4849 HOMESTEAD RD.,
P.O. BOX 21258 (77226-1258)
HOUSTON, TX 77028

WATS: 800-538-5823
PHONE: 713-674-7617
FAX: 713-678-4604
E-MAIL: sales@jetlube.com
www.jetlube.com

OILFIELD OILFIELD OILFIELD OILFIELD OILFIELD

JET-LUBE, INC.
MATERIAL SAFETY DATA SHEET

I

Product Name: KOPR-KOTE®
Chemical Family: Petroleum based lubricating grease
Use: Tool joint and drill collar compound/anti-seize (MIL-PRF-907E)/ jacking lubricant

Manufacturer/Supplier: JET-LUBE, INC.
Address: 4849 Homestead Rd., Ste. #200 Houston, TX, 77028 USA **Phone:** 713-674-7617
Emergency Phone: 713-674-7617 **Fax:** 713-678-4604
Chemtrec 24 hours (USA): 800-424-9300

II

Hazardous Components	CAS No.	Wt%	OSHA PEL	ACGIH TLV	Other Limits of Exposure
Lubricating Grease	74868219	60	N/A	N/A	STEL:
Nonhazardous Blend	7782435/1317335 1377674/471341	20-30	UN	UN	STEL: UN STEL: UN
Metallic Copper	7440508	10	N/A	1mg/M³	STEL: 2mg/M³

III

Main Hazards–Health Effects
Eyes: May cause irritation. **Inhalation:** Viscous nature may block breathing passages if inhaled. **Ingestion:** May cause diarrhea.
Skin: For hypersensitive persons, may irritate the skin after prolonged periods of contact.

IV

Eyes: Flush with water until all residual material is gone. If irritation persists, seek medical help. **Inhalation:** Clear air passage. If respiratory difficulty continues, seek medical help. **Ingestion:** Wash out mouth immediately. Consult physician. **Skin:** Wash thoroughly with hand cleanser, followed by soap & water. Contaminated clothing should be dry cleaned before reuse.

V

Extinguishing Media: Foam, dry powder, Halon®, carbon dioxide, sand, earth & water mist. **Unsuitable Extinguishing Media:** Water jet.
Protective Equipment for Fire fighting: Self-contained breathing apparatus.

VI

Personal Precautions: Wear gloves & protective overalls. **Environmental Precautions:** Do not allow it to enter drains. **Spillage:** Scrape up bulk, then wipe up remainder with cloth. To prevent walking hazard, pick up remaining residue with diatomaceous earth.

VII

Handling: No special handling precautions necessary. **Storage:** Do not store at elevated temperatures.

VIII

Respiratory Protection: None needed. **Hand Protection:** Protective gloves for hypersensitive persons.
Eye Protection: Glasses, if applied to parts in motion. **Body Protection:** Overalls.

IX

Physical State: Semisolid paste **Color:** Copper/Bronze **Odor:** Petroleum **pH:** Neutral **Boiling Range/Point °F (°C):** <600 (316)
Melting Point °F (°C): 500 (260) **Flash Point (COC) °F (°C):** 430 (221) **Autoignition Temperature °F (°C):** >500 (260)
Explosive Properties: **LEL:** 0.9% **UEL:** 7% **Evaporation Rate (Butyl Acetate):** <0.01 **Partition Coefficient (Log Pow):** N/A
Vapor Pressure (kPa): <0.01 **Percent Volatiles:** Nil **Density (g/cm³):** 1.15 **Flammability:** Not flammable at ambient temperature.
OAR Value: N/A **Oxidizing Properties:** None **Water Solubility:** Nil **Vapor Density:** >5

X

Stability: Chemically stable under normal conditions. No photoreactive agents. **Conditions to Avoid:** Powerful sources of ignition & extreme temps. **Materials to Avoid:** Strong inorganic & organic acids, oxidizing & copper reactive agents. **Hazardous Decomposition Products:** Burning generates smoke, airborne soot, hydrocarbons & oxides of carbon, sulfur & nitrogen. Residue mainly comprised of soot & mineral oxides.

XI

Acute Toxicity: Not known. **Irritancy–Skin:** Very mild. **Skin Sensitization:** Not known. **Subacute/Sub-chronic Toxicity:** Not known.
Genotoxicity: None known. **Chronic Toxicity:** None known. **California Prop 65:** N/A **Carcinogen:** **NTP:** No **IARC:** No **OSHA:** No
EC Classification (67/548/EEC): No **Allergens:** None known. **LC-50:** 1.98gm/l—actual test data - mysidopsis bahia. **LD-50:** N/A

XII

Possible Effects: In extreme cases, may gernerate oil fractions that could act as a marine pollutant. Occurrences of this nature are highly unlikely. **Behavior:** Relatively well behaved. Bioaccumulation potential nil.
Environmental Fate: Highly unlikely to cause widespread contamination. Nontoxic to marine or land organisms.

XIII

Product Disposal: Do not incinerate. Contact waste disposal company or local authority for advice.
Container Disposal: Pails without liner–see Product Disposal section above. Pails with plastic liner–pail may only be disposed of via standard waste disposal services, recycled or reused. Liner–see Product Disposal section above.

XIV

D.O.T.: Nonhazardous D.O.T. exception CA2004080025 **UN No.:** Nonhazardous **Air Transport (ICAO & IATA):** Nonhazardous
Sea Transport (IMO & IMDG): Nonhazardous **Road & Rail Transport (ADR/RID):** Nonhazardous

XV

Labeling Information: None needed **EC Annex 1 Classification:** Not Applicable. **R Phrases:** R22—harmful if swallowed.
S Phrases: N/A, as known. **Ozone Depleting Chemicals:** N/A **TSCA:** All components are listed. **TSCA 12B Components:** None
WHMIS (Canada): Not controlled. **Canadian DSL:** All components listed. **40 CFR Part 372 (SARA Section 313):** This product contains in part raw material components subject to reporting. **SARA 311/312:** None **CERCLA:** Nonhazardous **RCRA Hazard Class:** Nonhazardous

XVI

SDS first issued. SDS data revised. **New Jersey Right To Know:** See Section II

HMIS SYMBOL

HEALTH	1
FLAMMABILITY	1
REACTIVITY	0
PPI	B

NFPA SYMBOL

Signature:
Prepared by: Donald A. Oldiges
Date Issued: June 25, 2008

As of issue date, the information contained herein is accurate and reliable to the best of **JET-LUBE'S** knowledge. **JET-LUBE®** does not warrant or guarantee its accuracy or reliability and shall not be liable for any loss or damage arising out of the use thereof. It is the user's responsibility to satisfy itself that the information offered for its consideration is suitable for its particular use.

LEGEND

I. Identification of the substance/preparation and company
II. Composition information on ingredients
III. Hazards identification
IV. First aid measures
V. Fire fighting measures
VI. Accidental release measures
VII. Handling and storage
VIII. Exposure control/personal protection
IX. Physical and chemical properties
X. Stability and reactivity
XI. Toxicological information
XII. Ecological information
XIII. Waste Disposal
XIV. Transport information
XV. Regulatory Information
XVI. Other information

SOCIAL MANAGEMENT PLAN

	Name	Position	Date	Signature
Prepared by		CLO TEPLB		
Verified by		TEPLB HSE Manager		
Verified by		TEPLB OPS Manager		
Approved by		TEPLB General Manager		

Revision	Date	Prepared by	Verified by	Verified by	Approved by
0					

Metier: HSEQ	**Entity: E&P**

Table of Contents:

SOCIAL MANAGEMENT PLAN

1 - OBJECTIVE

The objectives of the Social Management Plan (SMP) are to:

- ensure that COMPANY activities comply with Lebanese regulations, TEPLB corporate standards and good international practice in relation to the mitigation of social impacts;
- describe the protocol to implement the social mitigation measures identified during Environmental Impact Assessment (EIA) process for Block 4;
- provide links to other management plans that have relevance for the mitigation of social impacts;
- outline the split in accountabilities between COMPANY and CONTRACTOR and provide detail of the organizational structure, roles and responsibilities where appropriate; and
- describe the monitoring and reporting activities.

The SMP is a sub-plan of the Environment and Social Management Plan (ESMP), which in turn is part of the TEPLB Health, Safety and Environment Management System (HSEMS).

2 - SCOPE

The SMP applies to all exploration activities of COMPANY in Block 4, as well as support activities associated with the Project implementation. It is applicable to offshore and onshore, including all sites, logistics base, helicopter, rig or ships operating on behalf of the Project.

The SMP brings together the social mitigation commitments in the EIA to either provide greater detail about how the commitment will be implemented or provide reference to the section of the HSEMS where that detail is found. It includes the following:

- General economy - Section 6.1 -
- Education and Training – Section 6.2 -
- Social conditions – Section 6.3
- Public health – Section 6.4
- Archaeological and Cultural Resources – Section 6.5
- Infrastructure – Section 6.6
- Shipping – Section 6.7
- Fisheries – Section 6.8
- Tourism – Section 6.9

To facilitate the tracking of commitments from the EIA, through the commitments register and into the management plans, the mitigation measures unique identifier (UID) is provided in the text as appropriate.

The activities to ensure positive relationships with local communities and other key stakeholders, including notification, consultation, and engagement are not considered here, but rather in the Drilling Operations Stakeholder Management Plan (DOSMP - SEP) for Block 4. The management of grievances is considered in the TEPLB Grievance Management Procedure (GMP).

3 - DEFINITIONS & ACRONYMS

3.1 - Acronyms

CLO	Community Liaison Officer
CR	Commitments Register
COMPANY	Total E&P LIBAN
CONTRACTOR	Entities contracted by COMPANY to deliver Project aspects
CSMP	Contractor Social Management Plan
DGA	Directorate General of Antiquities
DOSMP	Drilling Operations Stakeholder Management Plan
E&P	Exploration and Production
EIA	Environmental Impact Assessment
EMoP	Environmental Monitoring Plan
GMP	Grievance Management Procedure
HSE	Health, Safety, Social and Environmental
HSEMS	Health, Safety and Environmental Management System
KPI	Key Performance Indicators
MoC	Ministry of Culture
PAR	Petroleum Activities Regulations Decree 10289/2013
Project	Offshore exploration drilling in Block 4, Lebanon
ROV	Remote Operated Vehicle
SMP	Social Management Plan
SUB-CONTRACTOR	Entities contracted by the CONTRACTOR to deliver Project aspects
TEPLB	Total E&P Liban

4 - RELATED DOCUMENTS

4.1 - Internal Documents

Reference	Title
	Environmental Impact Assessment (EIA)
2-PR-HSEQ-009	Grievance Management Procedure (GMP)
1-PL-HSEQ-007	Drilling Operations Stakeholder Management Plan (DOSMP)
	Commitments Register (CR)
MA-HSEQ-001	Health, Safety and Environment (HSE) Plan
2-PL-HSEQ-006	Pollution Prevention and Environmental Monitoring Plan (PPEMP)

5 - ROLES AND RESPONSIBILITEIS

5.1 - COMPANY'S Role

COMPANY request its CONTRACTORS to apply B4 EIA Commitment Register including requirements to apply in their Social Management Plan.

The majority of the Project activities are undertaken by CONTRACTORS. There will be four major contracts, specifically:

- Logistics base contractor;
- MODU/drilling and well services contractor;
- Helicopter services contractor; and
- Support and supply vessel contractor.

COMPANY will communicate EIA report and the related commitments register in order for the CONTRACTOR to:

- include Project EIA commitments into relevant CONTRACTORS scope;
- communicate relevant aspects of present SMP to its workers and subcontractors, including training as necessary; and

The implementation of COMPANY SMP will be led by the TEPLB HSE Manager, based in Beirut, Lebanon

The HSE Manager role will be supported by a Community Liaison Officer (CLO).

5.2 - CONTRACTOR'S Role

CONTRACTOR is required to pay due regard to the local community and act responsibly in order to protect the local community from adverse effects resulting from activities performed under their CONTRACT. CONTRACTOR is also required to avoid or/and minimize any adverse impact which may arise from such activities.

6 - MANAGEMENT OF SOCIAL ISSUES

6.1 - General Economy

Employment

Opportunities for employment and training are limited during the exploration phase of the Project. The majority of employment will be through CONTRACTORS and SUBCONTRACTORS.

COMPANY expect that CONTRACTORS implement the following aspects which are reflected from the Commitment Register:

- CONTRACTORS will be obliged to comply with all applicable labour laws (UID SOC16).
- CONTRACTORS will be encouraged to consider the use of local labour and to advertise any Project related vacancies locally (UID SCM01).

- CONTRACTORS will provide clear information on the number and limited timescales of employment opportunities.
- CONTRACTORS will ensure that the person who is most suited to the post, based on the applicant's abilities, qualification, experience and merit as measured against the job description and person specification.

COMPANY will implement a grievance mechanism, ensuring that relevant stakeholders are aware of the communication channels open to them (UID SOC 01) in order to address any concerns about economic opportunities, or any other Project related issue. Full details are provided in the Grievance Management Procedure (GMP).

Procurement of goods and services

COMPANY will give priority to award local contracts to procure catering, cleaning, security, transportation, logistics, and material supplies services during the drilling campaign, providing they meet project standards and requirements. Additionally, COMPANY will conduct due diligence process at the vendor qualification stage to ensure environmental, social, health and safety standards as well as human rights and labour requirements are met.

COMPANY requires that CONTRACTOR shall:

- Give preferential treatment to the procurement of goods and services originating from Lebanon or/and sourced in Lebanon, when such goods and services are internationally competitive with respect to quality, availability, price and performance (UID SCM01);
- Ascertain that all SUBCONTRACTORS and intermediaries are reputable and legitimate enterprises.

6.2 - Education and Training

The offshore Project activities will require personnel with relevant professional qualifications and work experience that are not widely available in Lebanon. The activities last only approximately 60 days for each well. There will be limited training opportunities during this phase.

The onshore support activities will be provided by the Logistics Base CONTRACTOR. CONTRACTOR will provide professional guidance and supervision to their personnel where appropriate given the short duration of the services. In line with PAR Article 155, CONTRACTOR will give priority to training of Lebanese in order to facilitate the employment of Lebanese at all levels in the organisation (UID SCM03).

6.3 - Social Conditions

Security

Security risks offshore are negligible given the location of the well: it is in the territorial sea and it is located on an inner block, meaning that it is far from norther and southern borders. One support vessel will be allocated to be permanently present at the drill site in order to undertake security and safety duties such as monitoring the movement of other vessels in the safety zone (UID SOC14 and HSS08).

Onshore security arrangements are provided by the Port of Beirut where the Project logistics base is located. The logistics base CONTRACTOR will cooperate with the General Security and Port Security. CONTRACTOR will regularly assess security risks through CONTRACTOR Security Plan as required under their contractual conditions with COMPANY (UID HSS13).

Road safety and congestion

CONTRACTORS shall include road safety in their HSE Management System including movement of personnel, machinery, plant and equipment on public roads.

This section summarises those commitments relevant to community safety.

CONTRACTOR Driving and Transportation Policy (DTP) shall detail measures to ensure community safety.

The DTP will include, but is not limited to:

- CONTRACTOR will not commence any work that affects the public roads until all agreed traffic safety and management measures essential for the works are in place.;
- Enforced speed limits & restrictions will always be adhered to (UID HSS01), including a slow speed when moving through populated areas;
- The speed limit around the Logistics Base will be 20 km/hour (UID HSS01);
- Vehicle movements will be restricted to defined access routes and demarcated working areas (including dedicated parking areas if outside the logistics base) (UID HSS02);
- All statutory vehicle limits (width, height, loading, gross weight) and any other statutory vehicle requirements will be met;

6.4 - Public Health

Air Quality

The Pollution Prevention and Environmental Monitoring Plan outlines full details of the actions to mitigate potential pollution. This section details only those control measures that are related to public health.

COMPANY requires the CONTRACTORS to implement B4 EIA Commitment Register relevant actions including the following:

- Monitor consumption of fuel in order to calculate air emission quantities (UID MR05).
- All machinery, equipment and installations will comply with generally accepted standards in the international petroleum industry, will be of proper construction, and kept in good working order (UID PP31).
- Generators will be operated according to the manufacturer's instructions to operate in most energy efficient manner (UID PP34).
- Low sulphur fuel will be used where practicable (UID PP32).
- CONTRACTOR will comply with Lebanese maximum emission limits (Decision 8/1/2001), (UID PP39).
- Dust generated by the receipt and transfer of dry bulk materials at the drilling fluids mixing plant will be controlled through dust suppression measures to be specified by CONTRACTOR and (UID PP40,).

- Planned, preventive maintenance is mandatory for all equipment, in line with the manufacturer's recommendation (UID PP60).

Noise

The Pollution Prevention and Environmental Monitoring Plan outlines full details of the actions to mitigate potential pollution. This section details only those control measures that are related to noise.

The activities at the onshore logistics base that will generate noise are limited to loading and unloading operations, and noise related to mixing plant and bulk facilities (generators, pumps, agitators and air compressors). None of these are anticipated to be particularly acute noise sources and will be contained within the territory of the Port of Beirut.

COMPANY requires the CONTRACTORS to implement B4 EIA Commitment Register relevant actions including the following:

- All equipment used by CONTRACTOR shall follow the national and international standards ruling noise emissions including PAR, OPRL, EPA and MoE decision No. 52/1/1996, and national maximum allowable noise levels and the permissible noise exposure standards. (PP-43)
- Noise levels shall be monitored, if appropriate. The threshold limit value of 85 dB A shall not be exceeded over an 8-hour exposure time. This threshold limit takes into account hearing protection equipment (UID PP62).
- CONTRACTOR shall minimize the inconvenience to local people generated by transport of materials (noise, dust, etc.).

Project personnel working offshore will be transported from the international airport to MODU location by helicopters with flights scheduled for daylight hours (between 06:00 and 20:00) in order to minimise noise disturbance to local communities at night (UID SOC 02).

6.5 - Archaeological and Cultural Resources

A submarine archaeologist recommended by Ministry of Culture was present during the Environmental Baseline Survey in Block 4 and did not find any cultural heritage sites at the sample locations in the priority area.

The following sections outline the archaeological resources control measures to be conducted.

Pre-drilling, plugging and abandonment activities

COMPANY will avoid existing known cultural heritage and archaeological sites and comply with their protection regimes according to regulatory requirements (Antiquities System Decision 166/1933 and Cultural Properties Law 37/2008), (UID CH01).

A survey was performed during the Environmental Baseline Survey where no archaeological site was found; a pre-drilling ROV survey will be conducted by COMPANY around the drilling sites to identify any previously unknown archaeological sites and avoid them (UID MR-1).

If a semi-submersible is selected for drilling, the sea bed will be surveyed ahead of anchoring by an ROV. This will ensure the anchor pattern selected will avoid sensitive seabed features, including cultural heritage. There will be an appropriate buffer to reduce the risk of potential impacts from anchor chain movement (UID BIO05).

A plugging and abandonment programme will be submitted to respective authorities as part of the Advanced Drilling Plan (ADP) before drilling begins (UID DC01).

Chance Finds Procedure

If pre-drilling and anchor setting ROV surveys identify the presence of potential cultural heritage (or paleontological) objects, features or sites, COMPANY, CONTRACTORs and SUBCONTRACTORs shall follow this Chance Finds Procedure.

The Chance Find Procedure shall be agreed with DOA prior to operations.

In the case of a Chance Find:

- Work must cease
- DGA will be informed as soon as possible
- A Chance Find Report will be sent to DGA including:
  - date and time of discovery
  - location of discovery (GPS coordinates)
  - description of the discovery (footprint, photos, video, sketch)
  - confirmation is received from DGA and MoC that works can resume.
  - temporary protection measures implemented (for example delayed or stopped work)

The next steps will be agreed with the relevant authorities. Actions may include, but not be limited to:

- Preservation in place through change of drilling anchor position
- Rescue and removal prior to further drilling work. COMPANY is responsible for ensuring that removal is conducted according to international and Lebanese standards and with oversight and involvement of the appropriate government institutions
- Drilling activities will resume only once regulator-approved mitigation measures are complete.

CONTRACTORS involved will keep COMPANY informed about each step of the Protocol implementation.

6.6 - Infrastructure

Offshore (submarine cables and pipelines)

Mapping of all cables and pipelines was completed and none were identified at the wellhead location. The EBS confirmed the findings and did not identify any existing cables or pipelines in the exploration drilling area in Block 4.

Onshore (Port of Beirut; Road Network and Air Traffic)

CONTRACTORS shall preserve and, if damaged by their operations, reinstate the infrastructure and community services owned or used by the LOCAL COMMUNITY (roads, irrigation canals, farm lands, etc.).

6.6.1.1 - Port of Beirut

- Supply vessels will have a designated mooring jetty at the onshore logistics base reducing interference with other non-project vessels using the Port (UID SA03).
- The logistics base contractor will be required to comply with the Port's operational limits, including responsibilities for maintenance and preservation of impacted infrastructures (UID SOC08).
- The logistics base contractors will be responsible for protecting community infrastructure and reinstating any damages if caused by their operation activities (UID SOC 13).

6.6.1.2 - Road Network

Logistics base CONTRACTORS will ensure that vehicle movements will be restricted to defined access routes and demarcated working areas (including dedicated parking areas if outside logistics base) to avoid potential damage to existing roads. CONTRACTORS shall comply with Driving and Transportation policy requirements under the contract.

6.6.1.3 - Air Traffic

- A flight plan will be developed and agreed with the Lebanese aviation authorities (UID SOC9).

6.7 - Shipping

The supply and support vessel CONTRACTORs will manage the interference with other sea users, particularly commercial vessels (tankers, tugs, pilot boats and cargo vessels) passing MODU location and transiting to and from the Port of Beirut.

COMPANY request CONTRACTORs to implement B4 EIA Commitment Register relevant actions including the following:

- Ensure that all Project vessels are fitted with navigational aids, communication systems and follow specified shipping routes and speed restrictions (UID SA01).
- Adhere to existing shipping corridors with known buffer zones and standard operating procedures as stipulated in UNCLOS (UID SOC03).
- In the Port of Beirut area, all vessels shall operate according to communication from Port Authorities, who are responsible for Port operations up to the quay line (UID SA01).
- Vessels and crafts used for or involved in Petroleum Activities shall comply with applicable international and Lebanese laws and regulations regarding Petroleum Activities and navigation Petroleum Activities Regulations (PAR), Article 6. The vessels and crafts shall abide by instructions given by the competent Lebanese authorities and by the competent Lebanese naval vessels, patrol boats or crafts (UID SOC 15).

6.8 - Fisheries

The Block 4 exploration drilling priority area is located outside fishing grounds, 20 km from the shore line. Any impacts on fisheries during exploration drilling will be minimal and temporary.

Drilling CONTRACTOR will ensure that the MODU will:

- Stay within authorised 500 m restriction zone around the drilling well;
- Adhere to existing shipping corridors (UID SOC 03).
- Notify fishermen about the start of drilling activities (see Stakeholder Management Plan for Block 4 exploration drilling (UIA SOC06)).

COMPANY will:

- Submit Safety Zone Authorisation to the authorities for approval prior to drilling activities (UID SOC 05).

6.9 - Tourism

Exploration well is in a deep sea approximately 20 km away from the shore, and any potential interruptions of shore-based tourism is minimal. The nearest port providing Project support is purely commercial (Port of Beirut) and personnel transfer is planned to be via helicopter transfers from Beirut International airport directly to MODU location.

The following control measures will be implemented by relevant CONTRACTORS, including:

- Avoidance of low flight directly over internationally recognised and proposed conservation areas and, over local communities and popular beaches, in the vicinity of the airport, if safe and practical to do so (UID SOC 02).
- A flight plan will be developed and agreed with the Lebanese aviation authorities (UID SOC09).
- Helicopter transfers will be planned for daylight hours (between 06:00 and 20:00) to minimise noise disturbance at night (UID SOC 10).

7 - MONITORING AND REPORTING

7.1 - COMPANY's Monitoring

COMPANY's monitoring tools include but not limited to site inspections, periodic reviews of the CONTRACTOR'S facilities and documentation as well as regular COMPANY-CONTRACTOR progress meetings where requirements of this SMP are discussed.

7.2 - CONTRACTOR's reporting

COMPANY will agree with CONTRACTOR the frequency and scope of monitoring reports. These reports shall include elements of the SMP as relevant. It may include, for example, local content and employment information, community safety issues, grievance reports and other community monitoring data.

OIL SPILL CONTINGENCY PLAN

VOLUME N°0:

INTRODUCTION

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

The client will use the present document if and when needed, under its sole responsibility. The client will modify, complete, update etc. the present document under its sole responsibility.

OTRA company will not be held responsible for any use of any part of the present document.

Markings:

/!\ Warning

🖹 Link to other documents of the TEP Liban OSCP

ⓘ Link to external document or information, not part TEP Liban OSCP

Table of Contents

1. PURPOSE & SCOPE

The purpose of the Total E&P Liban Oil Spill Contingency Plan (TEP Liban OSCP) is to assist Total E&P Liban personnel in dealing with any unexpected oil spills and releases of hydrocarbon in the environment (at sea, on shore and on land), related to their offshore operations and associated logistical support.

Its primary objective is to set in motion the necessary actions to minimize the effects of any discharge of oil and:

- Provides an emergency notification system, including a standardized format for oil spill notification.
- Describes the escalation process from Tier 1 to Tier 2 and Tier 3 incidents.
- Outlines the system for command and control of the oil spill response operations.
- Provides checklists of actions for key personnel during an oil spill.
- Provides strategy and tactics to respond to the different types and levels of oil spills.

The TEP Liban OSCP, addresses response in case of release of hydrocarbons in the environment in offshore Blocks where TEP Liban carries out offshore exploration operations and in other locations related to the logistical support of the exploration activity.

This OSCP covers:

- Drilling operations in offshore Blocks operated by TEP Liban;
- Operations linked with the supply vessels under contract, at the Logistics base in the port of Beirut and at the drilling location in Block 4 and “en route” to / from the drilling unit;
- Operations at the Logistics base in the port of Beirut, on land, at the berth and in the port.

2. RELATION WITH OTHER EMERGENCY DOCUMENTS

The TEP Liban Oil Spill Contingency Plan (OSCP) is consistent with the provisions of the TEP Liban Emergency Response Plan (ERP).

When an oil spill is associated with a wider emergency (e.g. fire, explosion, personal injury), the **TEP Liban ERP** is activated. The members of TEP Liban involved in the emergency will assume their responsibilities as described in:

- the **TEP Liban ERP** for the overall management of the emergency(ies): Search and rescue, blow-out, evacuation of facilities, fire, etc.
- the **present OSCP** to deal with the oil spill aspects.
- Other contingency plans as needed (e.g. TEP Liban Blow-out Contingency Plan).

3. RESPONSIBILITIES FOR THE OSCP PROCEDURE

Responsibilities for reviewing, updating, validation, internal dissemination and provision to the authorities of the present document are assigned to the HSE department of TEP Liban. All questions related to its application should be submitted to this entity.

The HSE department of TEP Liban ensures that the present procedure is operational, up to date, that all TEP Liban personnel are aware of their responsibilities, and that adequate oil spill monitoring and response resources are available.

4. DISTRIBUTION LIST

This OSCP is a controlled document with limited distribution.

Electronic copies of TEP Liban OSCP and supporting files are available on the servers of TEP Liban, accessible in the head office, Logistics base and on the drilling unit.

Paper copies (and electronic version) of the vol. 1.2 and Operational Supports (n°1, 2, 3, 4, 5 & 6) are available in the Local Incident Command Post on the drilling unit.

Paper copies of Action Plans Vol. 1.1 for TEP Liban (Tier 2 & 3), Vol. 1.2 and 1.3, and of all Operational Supports (n°1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13) are available in the IMT room in Beirut.

An electronic copy of the TEP Liban OSCP is provided to Total H.Q. service in charge of coordinating oil spill response preparedness.

A (paper or soft) copy is provided to the competent national authorities in Lebanon for oil spill preparedness and response:

- **Lebanese Petroleum Administration** (LPA) in the Ministry of Water & Energy;
- **Directorate General of Land and Maritime Transport** (DGLMT) in the Ministry of Public Works and Transport.

If needed, LPA or DGLMT may, after informing TEP Liban, forward a copy to other national agencies involved in oil spill preparedness and response.

5. TEP LIBAN OSCP CONTENT

TEP Liban Oil Spill Contingency Plan (OSCP) is developed according to the provisions of the Total Exploration & Production Company Rule (CR EP HSE 094) and the methodology outlined in the Guidelines (GM EP ENV 092).

Along the development of the OSCP, Total E&P Liban ensured compliance with the provisions of the national legislation and regulations of the Republic of Liban.

VOLUME 0 "INTRODUCTION" is the present document, providing an overview of the OSCP for all users.

VOLUME 1 "ACTIONS PLANS"

These volumes are operational documents, designed for use by personnel involved in the response and aims at assisting them by defining "What to do?".

VOLUME 1.1, intended for personnel mobilized at and by TEP Liban for Tier 2 & 3 spills,

VOLUME 1.2, intended for personnel on the Drilling unit, provides:

- a description of the organization on the drilling unit for dealing with offshore spill,
- guidelines on initial actions to be undertaken,
- a summary of spill response strategy, according to the Tier levels of the incident (Tier 1, 2 and 3),
- Responsibilities of the Local Incident Command team on the drilling unit.

VOLUME 1.3, intended for personnel at the Logistics base, with the same objectives as the Vol. 1.2, applied to the Logistics base.

OPERATIONAL SUPPORTS are designed to assist personnel on sites and at the head office by defining "How do to it?".

VOLUME 2

This document presents the justification of TEP Liban oil spill response strategies, by following a methodology advocated by Total and compliant with internal guidelines which:

- Takes into account:
  - the legal context (international, regional and national);
  - an analysis of the environmental context, leading to the identification of the most sensitive areas on the coastline of Lebanon, translated into Coastal Sensitivity maps.
- Is based on a risk analysis which leads to:
  - the identification of possible oil spill scenarios;
  - the analysis of the fate and behaviour of hydrocarbons which could be spilled;
  - the identification of 3 levels of seriousness of potential incidents (Tier 1, 2 and 3), requiring increasing mobilization of resources and calling for the involvement of Emergency Response.

		Object	Users
0	INTRODUCTION	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, Key abbreviations, references	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management. • Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring and modelling. Offshore response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**INVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

6. RELATED DOCUMENTS

6.1 TEP Liban documents

Procedures

- Affiliate Emergency Response Plan (TEP Liban AERP, 2019)
- Blow Out Contingency Plan (TEP Liban BOCP, 2019)
- Individual Rig, Logistics Base and Vessels Contingency Plans and bridging documents if any
- MEDEVAC Procedure

Studies

- Total E&P Liban Sal. Block 4 (Lebanon) offshore exploration drilling Environmental and social impact assessment scoping report: - 80754. MAY 2019 RSK
- Total E&P Liban Sal. Block 4 (Lebanon) offshore exploration drilling Environmental impact assessment - 80754. JUNE 2019 RSK
- TEP LEBANON - Block 4 Exploration Well Spill Drift Modeling – OSCAR TECHNICAL REPORT, DG/PSR/HSE/EP/ES/ENV, Nº 2019_45, September 19

6.2 Total documents

- DIR-GR-ENV-002 Preparedness for Response to Accidental Surface Water Pollution
- DIR-GR-SEC-020 Crisis Management
- CR EP GIN 301 Geographic Information in Exploration & Production: Organization and Management
- CR EP HSE 031 HSE risk management in operations
- CR EP HSE 035 Site Hygiene Safety & Environment Manager (RSES)
- CR EP HSE 041 Technological Risk Management
- CR EP HSE 071 HSE management of Contractors
- CR EP HSE 081 HSE Training of Exploration and Production personnel
- CR EP HSE 082 HSE training for personnel holding job in HSE domain
- CR EP HSE 091 Managing emergencies/crises in affiliates
- CR EP HSE 092 Information, notification and communications between affiliates and E&P in case of emergency/crisis
- CR EP HSE 093 Large-Scale Exercises (LSEs)
- CR EP HSE 094 Oil spill preparedness and response policy in Exploration & Production
- CR EP HSE 102 Anomalies, incidents, and occupational illnesses. Definitions, reporting, and recording
- GS EP ENV 111 Environmental baseline and monitoring studies: Onshore Sites
- GS EP ENV 112 Environmental baseline and monitoring studies: Offshore and Nearshore Sites
- GS EP ENV 120 Environmental impact assessment of E&P activities
- GS EP ENV 501 GIS deliverables for HSE
- GS EP SDV 102 Social Impact Assessment

- GM EP HSE 002 Crisis Management Cell of the DGEP (Paris headquarter)
- GM EP HSE 006 Duty Officer DGEP
- GM EP HSE 071 Implementation Guide - HSE Management of contractors
- GM EP HSE 091 Guidelines for Affiliate Emergency Response Plan
- GM EP ENV 092 Preparing and managing an oil spill response plan
  - GM EP ENV 092 Handbook No. 1. Detailed structure and content of an oil spill response plan
  - GM EP ENV 092 Handbook No. 2. Details of each stage in developing an oil spill response plan
- GM EP HSE 093 Guidelines for Site Contingency Plan

6.3 External documents

6.3.1 International good practice

Oil Spill Response – Joint Industry Project IPIECA-IOGP http://www.oilspillresponseproject.org	OSR-JIP represents the oil industry's consensus view on good practices related to oil spill preparedness and response Oil Spill Preparedness and Response Tiered Preparedness and Response Net Environmental Benefit Analysis (NEBA) Planning Volunteer Management Oil Spill Training & Exercises Oil Spill Responder Health & Safety Surveillance, Modelling and Visualization Dispersants In-Situ Burning At-Sea Containment and Recovery Shoreline and Inland Clean-up Waste Management Oiled Wildlife Impacts of Oil Spills
Technical Information Paper TIP (ITOPF) http://www.itopf.org/knowledge-resources/documents-guides/#filter_top	TIP 01: Aerial observation of marine oil spills TIP 02: Fate of marine oil spills TIP 03: Use of booms in oil pollution response TIP 04: Use of dispersants to treat oil spills TIP 05: Use of skimmers in oil pollution response TIP 06: Recognition of oil on shorelines TIP 07: Clean-up of oil from shorelines TIP 08: Use of sorbent materials in oil spill response TIP 09: Disposal of oil and debris

	TIP 10: Leadership, command & management of oil spills TIP 11: Effects of oil pollution on fisheries and mariculture TIP 12: Effects of oil pollution on social and economic activities TIP 13: Effects of oil pollution on the marine environment TIP 14: Sampling and monitoring of marine oil spills TIP 15: Preparation and submission of claims from oil pollution TIP 16: Contingency planning for marine oil spills TIP 17: Response to Marine Chemical Incidents
ISO Guidelines	ISO 22320:2018 Security and resilience -- Emergency management -- Guidelines for incident management
IMS Good Practice (IPIECA/OGP, 2014)	Incident management system for the oil and gas industry. Good practice guidelines for incident management and emergency response personnel, August 2014, IPIECA/IOGP, 56 p.
IFC Standard 2015	Environmental Health and Safety General Guidelines.
IFC Standard 2015	Environmental Health and Safety Guidelines for Offshore Oil and Gas Developments.
IMO	IMO. Response to a Marine Oil Pollution Incident, 2016 Edition IMO. Manual on Oil Pollution - Section I – Prevention, 2011 Edition IMO. Manual on Oil Pollution - Section II – Contingency Planning, 2018 Edition IMO. Manual on Oil Pollution - Section IV – Combating oil spills, 2005 Edition IMO. Manual on Oil Pollution - Section V – Administrative aspects of oil pollution response, 2009 Edition IMO. Manual on Oil Pollution - Section VI – IMO Guidelines for sampling and identification of oil, 1978 Edition IMO Guidance document on Implementation of an Incident Management Ssytem (IMS), 2012 edition IMO. Manual on Oil Spill Risk Evaluation and Assessment of Response Preparedness 2010 edition IMO. Guidelines on International Offers of Assistance in Response to a Marine Oil Pollution Incident (2016 edition) IMO. In-Situ Burning Guidelines, 2017 Edition IMO. Guideline for Oil Spill Response in fast currents, 2013 Edition IMO. Operational Guidelines on Sunken and Submerged Oil Assessment and Removal Techniques, 2016 Edition IMO. Use of Sorbent for Spill Response – An Operational Guide, 2016 edition IMO. Oil Spill Dispersant Application Guidelines, 1995 Edition IMO. Bioremediation in Marine Oil Spills, 2004 Edition IMO/UNEP Guidance Manual on the Assessment and Restoration of Environmental Damage following Marine Oil Spills, 2009 edition
OSRL	Incident Management Handbook, OSRL Limited, 2012

FEMA	National Incident Management System, Third Edition, October 2017
U.S. COAST GUARD	INCIDENT MANAGEMENT HANDBOOK May 2014

6.3.2 Manual and guidance/ reference documents

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POEM Group. 1992. General circulation of the Mediterranean Sea. Earth-Science Reviews 32:285-309.

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7. DEFINITIONS

GENERAL DEFINITIONS

Incident, emergency & crisis: refer to the TEP Liban ERP (2019), CR EP HSE 102 and DIR-GR-SEC-020.

Oil Spill: Any accidental release of hydrocarbons or of oily water at sea creating a continuous silvery or rainbow colour slick (or thicker) of more than 200 to 300 m long;

or any release of few litres or more (range of 5 litres or more) at sea;

or any release of 1 litre or more in coastal or port waters, or on land outside of TEP Liban facilities.

Note. loss of containment is a release of hydrocarbon contained in the installation, which does not reach the environment.

Pollution: Pollution, also called environmental pollution, the addition of any substance (solid, liquid, or gas) or any form of energy (such as heat, sound, or radioactivity) to the environment at a rate faster than it can be dispersed, diluted, decomposed, recycled, or stored in some harmless form. The major kinds of pollution, usually classified by environment, are air pollution, water pollution, and land pollution (https://www.britannica.com/science/pollution-environment).

DEFINITIONS RELATED TO THE INCIDENT COMMAND SYSTEM

Source: *Incident management system for the oil and gas industry. Good practice guidelines for incident management and emergency response personnel*, August 2014, IPIECA/IOGP, 56 p.

Branch	an organizational level below the Section level and above the Division/Group level that facilitates efficient management of multiple operational activities via geographic, functional or jurisdictional responsibility. Typically, Branches are established only for very large or complex incidents.
Division	an organizational level of the Operations Section that partitions resources on the basis of separation in terrain, geography or fuelling locations. Divisions (or Groups) are established when the number of resources exceeds the manageable span of control of the Operations Chief.
Group	an organizational level that partitions resources based on major operational functions. Groups are established when the number of single resources exceeds the manageable span of control.
Leader	an individual assigned to supervise a particular Strike Team or Task Force within the Operations Section or a particular Unit within another Section of the IMS organization.
Section	the organizational level having responsibility for a major functional area of incident management, e.g. Operations, Planning, Logistics, Finance/Administration and Intelligence (if established).
Supervisor	an individual assigned to supervise a particular division or group within the Operations Section.
Unit	the organizational element formed under a Section with functional responsibility for a specific incident Planning, Logistics or Finance/Administration activity.

8. KEY ABBREVIATIONS

ADCP	**Acoustic Doppler Current Profiler**
ADIOS	**Automated Data Inquiry for Oil Spills**(software from NOAA ,U.S.A.)
ARGOS	**Advanced Research and Global Observation Satellite** (worldwide location and data collection system dedicated to studying and protecting the environment)
AHTS	**Anchor Handling Tug Supply Vessel**
AIS	**Automated Identification System** (used to track vessels)
API	**American Petroleum Institute**
AUV	**Autonomous Underwater Vehicle**
BAOAC	**Bonn Agreement Oil Appearance Code**
bbl	**Barrel** (0.159 m3)
BOCP	**Blow-Out Contingency Plan**
BOP	**Blow-Out Preventer**
bopd	**Barrels of oil per day**
BTEX	**Benzene, toluene, ethylbenzene and the 3 xylene isomers (p-xylene, m-xylene, o-xylene)**
BUNKER 2001	**International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001**
C	**Celsius**
Cedre	**Centre de documentation, de recherché et d'expérimentations sur les pollutions accidentelles des eaux** (Centre of Documentation, Research and Experimentation on Accidental Water Pollution)
CLC 92	**1992 Civil Liability Convention**
CMT	**Crisis Management Team** of TEP Liban
COA	**Call Out Authorities**
COP	**Common Operating Picture**
CSC	**Crisis Support Cell** at Total E&P Head Quarter in Paris
cP	**CentiPoise**
cSt	**CentiStoke**
CTTH	**Coiled Tubing Termination Head**
DARAG	**Direction Appréciation des Risques et Assurances Groupe (Total)**
DGLMT	**Directorate General of Maritime and Land Transport of Lebanon**
DOR	**Dispersant to Oil Ratio** (used for dispersant spraying dosage)**.**
E	**East**
E&P	**Exploration & Production** branch of the Total Group
EBS	**Environmental Baseline Study**
EEZ	**Economic Exclusive Zone**
EIA	**Environmental Impact Assessment**
EMSA	**European Maritime Safety Agency**
ESIA	**Environmental & Socio-economic Impact Assessment**
ERP	**Emergency Response Plan**
ESD	**Emergency Shut Down**

ESI	**Environmental Sensitivity Index**
FEMA	**Federal Emergency Management Agency** (U.S.A.)
FOST	**Fast Oil Spill Team** (Total)
ft	**Feet (or ')**
FUND 92	**International Oil Pollution Compensation Fund, 1992 (1992 Fund)**
FSIV	**Fast Support Intervention Vessel**
GDS	**Global Dispersant Stockpile**
GIS	**Geographic Information System**
GPS	**Global Positioning System**
GM	**General Manager**
H2S	**Hydrogen Sulphide**
HFO	**Heavy Fuel Oil**
HNS	**Hazardous & Noxious Substances**
HNS 96	**International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), 1996 (and its 2010 Protocol)**
HO	**Head Office** (of TEP Liban in Beirut)
HQ	**Head Quarters** (of Total Group in Paris)
HSE	**Health/ Hygiene Safety & Environment**
hr	**Hour**
HSE	**Health, Safety & Environment**
IAP	**Incident Action Plan**
IBA	**Important Bird and Biodiversity Areas**
IBC	**Intermediate Bulk Container**
IC	**Incident Commander**
ICAG	**Incident Command Advisory Group** (national entity in Lebanon)
ICS	**Incident Command System**
IFO	**Intermediate Fuel Oil**
IMO	**International Maritime Organization**
IMS	**Incident Management System**
IMT	**Incident Management Team**
in	**Inch (or '')**
IOGP	**International Association of Oil & Gas Producers**
IOPC	**International Oil Pollution Compensation Funds**
IPIECA	**International Petroleum Industry Environment Conservation Association** (oil and gas industry association for environmental and social issues)
ISB	**In-Situ Burning**
ISO	**International Standardisation Organization**
IT	**Information Technology**
ITOPF	**International Tanker Owners Pollution Federation**
IUCN	**International Union for Conservation of Nature**
JMOC	**Joint Maritime Operations Chamber**

KBA	**Key Biodiversity Area**
kg	**Kilogram**
km	**Kilometre**
kts	**Knots** (1 nautical mile/ hour, 1.852 km / hr, <>30.8 m/s)
LAF	**Lebanese Armed Forces**
LEL	**Lower Explosive Limit**
LPA	**Lebanese Petroleum Administration**
Local IC	**Local Incident Commander –** Person In Charge in charge of operations on site (e.g., RSES initially or specifically designated personnel).
l	**Litre**
m	**Metre**
m3	**Cubic meter**
MAP	**Mediterranean Action Plan**
MARPOL 73/78	**International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997**
min	**Minute**
MD	**Managing Director**
MDO	**Marine Diesel Oil**
MetOcean	**Meteorological and Oceanic conditions offshore (wind, currents & sea state)**
mg	**Milligram**
MGO	**Marine Gas Oil**
Mm	**Millimetre**
MMJ	**Mid-Mediterranean Jet**
MNA	**Monitored Natural Attenuation**
MoE	**Ministry of Environment**
MoEW	**Ministry of Energy and Water**
MoPWT	**Ministry of Public Works and Transport of Lebanon**
MPA	**Marine Protected Area**
MPSV	**Multi Purpose Supply Vessels**
MSDS	**Material Safety Data Sheet**
N	**North**
N/A	**Non Available**
NABM	**Non-Aqueous Based Mud**
NEBA	**Net Environmental Analysis** (now SIMA)
NM	**Nautical Miles** (1,852 m or 1 minute of latitude)
NOAA	**National Oceanic and Atmospheric Administration**
NOSIC	**National Oil Spill Incident Commander**
NOSCP	**National Oil Spill Contingency Plan**
OBM	**Oil Based Mud**
OIM	**Offshore Installation Manager**
OPRC 90	**International Convention on Oil Pollution Preparedness, Response and Co-operation 1990** (IMO Convention)

OPRC-HNS Protocol	**Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances, 2000**
OSCP	**Oil Spill Contingency Plan**
OSRA	**Oil Spill Responder Application (by OTRA)**
OSR	**Oil Spill Response**
OSRL	**Oil Spill Response Limited**
OSSC	**Oil Spill Support Cell (Total Group)**
PEARL	**People, Environment, Assets/activities, Reputation, Liability**
POLREP	**Pollution Report**
PPE	**Personal Protective Equipment**
ppm	**Party per million (= mg/l)**
PSV	**Platform Supply Vessel**
RAMSAR	**Convention on Wetlands of International Importance especially as Waterfowl Habitat 1994**
REMPEC	**Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea**
ROV	**Remotely Operated Vehicle**
S	**South**
SBS	**Social Baseline Study**
SCAT	**Shoreline Clean-Up Assessment Technique**
SDS	**Safety Data Sheet**
SG	**Specific Gravity**
SIMA	**Spill Impact Mitigation Assessment** (formerly NEBA)
SITREP	**Situation Report**
SLA	**OSRL Service Level Agreement**
SMART	**Specific, Measurable, Achievable, Realistic, Timely**
SMART	**Special Monitoring and Applied Response Technologies**
SOPEP	**Shipboard Oil Pollution Emergency Plan**
SPA	**Special Protected Area**
SSDI	**SubSea Dispersant Injection**
TEP Liban	**Total Exploration & Production Liban**
THC	**Total Hydrocarbon Content**
UEL	**Upper Explosive Limit**
UNEP	**United Nations Environment Program**
VOC	**Volatile Organic Compound**
WAT	**Wax Appearance Temperature** (or cloud point)
WCCD	**Worst Credible Case Discharge**
WCD	**Worst Case Discharge**
W	**West**

OIL SPILL CONTINGENCY PLAN

VOL 1.1 TEP LIBAN ACTION PLAN FOR TIER 2 & 3 SPILLS

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	**Date**	**Description**
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

The client will use the present document if and when needed, under its sole responsibility. The client will modify, complete, update etc. the present document under its sole responsibility.

OTRA company will not be held responsible for any use of any part of the present document.

The present document describes the organization set-up by TEP Liban to manage Tier 2 & 3 spills (i.e. spills exceeding the response capabilities of the site) and the command and coordination system to manage the overall response.

The TEP Liban OSCP “Vol. 1.1 Action Plan for TEP Liban Tier 2 & 3 spills” is activated by the Operation Director or General Manager of TEP Liban.

Markings:

/!\ Warning

🖹 Link to other documents of the TEP Liban OSCP

ⓘ Link to external document or information, not part of the TEP Liban OSCP

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1. INTRODUCTION	Tier Levels for TEP Liban (based on the specific oil spill risks of TEP Liban), and of responsibilities for oil spill management depending on the location and origin of the spill.
2. ORGANIZATION FOR OIL SPILLS	General organization of TEP Liban for Tier 1, 2 & 3 oil spill management based on ICS/ IMS principles and interfaces with the authorities And of specific oil spill management organizations depending on the location and magnitude of the spillage.
3. IMMEDIATE ACTIONS	Immediate actions of TEP Liban in case of Tier 2 & 3 spills: alert, assessment, activation and mobilization, notification of authorities and assistance.
4. INCIDENT MANAGEMENT	Incident management actions by the IMT and site personnel, to ensure an efficient and coordinated response (after the immediate actions) based on the Incident Action Planning process, up to the end of the spill.
5. CRISIS MANAGEMENT – FOR CMC ONLY	Some key actions for crisis management and public relations, responsibilities of the CMC.
6. (APPENDICES) DETAILED IMT ORGANIZATION & JOB TICKETS	Presentation of the full-blown TEP Liban incident management organization and related job tickets.

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1. INTRODUCTION

1.1 Purpose & Scope

The present document (TEP Liban OSCP Vol 1.1 Action Plan) aims at assisting TEP Liban personnel dealing with Tier 2 & 3 spills caused by the drilling activities in Block 4.

TEP Liban will provide assistance if and when required for spills originating from PSV or at the Logistics (which will be managed by the responsible party).

The general purpose and scope of the overall TEP Liban OSCP (including references and abbreviations) is described in:

TEP Liban Vol. 0, section "Purpose & scope"

The initial responsibility on site for oil spill response, after a release of hydrocarbons in the environment (due to the activities of TEP Liban, detailed in "1.3 Responsibilities") depends on the origin and location of the incident and is detailed in the present document.

Third party or unknown origin spills may notified to TEP Liban head office (by personnel on site), which forwards the information to the authorities, who take the leadership of the response.

1.2 Spill Tier Levels

TEP Liban uses the **Tier level concept** (international concept to classify spills into three levels of severity and mobilization). Specific Tier levels are defined based on the risk profile and settings of TEP Liban (see TEP Liban OSCP Vol. 2 "RESPONSE STRATEGY DISCUSSION & PREPAREDNESS").

Tier level of an incident is assessed as soon as possible, based on best available information and the table below.

- One criterion is enough to classify a spill in Tier 2 or 3.
- Level is assessed considering the volume, nature and persistency of the product spilled, associated risks and level of resources needed for the response.
- Volumes of oil accidentally released into the environment are indicative guidelines.
- Good practice is to "prudently over-estimate" the spill and risks.
- Tier 2 or 3 classification is approved by the GM.

TEP Liban Tier levels are described in the Table 1 next page.

TEP Liban Tier levels are in line with the National Tier levels, described in the Lebanon NOSCP, 2017, Ver. 1, Vol A (Notification and activation) and provided in the Table 2, p.9.

Table 1 : Tier levels for TEP Liban

OFFSHORE SPILLS - TIER LEVELS

Status 25/11/2019

		- TIER LEVELS +		
		☐ TIER 1	☐ TIER 2	☐ TIER 3
SPILL	**General characteristics**	☐ (Very) Minor spill. Minor to insignificant pollution offshore. ☐ Source stopped.	☐ Intermediate spill. Potential to significant pollution. ☐ Source stopped or minor release of few days.	☐ Major to catastrophic spill. Significant to catastrophic pollution. ☐ Spill that may escalate &/ or be continuous.
LOCATION	**OFFSHORE**			
	Non-persistent oil Extent	☐ **< 50 m3** ☐ Offshore spill. No risk of damage on the coast. Possible (minor) transboundary spill.	☐ **50 to 300-400m3** ☐ Offshore. No risk of significant damage on the coast. Possible transboundary spill.	☐ **> 400 m3** ☐ Offshore. Possible residual spill on the coast. Possible large transboundary spill.
	Note. Extended to +/-100m3 for drilling mud (sinks)			
RESPONSE	**Resources**	☐ Tier 1 resources (TEP Liban) + Contracted companies in country	☐ Tier 1 resources (TEP Liban) + Other O&G operators + Service companies in country/ close countries + National resources	☐ All Tier 1 + 2 resources + Mobilization of regional & international assistance
	Management	☐ **TEP Liban**: Site personnel + support of HO if needed Or **captain of vessel** if PSV incident	☐ **TEP Liban** : site, IMT & CMT + Total HQ & TEPCY : "spot" support + Drilling unit Company HQ **+ Authorities**: Follow-up & supervision (activation of NOSCP at the discretion of the Authorities) Or shipowner if PSV incident	☐ **TEP Liban**: site, IMT & CMT + Total HQ assistance (remote & in country) + TEPCY + Drilling unit Company HQ **+ Authorities**: Follow-up & supervision (activation of NOSCP at the discretion of the Authorities) Or shipowner if PSV incident
	Note. Persistents: crude, HFO & IFO, utility oils, etc.		*Non-persistent: Condensate, MGO, drilling mud NABM, etc.*	

COASTAL, PORT, LOGISTICS BASE & INLAND SPILLS - TIER LEVELS

Status 25/11/2019

		- TIER LEVELS +		
LOCATION	**LOGISTICS BASE WATERS, PORT & CLOSE WATERS**			
	Non-persistent oil Extent	☐ **< 1-2 m3** ☐ Very close installations & quaysides, river banks, beaches.	☐ **2 m3 to 35-40m3** ☐ Installations, quaysides, river banks, beaches, etc. in the area.	☐ **> 40 m3** ☐ Installations, quaysides, river banks, beaches, coastal villages, islands etc. in extended area.
	LOGISTICS BASE INLAND			
	Non-persistent oil Extent	☐ **< 10-15 m3** ☐ Logistics base, storage area	☐ **15 m3 to 150m3** ☐ Logistics base, storage area & immediate surroundings	☐ **> 150 m3** ☐ Logistics base, storage area & surroundings + soil infiltration
RESPONSE	**Resources**	☐ Tier 1 resources (of Logistics Base) + Contracted companies on site.	☐ Tier 1 resources + Other O&G operators + Port Authorities + Service companies in country/ close countries + National resources	☐ All Tier 1 + 2 resources + Mobilization of regional & international assistance
	Management	☐ **Manager of Logistics base** Port Authorities 1/ Or captain of vessel if PSV incident	☐ **Port Authorities** + TEP Liban assistance + Total HQ : "spot" support + Authorities: Follow-up & supervision (activation of NOSCP at the discretion of the Authorities) Or shipowner if PSV incident	☐ **Port Authorities** + TEP Liban assistance: IMT & CMT + Total HQ assistance (remote & in country) **+ Authorities**: Follow-up & supervision (activation of NOSCP at the discretion of the Authorities) Or shipowner if PSV incident
	Note. Persistents: crude, HFO & IFO, utility oils, etc.		*Non-persistent: Condensate, MGO, drilling mud NABM, etc.*	

Table 2 : Tier levels in Lebanon (NOSCP, 2017, Ver. 1, Vol A "Notification and activation")

RESPONSE ESCALATION. See section 3.3 for definition of response tiers.		
TIER 1	**TIER 2**	**TIER 3**
In line with the initial actions outlined above facility manager, captain or the Offshore Installation Manager (OIM) will mobilize the facility/operation OSCP. If the incident can be managed with the resources on site, the spill will remain a Tier 1 response. The Local Incident Commander will report regularly to the facility or operational duty manager, the Affected Ministry and MOPWT-DGLMT **Incident Commander:** LIC as defined by the OSCP **Incident Management:** Organisation OSCP and incident management procedures **Interaction with NOR:** None **Response Resource:** Local onsite resources only. **Escalate to Tier 2/3 if:** • Response resources, equipment, manpower or expertise, are not sufficient to deal with the incident. • The oil spill spreads outside the area of jurisdiction of the spiller i.e. impacts other local facilities, or shorelines • Support required from the national oil spill response i.e. aerial surveillance.	Response requires mobilization of additional local and regional resources. Additional support may potentially come from mutual aid agreements between a group of industry operators (other field operators), industry funded oil spill response cooperatives, specialized Tier 2 services or local commercial service providers. Activation of Governorate Shoreline Response Plans will be required in the case of oil pollution reaching shorelines. **Incident Commander:** LIC appointed by the Affected Ministry **Incident Management:** Organisation Emergency Response Team and Crisis Management Team. Affected Ministry Sectoral Centre response established to support and oversee response. **Interaction with NOR:** GREEN or YELLOW alert **Response Resource:** Organisation resources, supported by national resources as required. **Escalate to Tier 3 if:** • The spill impacts a large area i.e. more than one governorate. • The national oil spill response stockpile of equipment and resources is required to respond. • The spill has or is likely to impact neighbouring countries	A large scale incident requiring the National Incident Management Structure to be mobilized as described in this plan. **Incident Commander:** NOSIC **Incident Management:** National Incident Management Teams **Interaction with NOR:** YELLOW or RED alert **Response Resource:** National and International resources.

1.3 Responsibilities

The initial responsibility depends on the incident location and applicable regulations.

Table 3 : Initial responsibility for spill response depending on incident location

AREA	SPILL ORIGIN	TYPES OF HYDROCARBONS	INITIAL RESPONSIBILITY	INITIAL RESPONSE
Offshore Block 4	Drilling unit, risers, well head etc. PSV close to the drilling unit (within MRA)	Condensate, MGO, drilling mud & other refined products	**TEP Liban**	TEP Liban
Maritime area: from Block 4 to Logistics base	PSV "en route"	MGO, drilling mud & other refined products	**Captain of PSV & Ship Owner**	Captain of PSV
Port and at sea area & Logistics base quaysides	PSV in port waters (at Logistics Base quayside or in port waters)	MGO, drilling mud & other refined products	**Captain of PSV & Ship Owner**	Captain of PSV + Logistics Base Operator
	Ship-to-ship bunkering operations at quayside, port area, close port and at sea with spill in water	MGO	**Bunkering barge/ tanker** (incident on barge/ tanker up to the flange on the PSV) **Captain of PSV** (incident on PSV)	Logistics Base Operator &/ or Bunkering company Captain of PSV
	Transfer operations (to the PSV) with spill in port water (*)	Hydrocarbon base products	**Logistics Base Operator**	Logistics Base Operator
Logistics base on land	Other oil spills inland within the perimeter of Logistics Base	Drilling mud, other hydrocarbon base products	**Logistics Base Operator**	Logistics Base Operator

(*) Not applicable under normal operating conditions.

2. ORGANIZATION FOR OIL SPILLS

2.1 National organization in Lebanon for oil spill response

"*The MOPWT-DGLMT,MOE and Affected Ministry (LPA for an incident related to offshore E&P activities) will assess the spill and the tier 3 potential. In the event that a tier 3 is likely to be declared, a* ***National Oil Spill Incident Commander NOSIC*** *will be given command and the NOSCP will be formally activated. The agency that will assume the role of NOSIC in charge of this function depends on the nature of the spill and will be:*

- ***MOPWT-DGLMT*** *– For a spill at sea (shipping), a spill on land (loss of containment), a spill in a port, a spill where the source is unknown, and for a spill that originated from outside Lebanese territorial waters.*
- ***LPA****– For a spill that is created due to offshore O&G exploration activities.*

Each of these agencies will (…) designate personnel who, in the event of a tier 3 oil spill, would fulfil the role of NOISC.

Whilst the MOE has no operational jurisdiction over potential oil spill risk it does have a responsibility for environmental protection and so it is required to work closely with the MOPWT-DGLMT and/or LPA in spill assessment. The MOE will then work closely with the NOSIC and/or the Planning Section to minimize environmental impact." (Section 3.2.1.1 of NOSCP, Ver. 1, Feb. 2017, Vol. A « Strategy and Processes »).

For a Tier 3 (and possibly Tier 2), the **NOR** (National Operations Room) is activated "*at the presidency of the Council of Ministers (COM) to respond to National Disasters and Crisis according to a defined National Response Framework (NRF)*". The NOR oversees and supports the spill response and manages "*strategic decision making relating to areas of national significance such as finance, media and international assistance*"[1]. The NOSIC remains in charge of oil spill response and reports to the NOR via a Liaison Officer.

The national incident management team, meeting in a dedicated facility, is structured as per the ICS/IMS principles, and shows a similar structure as the TEP Liban IMT. The figure below describes the national organization activated for Tier 3 spills, and possibly Tier 2 (with a reduced partial version) according to the Lebanon NOSCP (2017 Ver. 1).

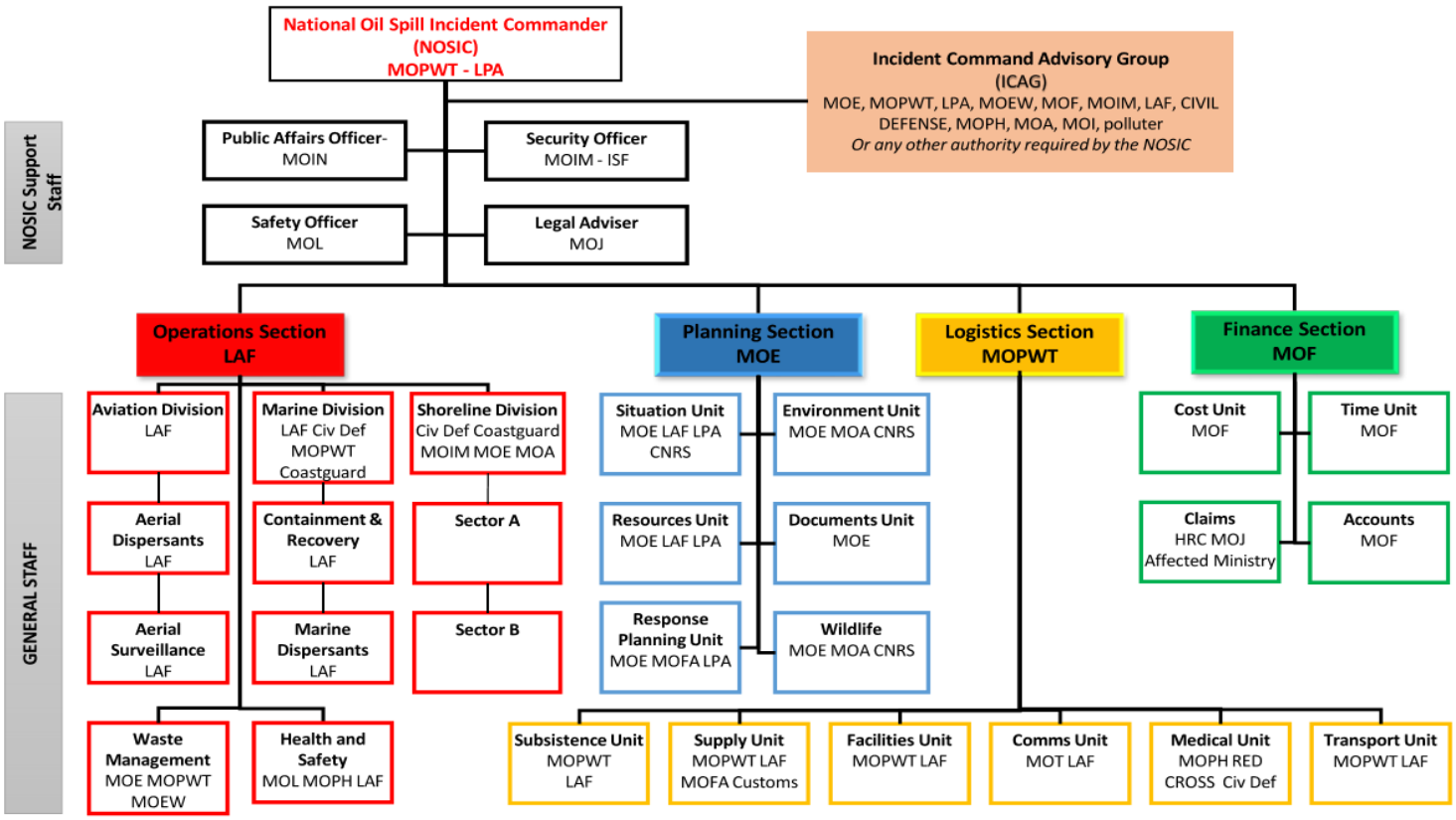

Figure 1 : National Lebanese spill response organization (extract from NOSCP 2017 Ver. 1, Vol C, p. C-5).

[1] At the level of the country, NOR has role and responsibilities showing strong similarities with the CMC.

Comment. The organization presented in the NOSCP mainly focuses on offshore response; and also mentions the responsibilities of the Governorates (and their "Shoreline Response Plans") to manage shoreline response. Links to local & port authorities and private sector are not detailed in the NOSCP present figure.

Role and responsibilities of the authorities[2], and designated agencies, are summarised in the table 2.1 of the NOSCP Vol. C: ROLES AND RESPONSIBILITIES as follows:

Role	Lead	Support
National Competent Authority (NCA)	Ministry of Public Works and Transport - Directorate General of Land and Maritime Transport (MOPWT-DGLMT)	
Plan Custodian	MOPWT-DGLMT	
National Oil Spill Incident Commander (Refer to Section 4.1)		
National Oil Spill Incident Commander (NOSIC)	• MOPWT-DGLMT for spills in the public maritime domain • Lebanese Petroleum Administration (LPA) for spills from offshore exploration and production activities	
Incident Command Advisory Group (ICAG)	Core members: MOE, MOPWT, LPA, MOEW, LAF, MOIM, CIVIL DEFENCE, MOF, MOPH, MOI, MOA	• Additional entities or affected Ministries as required, for example MOC. • Polluter • Other entities as deemed needed
NOSIC Support Staff (Refer to Section 4.14.4)		
Public Affairs Officer	Ministry of Information	
Security Officer	Ministry of Interior and Municipalities	Internal Security Forces
Safety Officer	Ministry of Labour	
Legal Advisor	Ministry of Justice	Government Consultative Council
General Staff		
Operations Section (Refer to Section 4.1)		
Operations Commander	Lebanese Armed Forces	
Aviation Division	Lebanese Armed Forces	Specialist Contractor
Marine Division	Lebanese Armed Forces	Civil Defence / MOPWT-DGLMT/ Coastguard
Shoreline Division	Civil Defence	Coastguard/ MOIM/ MOA/ MOE
Health & Safety	Ministry of Labour	MOPH/ LAF
Waste Management	Ministry of Environment	MOPWT-DGLMT/ MOEW
Planning Section (Refer to Section 4.7.1)		
Planning Director	Ministry of Environment	
Situation Unit	Ministry of Environment	LAF/ CNRS/ LPA
Resources Unit	Ministry of Environment	LAF/ LPA
Response Planning Unit	Ministry of Environment	MOFA/ LPA
Documents Unit	Ministry of Environment	
Environment Unit	Ministry of Environment	MOA/ CNRS
Wildlife Unit	Ministry of Environment	MOA/ CNRS

Role	Lead	Support
Logistics Section (Refer to Section 4.8.1)		
Logistics Director	Ministry of Public Works and Transport	LAF
Subsistence Unit	Ministry of Public Works and Transport	LAF
Supply Unit	Ministry of Public Works and Transport	LAF/ MOFA/ Customs
Communications Unit	Ministry of Telecommunications	LAF
Facilities Unit	Ministry of Public Works and Transport	LAF
Transport Unit	Ministry of Public Works and Transport	LAF
Medical Unit	Ministry of Public Health	Lebanese Red Cross, Civil Defence
Finance Section (Refer to Section 4.6.14.7.14.84.9.1)		
Finance Director	Ministry of Finance	
Cost Unit	Ministry of Finance	
Time Unit	Ministry of Finance	
Claims Unit	Higher Relief Council	Ministry of Justice/Affected Ministry
Accounts Unit	Ministry of Finance	

[2] Contact details are provided in the Operational Support n°12 EMERGENCY DIRECTORY.

2.2 TEP Liban overall response organization

TEP Liban response organization is in line with the national organization detailed in the NOSCP 2017 Ver. 1 and with international guidelines on Emergency Management[3] and Incident Management/ Command System[4].

2.2.1 TEP Liban overall response organization & interfaces with national authorities

Figure below shows the overall organization of TEP Liban to manage spills up to Tier 3 after a spill in Block 4[5], and links with the national incident organization for Tier 2 & 3.

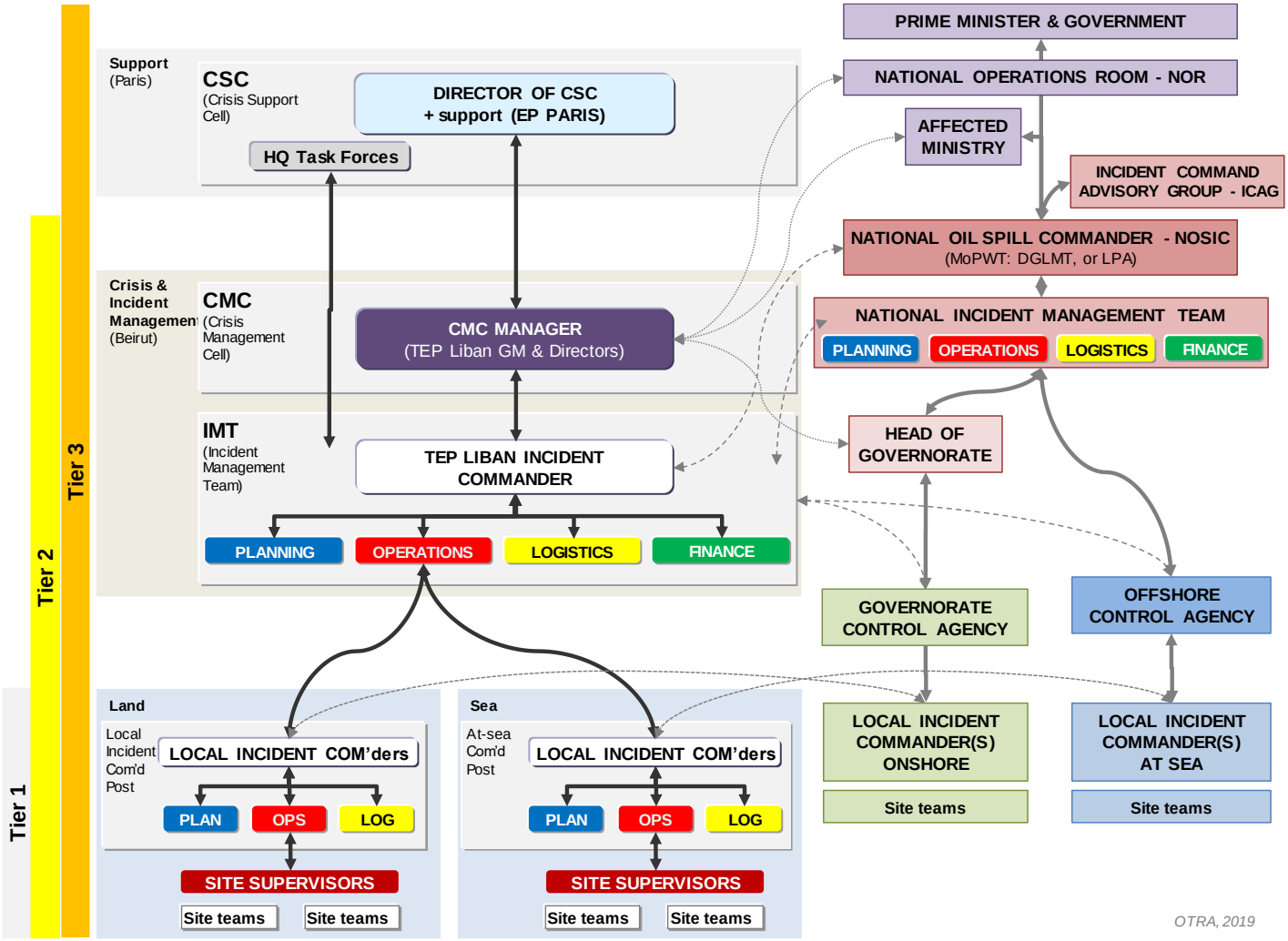

Figure 2: Overall Organization of TEP Liban & Total Group for Oil Spill Response

Local Incident Commanders IC's coordinate specific response operations in a given area (at-sea and onshore), with a Local Incident Command Post team, site supervisors and response teams on site.

TEP Liban Incident Commander IC coordinates the overall incident response with the assistance of the IMT, the TEP Liban Local Incident Commanders, external assistance and in liaison with the relevant authorities.

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[3] International Standard, ISO 22320, 2nd ed, 2018-11, Security and resilience. Emergency management. Guidelines for incident management

[4] - TEP Liban OSCP Volume 2, section "Incident Management System"
- *Guidance document on the implementation of an Incident Management system (IMS), IMO, 2012.*
Incident management system for the oil and gas industry. Good practice guidelines for incident management and emergency response personnel, IPIECA/OGP, 2014.
Incident Management Handbook, OSRL Limited, 2012

[5] Spills originating from PSV or at the Logistics are managed by the responsible party: captain or logistics base manager.

A "**Reduced IMT**" (e.g. Operations manager, HSE Manager, Drilling Manager & Logistics Manager) may be mobilized at TEP Liban offices to support the site before the official activation of the TEP Liban ERP and mobilization of the IMT.

TEP Liban General Manager approves response strategies, manages crisis issues and communication, and high-level interfaces in Lebanon, with the CMC.

/!\ TEP Liban sends a representative in the national incident management team (to facilitate interfaces) or to the sectoral centres (i.e. at LPA, if and when mobilized).

TEP Liban maintains constant communication with Drilling unit company and other contractors as needed.

Total Crisis Support Cell (CSC) provides support to TEP Liban, coordinates transboundary incident, manages the overall crisis-level issues and ensures crisis communication (from Total H.Q., Paris).

2.2.2 IMT core structure & responsibilities of sections

Figure below presents the five core functions in the IMT; command, planning, operations, logistics, finance.

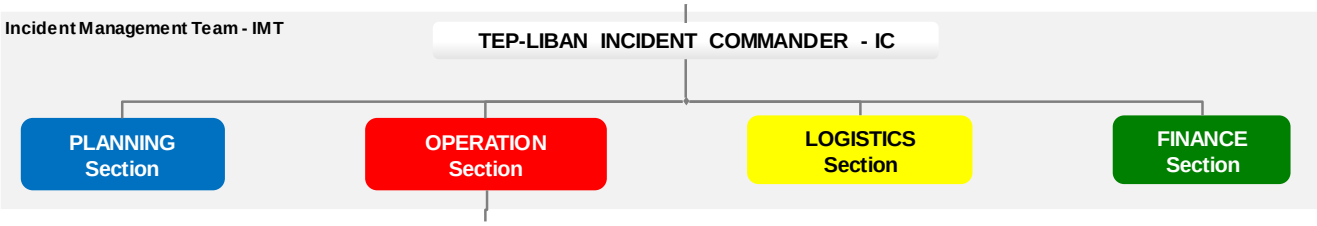


Figure 3 : The five core functions of TEP Liban IMT: command, planning, operations, logistics, finance

Table below lists the key responsibilities of each IMT core function[6].

IMT FUNCTION	KEY RESPONSIBILITIES
INCIDENT COMMANDER	- Overall management of incident response. - Establishing incident objectives and approving strategies and tactics. - Ensuring that activities accomplish objectives.
PLANNING SECTION	- Collecting, checking, and disseminating continuously information on the incident situation to the IMT (Incident Status Board) and site personnel. - Evaluating incident level and risks and identifying impacts. - Providing monitoring action plan. - Providing predictions (slick drift, oil behaviour, potential impacts, etc.). - Preparing status reports and notification (authorities and internal). - Maintaining the status of assigned resources and identify needs for external resources to mobilize. - Facilitating the Incident Action Plan IAP process; and preparing the IAP documents based on input from other sections and Command. - Propose incident objectives. Advise for OSR techniques and strategies. Provide scientific advice. - Planning for the demobilization of incident resources. - Collecting, recording, and safe-guarding all incident documents.
OPERATIONS SECTION	- Acting as the main point of contact with personnel on site and disseminate site feedback to the IMT. - Providing immediate support to the site. - Developing strategies and tactics to achieve incident objectives.

[6] Main reference: National Incident Management System, Third Edition, October 2017, FEMA + adaptation from U.S. COAST GUARD, INCIDENT MANAGEMENT HANDBOOK May 2014

	- Directing the implementation of the approved Incident Action Plan for maritime, subsea, aerial, shore tactical activities in liaison with the Local Incident Commander(s) and optimize the use of resources - Organizing the Operations Section (& designation of personnel on site) to meet the incident's needs. - Designate personnel on site. - Supporting the IAP development for each operational period.
LOGISTICS SECTION	- Acting as the main point of contact with external assistance/ resources providers. - Sourcing and providing external goods & services, and support for the incident management: • competent personnel, • facilities, security (of the IC facilities and personnel), • transportation, • supplies, equipment maintenance and fuel, • food services, • communications and IT support, • medical services for incident personnel etc. - Identify external providers. Formalize request, evaluate offer, set-up contracts. - Organize the mobilization/ reception/ check & transfer of resources to the Operations.
FINANCE SECTION	- Tracking costs, analysing cost data, making estimates, and recommending cost savings measures. - Recording time for incident personnel, equipment and logistical support. - Ensuring payments and reviewing contracts. - Analysing, reporting, and recording financial concerns (damage, insurance, responder injuries etc.). - Administering claims for compensation.

2.2.3 Full-blown IMT structure and responsibilities

Next figure presents the structure of a full-blown IMT for TEP Liban (to manage a Tier 3/ blow-out with offshore and onshore response), with all units, groups and divisions mobilized in all sections. All branches and functions of the Operations section are specific to oil spill, except the Blow-out, Vessels and Air Operations Branches.

/!\ This level of mobilization will most probably never be reached by TEP Liban.

Detailed structure of each section, with links to the sites, are proposed in:

"IMT full blown Tier 3/ Blow-out detailed organization", p.68

The responsibilities of each units, groups and divisions are presented in:

"IMT sections, units & groups: overview of responsibilities", p.73

Job tickets for:	Are in:
CMC	*"Job ticket: CMC", p.88*
IC & Section Chiefs	*"Job tickets: Incident Commander and IMT section chiefs", p.77*
PLANNING SECTION Units	*"Job tickets: IMT/ Planning section", p.90*
OPERATIONS SECTION Groups & Divisions	*"Job tickets: IMT/ Operations section", p.96*
LOGISTICS SECTION Units	*"Job tickets: IMT/ Logistics section", p.110*
FINANCE SECTION Units	*"Job tickets: IMT/ Finance section", p.120*

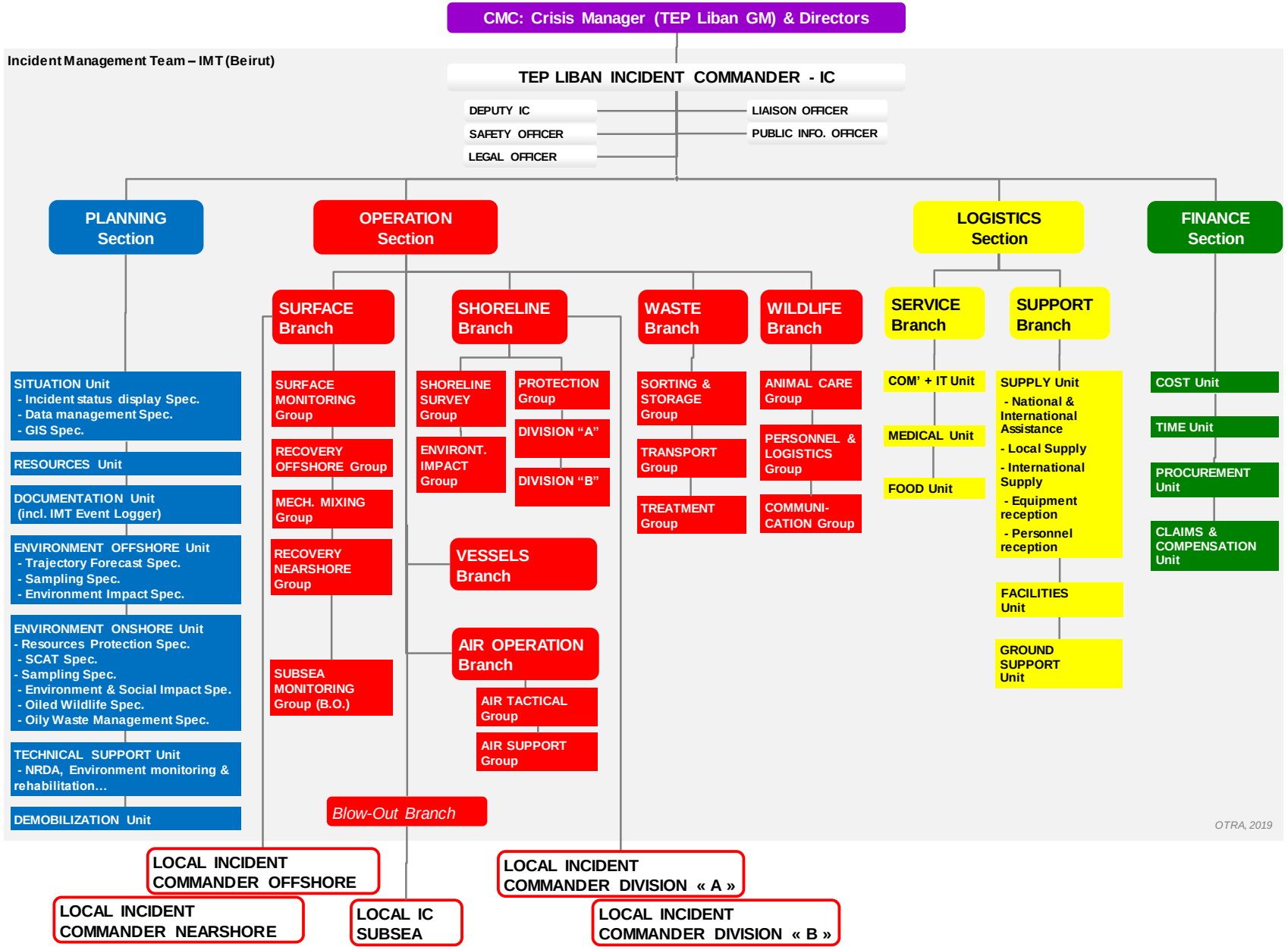


Figure 4 : Structure of a full blown TEP Liban IMT (Tier 3 at-sea response)

2.2.4 Personnel engaged on site for Tier 2 & 3 spills

/!\ Security is a critical issue. It is the responsibility of Total Liban M&S for personnel engaged on land.

Personnel engaged on site for Tier 2 & 3 spills can include:

PERSONNEL AT SEA “Job tickets: Personnel At Sea”, p.124	• Local Incident Commander At Sea • Offshore Safety Officer • Offshore Planning Officer • Vessel mixing/ recovery Supervisors
PERSONNEL ONSHORE “Job tickets: Personnel Onshore”, p.131	• Local Incident Commander for Onshore Division • Onshore Safety Officer • Onshore Planning Officer • Field Supervisors and SCAT/ NRDA Team Leaders • Waste Field Supervisor • Wildlife Field Supervisor • Logistics & Staging Area Manager • Onshore Facility/ Base camp Manager • Onshore Medic • Community Liaison Officer

For the general support function of the TEP Liban incident management organization, and security management by Total Liban M&S, refer to:

ⓘ *TEP Liban Emergency Response Plan, 2019*

2.2.5 Incident Management Facilities

TEP LIBAN INCIDENT COMMAND POST (IMT ROOM)	The initial IMT room is the dedicated room at TEP Liban head office in Beirut. The facility is adequate for the majority of incidents. For Tier 3, with offshore & onshore operations involving a large number of personnel, IMT may need to be expanded in other offices. If the incident further escalates, IMT may be transferred to another facility, e.g. close hotels, to be approved by TEP Liban. Additional security, IT & communication etc. is set-up with the support of Total group.
TEP LIBAN CRISIS MANAGEMENT ROOM	The crisis management room may be located at the TEP Liban head office or alternatively at the Total Liban M&S head office in Beirut (in charge of security, media communications and public relations).
LOCAL INCIDENT COMMAND POST(S) AT SEA	The Local IC and Post at-sea is initially on the drilling unit and can be relocated onto a dedicated vessel for oil spill, possibly equipped with helipad (for aerial observers and rapid movement of personnel). For large operations or blow-outs, two or more Local IC's for oil spill response at sea may be designated.
RECEPTION/ STAND-BY AREAS (under responsibility of Logistics section)	Logistics Section: • Establishes reception/ stand-by areas to receive, check and store arriving resources before assignment (equipment, fuel, dispersant, PPE, etc.). • Assigns a manager for each area, who logs in all incoming/ outgoing resources; and manages the area with a team. • Releases and transfers resources as per the instructions of the Operations section or Local IC's. Reception/ stand-by areas in Lebanon may include: • Logistics base (Beirut port): reception and storage of dispersant, equipment, PPE etc. before transfer offshore. • Beirut port (reception, storage and dispatch of resources). Beirut international airport (reception and custom clearance of equipment and consumables before transfer). • Other location onshore to hold large stock of shoreline response equipment and PPE arriving in country.
STAGING AREAS (under responsibility of the Operation section or Local IC's)	Operation Section Chief: • Ensures staging areas are established (with the assistance of the Logistics section) and managed by the Local IC's to receive resources (before use). • Assigns a manager for each staging area, who logs in all incoming/ outgoing resources. Possible staging areas include: • Offshore: vessels to store PPE, equipment and dispersant. • Onshore: any suitable area, with good road access, that can be secured.

Note. Dispersant use is only envisaged as an option for SSDI in case of a blow-out situation.

2.3 Drilling unit organization – Tier 1 & initial Tier 2 / 3 maritime response

This section covers the organization to implement on site for Tier 1 and initial Tier 2 / 3 spills close to the rig.

Figure below illustrates the organization on the drilling unit for the initial oil spill response.

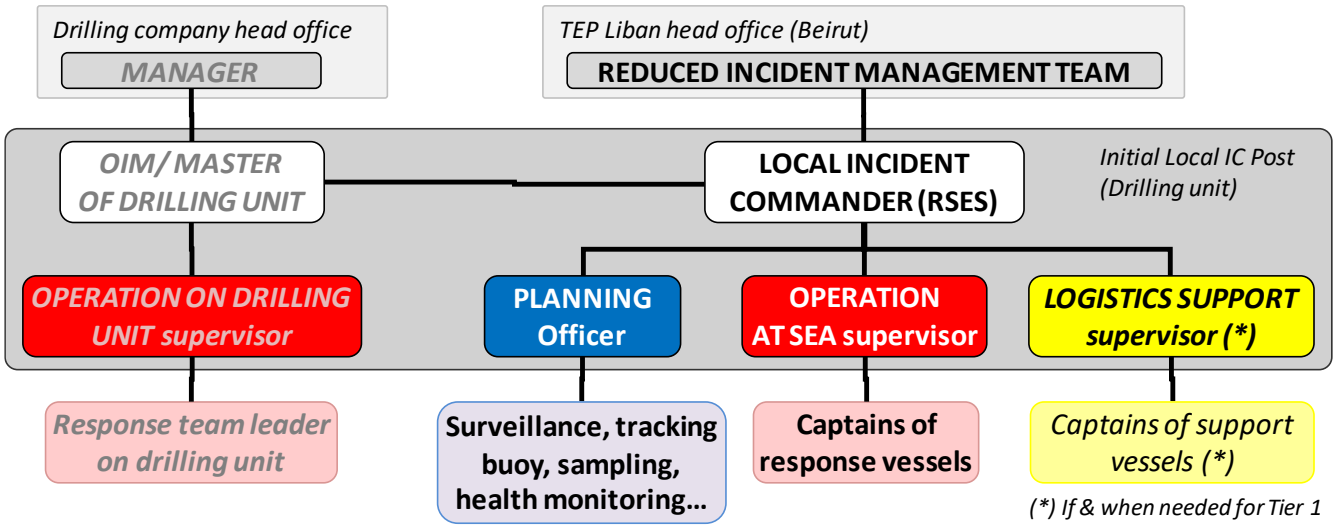


Figure 5: Initial Oil Spill Incident Management on the Drilling Unit

▶ The **initial Local Incident Commander IC (Local IC)** for oil spill at sea close to the drilling unit is the TEP Liban RSES on the drilling unit.

Note. Spills from PSV "en route" are managed by the captain and ship owner (with assistance of TEP Liban as needed).

▶ The **Local IC** is responsible of the overall spill management (until he delegates to members of the Local IC Post) and:

- Alerts immediately the TEP Liban Duty Officer [7]and sends the notification form;
- Ensures a rapid spill assessment and activates the OSCP Vol 1.2 Drilling Unit Action Plan if needed;
- Assumes the position of initial Local Incident Commander IC;
- Approves the tactical response plan; mobilizes vessels and coordinates the response at sea.

▶ The **Local IC** acts in liaison with the OIM/ Master of the Drilling unit to:

- Ensure the general management of the emergency;
- Ensure adequate health & safety measures are enforced on the drilling unit and onboard the vessels;
- Ensure notification from the drilling unit to the maritime authorities is in line with the TEP Liban notification;
- Follow-up the source control measures and response operations on the drilling unit;
- Mobilize the Local IC Post and designate support personnel.

▶ The **Local IC** reports on a regular basis to:

- His hierarchy (e.g. Drilling Superintendent) and TEP Liban reduced IMT (if the TEP Liban ERP is not activated);
- The IMT/ Operations Section if the IMT is activated (Tier 2 or 3).

[7] The Duty Officer function is maned by the Drilling super intendent in TEP Liban H.O.

Table below presents the key functions and responsibilities of the Local IC Post members for oil spill.

PLANNING officer	- Advises about safeguarding of Health and Safety of personnel and responders. - Prepares the notification form and the daily situation report. - Organizes monitoring of Health & Safety and spill, and evaluation of response. - Collects information on spill status and associated risks. - Provides predictions about drift and behaviour of spilled product. - Consolidates the Action Plan for next day (based on tactics proposed by Operations at-sea supervisor). - Maintains the Incident Situation Board updated. - Acts as liaison with TEP Liban (Reduced) IMT.
OPERATIONS ON DRILLING UNIT supervisor	- Coordinates the response operations on the drilling unit (source control, loss of containment), under the supervision of the OIM/ Master – **Not in the scope of this present procedure**.
OPERATIONS AT SEA supervisor	- Proposes at sea spill response tactics to the Local IC, including resources needed, timing for mobilization and zoning for use. - Mobilizes the vessel(s), after approval of tactics by the Local IC. - Coordinates the spill maritime response operations with vessels. - Provides regular feedback on the response operations to the local IC Post. - Act as the contact point between the Local IC Post and the response vessels.
LOGISTICS SUPPORT supervisor	- Request resources to TEP Liban (Reduced) IMT if needed. - Manages the arrival and dispatch of resources: replacement PPE etc.

Support functions for incident management (e.g. Event logger) are described in the emergency response plan of the drilling unit.

▶ Personnel, designated by the OIM/ master, carry out the response operations on the drilling unit.

▶ Vessels are mobilized by the designated Operations at sea supervisor, after approval of the RSES (and OIM/ master if and when needed, e.g. release from an operation on-going with the drilling unit).

▶ **The Local IC manages Tier 1 spills**; and initiates the response to Tier 2 & 3 spills, if possible.

▶ **The TEP Liban Reduced IMT**[8] liaises initially with the site, to facilitate the provision of:

- Helicopter and observer for aerial surveillance;
- Additional supply vessel(s) to relieve the stand-by vessel etc.

▶ **The RSES remains the Local IC for oil spill**, until the TEP Liban Operations Manager or Incident Commander designates a replacement, e.g. if:

- Situation on the drilling unit prevents him from coordinating at sea operations;
- Oil slicks move away of the drilling unit, requiring response vessels to possibly operate over 2-3 hours sailing distance from the drilling unit (adapted on a case-by-case basis);
- Incident escalates (or risks of escalating) to a Tier 2 or 3 and requires mobilization of external resources.

[8] Composed of relevant senior personnel, e.g. Operations Manager, Drilling Manager, HSE Manager, Logistics Manager, until the TEP Liban ERP is activated and the full IMT is mobilized (Tier 2 or 3 or other emergency).

2.4 Logistics base organization – Tier 1 & initial Tier 2 / 3 response

This section covers the organization to implement for Tier 1 & initial Tier 2 / 3 spills at the Logistics Base.

The figure below illustrates the possible organization for the initial oil spill response, based on the best understanding of FAST BOLLORE spill response arrangements.

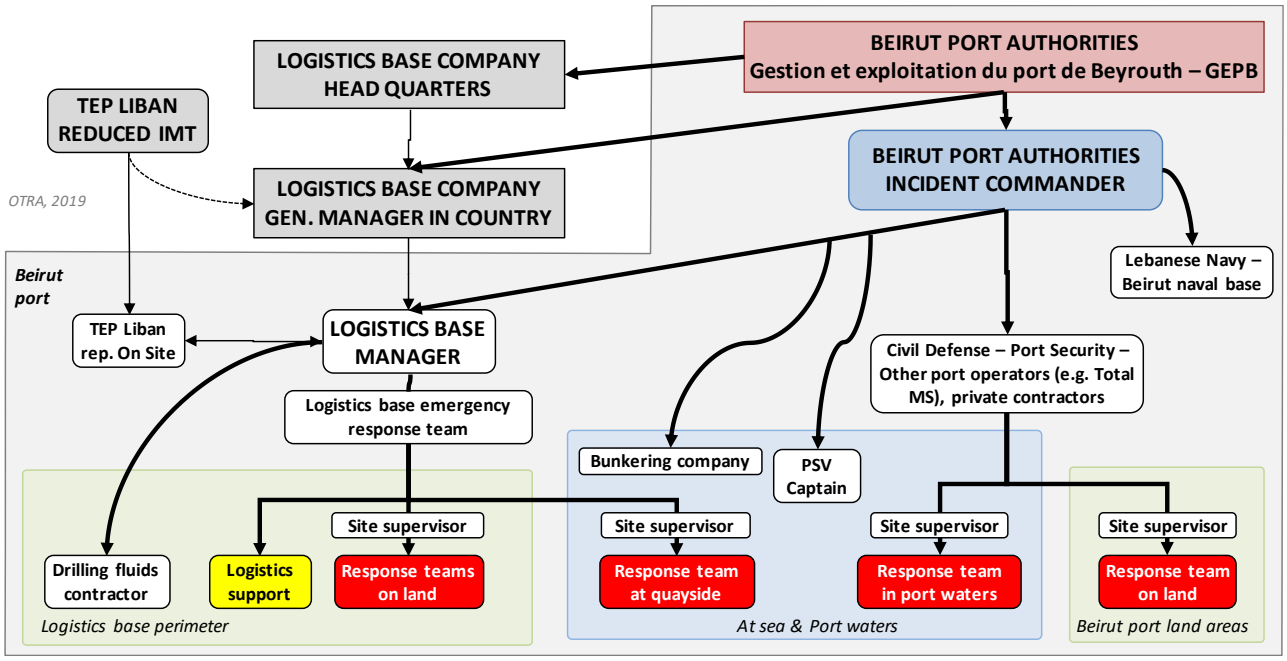


Figure 6 Oil spill response organization at FAST BOLLORE Logistics Base & Port of Beirut

▶ **FAST BOLLORE Base Manager** is responsible for:

- Tier 1 and initial Tier 2 & 3 land spill management in the perimeter of the logistics base.
- Tier 1 and initial Tier 2 & 3 spill management in port waters along the quayside of the logistics base (whether oil is spilled from a vessel at quayside or from uncontained logistics facilities on land).

▶ **FAST BOLLORE Base Manager**:

- Alerts GEPB for any spill (land or port waters) and the JMOC (if spill in port waters);
- Ensures a rapid spill assessment and activates the emergency procedures as needed;
- Approves the tactical plans, mobilizes the resources and commands the first response.
- Reports regularly to GEPB.

Note. For spills from PSV "en route", spill is managed by the captain and ship owner, with assistance of logistics base manager as needed.

Note. For spills of drilling fluids at the logistics base, contractor in charge of drilling fluids and running the mixing plant at the logistics base provides assistance as needed.

▶ **GEPB** is responsible for the overall management of Tier 2 & 3 spills (land and port waters) in the port perimeter, supervising FAST BOLLORE and coordinating the response with other entities such as Lebanese Navy (Beirut naval base), Civil Defence, Port security (access), industry partners (i.e. Total M&S) and private contractors.

▶ The **TEP Liban representative on site**, in liaison with the **FAST BOLLORE Base Manager**:

- Ensures emergency is adequately managed;

- Ensures adequate health & safety measures (monitoring, PPE etc.) are enforced;
- Ensures notification is sent to GEPB and JMOC as needed;
- Facilitates the provision of external assistance if required in liaison with the (Reduced) IMT in Beirut.

▶ The **TEP Liban representative on site** reports on a regular basis to:

- His hierarchy (e.g. head of Logistics) and TEP Liban HSE Manager (or reduced IMT) if the TEP Liban ERP is not activated;
- The IMT/ Operations Section if the IMT is activated (Tier 2 or 3).

Table below presents the key functions and responsibilities of the FAST BOLLORE personnel for oil spill response.

PLANNING officer	- Advises about safeguarding of Health and Safety of personnel and responders. - Organizes monitoring of Health & Safety and spill, and evaluation of response. - Provides information on spill status and associated risks. - Provides predictions about behaviour of spilled product. - Consolidates the Action Plan for next day (for land response & at sea response along quayside). - Maintains the Incident Situation Board updated. - Prepares the notification form and the daily situation report. - Acts as liaison with TEP Liban Reduced IMT.
OPERATIONS ON LAND supervisor	- Coordinates the response operations on land.
OPERATIONS AT QUAYSIDE supervisor	- Coordinates the response operations from the quayside/ along the quayside.
LOGISTICS SUPPORT supervisor	- Request resources as needed (TEP Liban and others as needed). - Manages the arrival and dispatch of resources: replacement PPE etc.

▶ **The TEP Liban reduced IMT**[9] liaises initially with FAST BOLLORE, via the TEP Liban representative on site, to facilitate the provision of assistance if needed.

▶ **The TEP Liban IMT** may liaise with GEPB to provide further assistance if needed (for Tier 2 & 3 spills).

[9] Composed of relevant senior personnel, e.g. Operations Manager, Drilling Manager, HSE Manager, Logistics Manager, until the TEP Liban ERP is activated and the full IMT is mobilized (Tier 2 or 3 or other emergency).

2.5 Organization for at-sea Tier 2 & initial Tier 3 spills from / close to the rig

While Tier 1 events are managed by the Local IC and their site organization, Tier 2 and 3 maritime spills from/ close to the rig require the mobilization of TEP Liban incident management organization to provide assistance and manage the overall incident.

TEP Liban ERP as well as the OSCP Vol. 1.1 Action Plan (the present document) are activated.

Similar organization is mobilized to assist for spills from PSV or logistics base.

2.5.1 Initial organization – First day(s)

2.5.1.1 Organization overview

Figure below is the initial IMT organization for Tier 2 & 3 offshore spills, including blow-out situation.

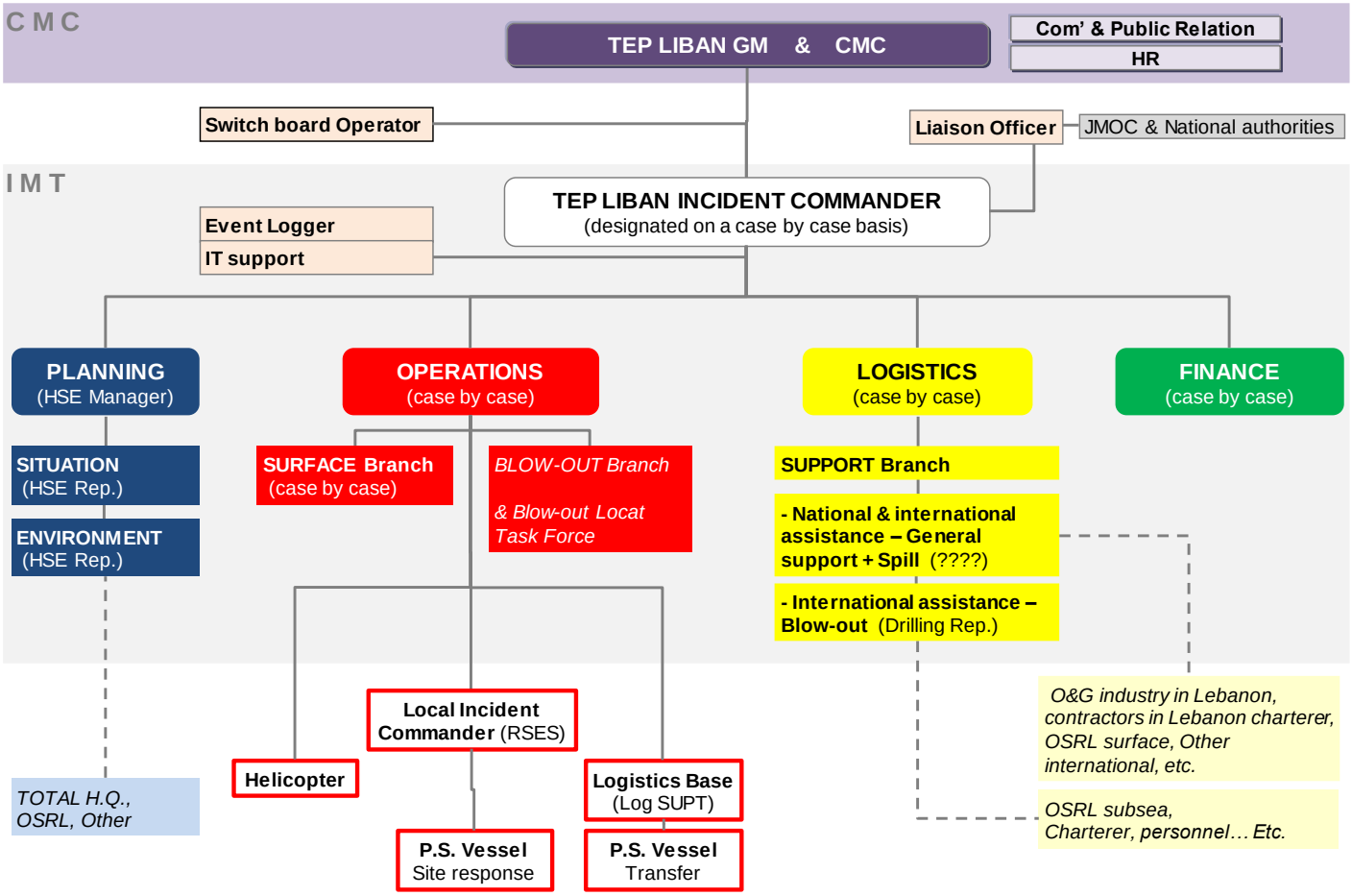


Figure 7 : Initial TEP Liban IMT organization for Tier 2 or 3 offshore spill

2.5.1.2 Local Incident Command Post (on site)

Spill on the location of the drilling unit. The Local IC (RSES) manages the operations on site. As soon as possible (i.e. next day), he is replaced by a designated Local IC At-Sea to coordinate the surface spill response (with Local IC Post members preferably on a response vessel).

Spill from a PSV in transit between the drilling unit and the port. The initial IC is the captain of the vessel. Spill is managed by the ship-owner. A dedicated IC and IMT may be appointed by TEP Liban to provide assistance.

Approach is similar for a spill at the logistics base, to assist the base operator.

2.5.1.3 Incident Management Team IMT (head office)

For Tier 2 and 3 spills, the overall responsibility for the incident management is transferred to the **TEP Liban Incident Commander IC**, assisted by the IMT.

The IMT is staffed with TEP Liban personnel, designated depending on their availability, type of incident and competencies required.

Incident Commander

▶ INCIDENT COMMANDER designates immediately:

- Chiefs of SECTIONS PLANNING, OPERATION and LOGISTICS (and FINANCE as soon as required);
- A deputy IC, Event Logger and Liaison Officer (for the communication to the authorities).

PLANNING SECTION

▶ PLANNING SECTION CHIEF designates (or assumes directly the functions):

- SITUATION UNIT (for Tier 2 & 3) with minimum:
  - 1 person for the collection of facts, information display, status report writing etc.,
  - 1 person for fate & behaviour predictions, drift modelling etc.;
- ENVIRONMENT OFFSHORE UNIT (for Tier 3);
- Aerial Observer.

Note. In case of multi-emergencies (fire, MedEvac, etc.), additional expertise is mobilized within this section.

OPERATIONS SECTION

▶ OPERATION SECTION CHIEF is designated depending on the incident, e.g.:

- Drilling manager for spill on the location of the drilling unit;
- Head of logistics for other cases: spill from a PSV in transit or close to the port, logistics base.

▶ OPERATION SECTION CHIEF designates (or assumes directly the functions of):

- A SURFACE RESPONSE BRANCH director assuming responsibilities of (until supervisors are designated):
  - SURFACE MONITORING GROUP to coordinate aerial observations and other monitoring operations (drifting buoys, gas/explosivity, etc.);
  - MECHANICAL MIXING GROUP to mechanical mixing operations to increase the natural dispersion of oil into the water.
  - RECOVERY OFFSHORE GROUP to coordinate oil containment and recovery operations at sea, as well as mixing operations.

- Note. SURFACE RESPONSE BRANCH director also initially assumes the responsibilities of:
  - Vessels Branch to coordinate all vessels allocations and movements;
  - Air Operations Branch to coordinate all aerial activities, in liaison with the National Civil Aviation.

- A BLOW-OUT BRANCH director who manages the Blow-out Local Task Force.
  - The Blow-out Local Task Force is activated as per the BOCP provisions.
- A specific Local Incident Commander(s) on site and ensures the Local IC Post(s) is(are) staffed correctly.

LOGISTICS SECTION

▶ The LOGISTICS SECTION CHIEF assumes the responsibilities of (until personnel is designated):

- The SUPPORT BRANCH responsible for mobilizing the external assistance.
  - Tier 2: national assistance (O&G and other industry in Lebanon and specialized companies).
  - Tier 3: OSRL personnel (for PLANNING, OPERATION SECTIONS, and LOGISTICS SECTION to facilitate OSRL mobilization & interface with OSRL Duty Manager).
  - Blow-out: subsea equipment is mobilized by Drilling representatives, in the LOGISTICS SECTION.
- The SERVICE BRANCH which is activated latter if needed e.g. for shoreline operations in remote areas.

FINANCE SECTION

▶ The FINANCE SECTION CHIEF assumes the responsibilities of (until personnel is designated):

- COST UNIT;
- TIME UNIT;
- PROCUREMENT UNIT.

2.5.1.4 Crisis Management Cell CMC (head office)

The General Manager is informed immediately and manages the mobilization and staffing of the **Crisis Management Cell CMC** to manage crisis and high-level issues; and liaise with "*the appropriate affiliate departments, contractor companies, agencies, governmental authorities, and community representatives, as required*".

Total Liban M&S, Total country chair, is in charge of security, media communications and public relations for any incident in country (from Total Liban M&S and TEP Liban).

Accordingly, CMC will integrate personnel of TEP Liban and of Total Liban M&S.

CMC room may be located at the TEP Liban head office or, alternatively, at the Total Liban M&S head office, both in Beirut.

ⓘ *Refer to the TEP Liban ERP, 2019*.

2.5.2 Expanded initial organization for maritime Tier 2 & initial Tier 3 spills

2.5.2.1 Organization overview

When needed, a robust and expanded Tier 2 (or initial Tier 3) IMT organization for maritime offshore response starts its set-up, within 24 to 48 hrs, with available personnel (Total Liban M&S, Total Group, OSRL, others).

Escalation will continue in case of oil groundings and/ or Tier 3, with the mobilization of additional resources and of the CSC in Paris (see next section).

Tier 2. LPA may designate a Local IC and activate a "sectoral emergency centre" (LPA only). Or a national Oil Spill Incident Commander (NOSIC) may be appointed with a reduced national incident management team (with various agencies) to oversee the response (partial activation of the NOSCP).

Tier 3. The National OSCP is activated. A NOSIC is designated to supervise maritime operations and facilitate the provisions of assistance, assisted by a national incident management team.

Figure below illustrates this level of mobilization of TEP Liban as well as a possible mobilization, and interfaces, with the authorities to manage offshore Tier 2 oil spill.

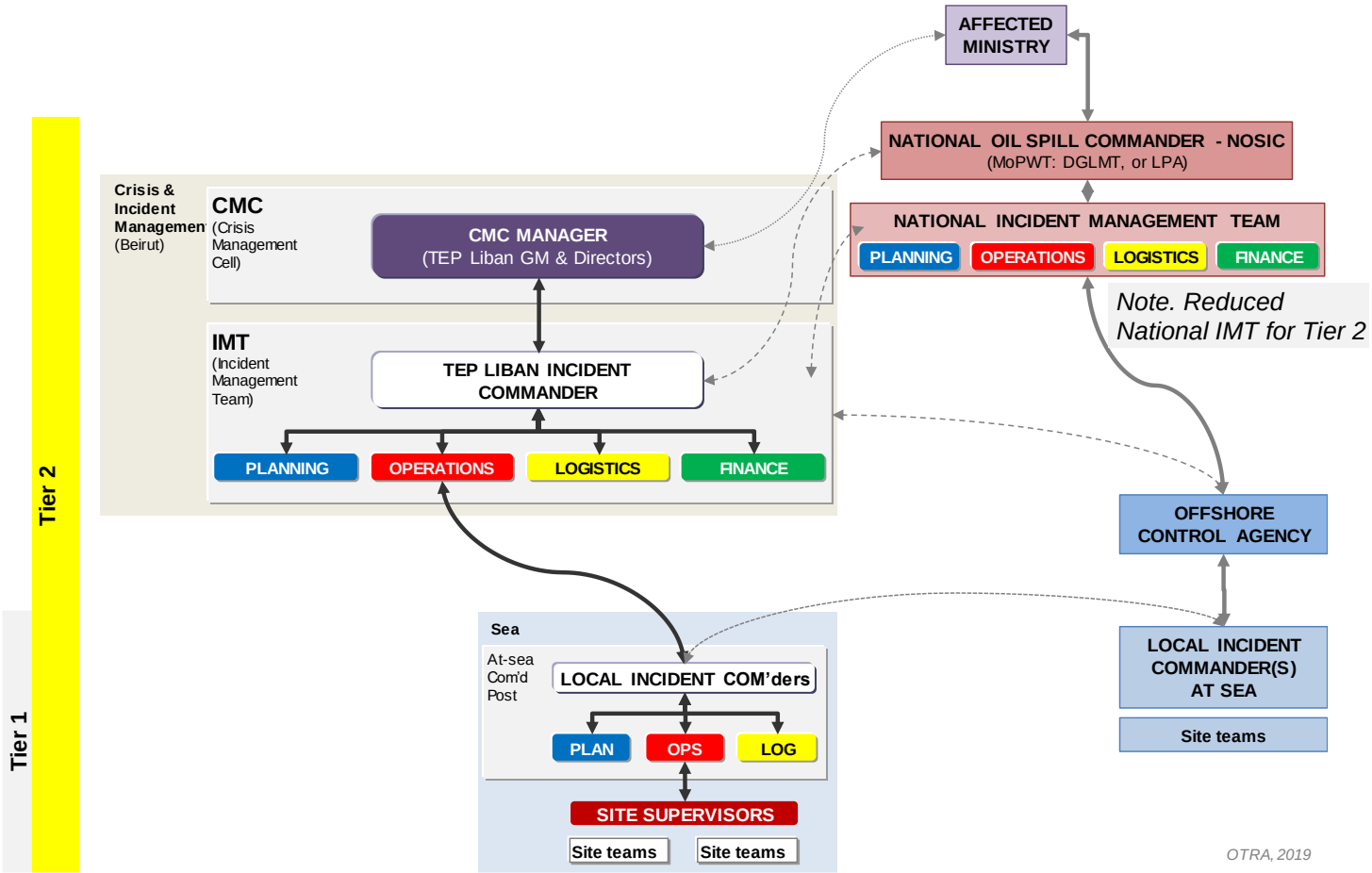


Figure 8: Possible TEP Liban organization for Tier 2 and initial Tier 3 spill offshore and interfaces with authorities (Tier 3 national organization shown)

2.5.2.2 Incident Management Team IMT (head office)

Each unit/ group is usually managed by one person and staffed as needed. For a Tier 2, one person may manage the functions of two or more units or groups.

External staff may be needed for a Tier 2 and is essential for a Tier 3. A list of personnel to initially request from OSRL and Total is proposed as guidance in:

TEP Liban OSCP Operational Support n°4, Section "Mobilisation of assistance"

Figure below illustrates an IMT structure for Tier 2 and initial Tier 3 offshore response.

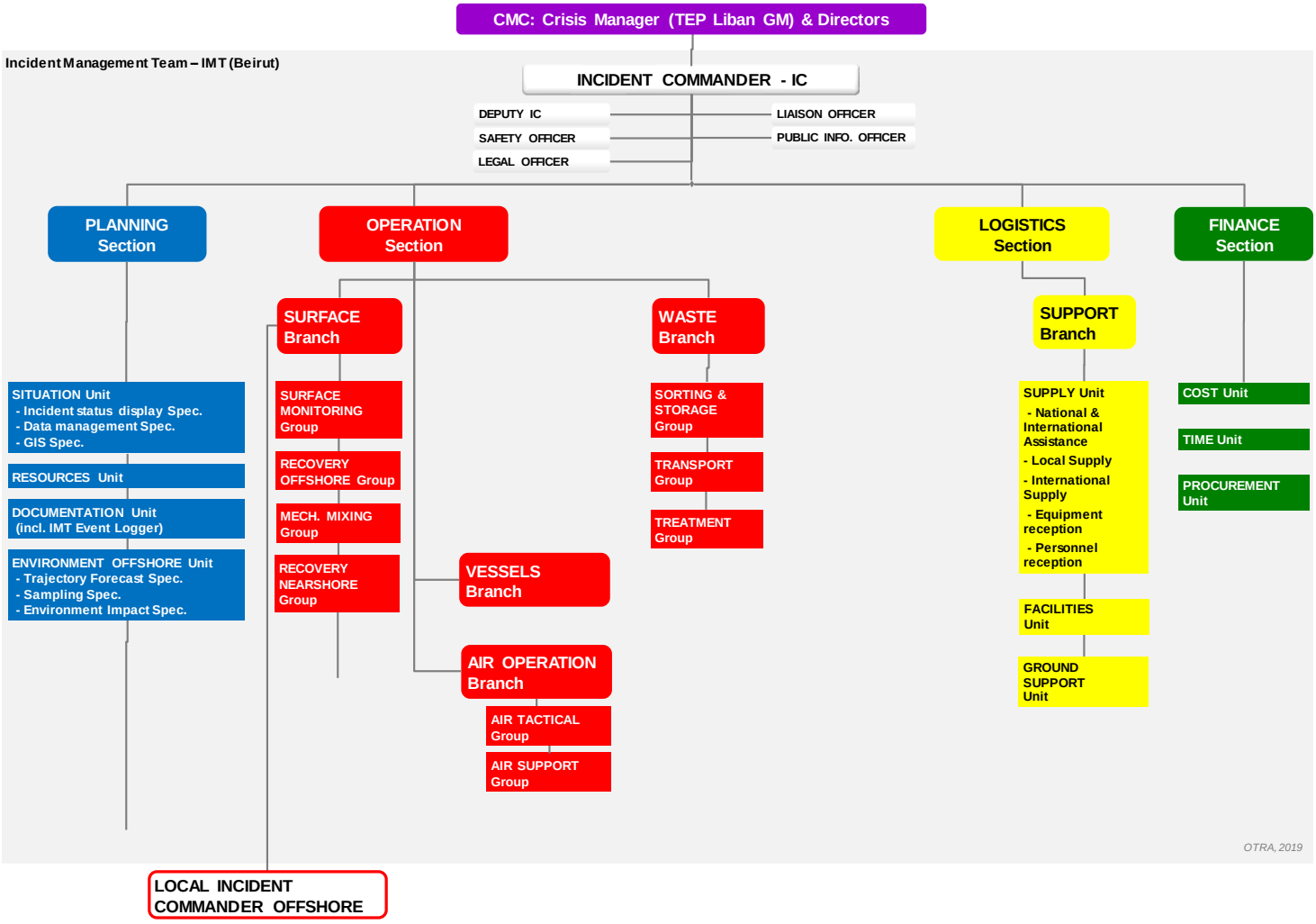


Figure 9 : Possible IMT organization for Tier 2 and initial Tier 3 offshore response

Incident Commander

▶ INCIDENT COMMANDER:

- Designates a deputy IC;
- Approves the reinforced structure of the IMT and the requests for additional personnel;
- Approves the communication channels: with authorities, external organizations etc.;
- Facilitates the mobilization of site responders, Local IC Posts, personnel on support sites etc.

PLANNING SECTION

u PLANNING SECTION CHIEF requests additional personnel to:

- Reinforce SITUATION UNIT and ENVIRONMENT OFFSHORE UNIT;
- Activate DOCUMENTATION UNIT and RESOURCES UNIT;
- Designate additional Aerial Observers and at-sea surveyors if needed.

OPERATIONS SECTION

▶ OPERATION SECTION CHIEF requests additional personnel to staff positions in:

- The SURFACE RESPONSE BRANCH: supervisors for:
  - SURFACE MONITORING GROUP,
  - RECOVERY OFFSHORE GROUP,
  - MECHANICAL MIXING GROUP,
  - RECOVERY NEARSHORE GROUP;
- The VESSELS BRANCH: director and staff;
- The AIR OPERATIONS BRANCH: director and staff (critical for Tier 3);
- Area of operations: Local Incident Commander, Local IC post members, responders on vessels, etc.

LOGISTICS SECTION

▶ LOGISTICS SECTION CHIEF requests personnel to staff positions in the SUPPORT BRANCH depending on the level of the incident:

- SUPPLY UNIT to coordinate the supply of assistance:
  - SUPPLY UNIT/ INTERNATIONAL ASSISTANCE MANAGER to manage provisions of contracted assistance;
  - SUPPLY UNIT/ NATIONAL SUPPLY MANAGER to manage local supply;
  - SUPPLY UNIT/ INTERNATIONAL SUPPLY MANAGER to manage international supply (Tier 3 only);
  - SUPPLY UNIT/ EQUIPMENT & SUPPLY MANAGER to manage reception, staging and dispatch of goods;
  - SUPPLY UNIT/ PERSONNEL MANAGER to manage reception, transfer and living/working environment of external personnel;
- FACILITIES UNIT to set-up and maintain the reception & staging sites (e.g. reception area at airport).
- GROUND SUPPORT UNIT if needed.

▶ LOGISTICS SECTION CHIEF requests personnel to activate the SERVICE BRANCH if risk of spill on the shore.

FINANCE SECTION

▶ FINANCE SECTION CHIEF staffs the following units, as needed:

- COST UNIT;
- TIME UNIT;
- PROCUREMENT UNIT.

2.6 Organization for at-sea Tier 2 & initial Tier 3 spills from/ close to the rig with shore response

This level of mobilization is implemented for a Tier 2 spill from/ close to the rig involving maritime and some (limited) shoreline response. This level also represents a transition step to set-up a full Tier 3 organization with maritime and onshore operations.

Tier 2. LPA may designate a Local IC (spill from drilling activity). Or a NOSIC is appointed with a reduced national incident management team to oversee the response (partial activation of the NOSCP). Governorate shoreline response plan(s) is/ are activated. NOR may be partially activated.

Tier 3. National OSCP is activated. A NOSIC is designated to supervise maritime and shoreline protection/ clean-up operations and facilitate the provisions of assistance. The NOR is mobilized.

TEP Liban carries out the operations in consultation and liaison with the authorities.

Similar organization is mobilized to assist for spills from PSV or logistics base.

2.6.1 Organization overview

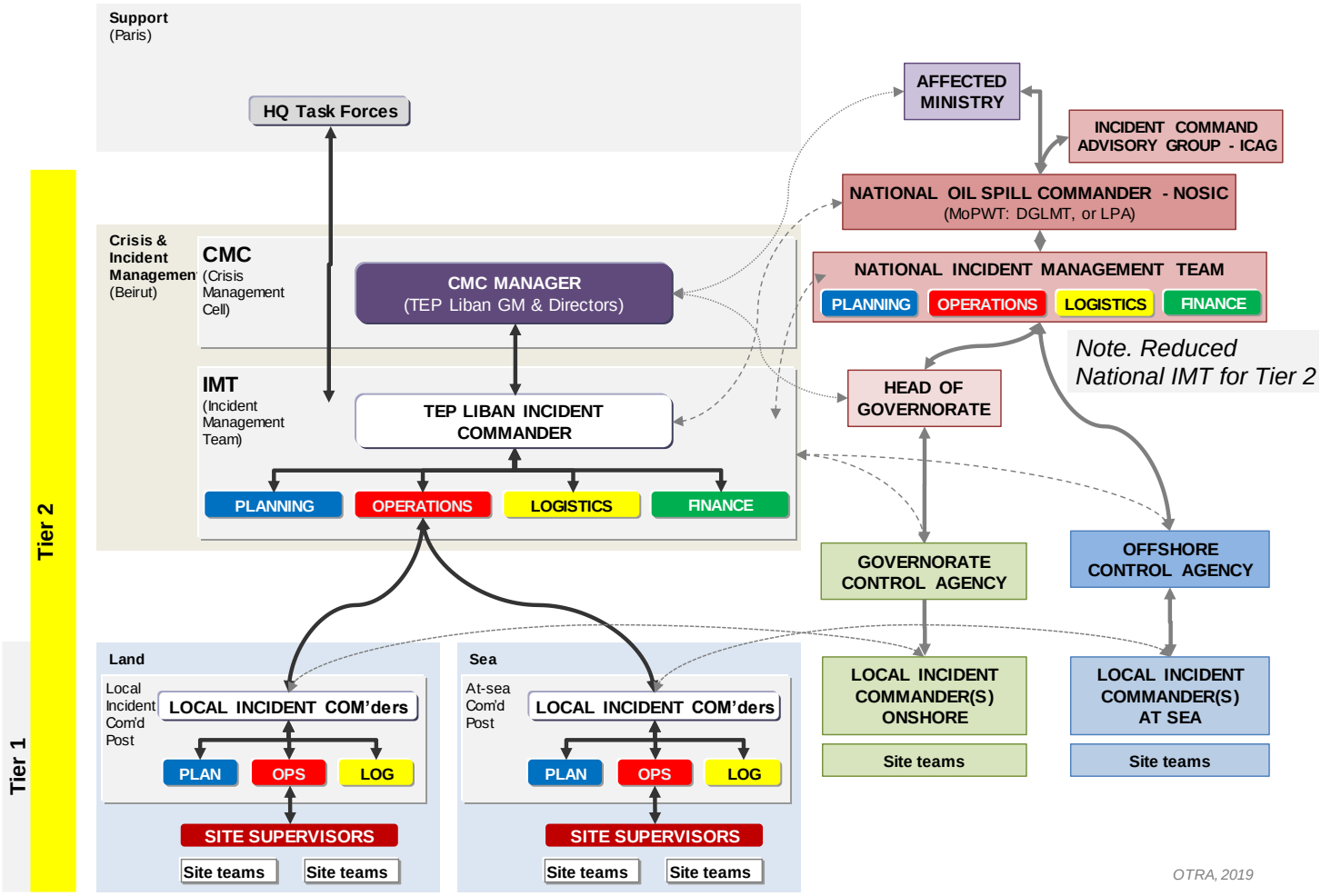


Figure 10: Possible TEP Liban organization for Tier 2 and initial Tier 3 maritime spill with limited shoreline operations, and interfaces with authorities

2.6.2 Incident Management Team IMT (head office)

Figure below illustrates a possible IMT structure for Tier 2 offshore and (limited) onshore response.

Functions of each unit are managed by at least one person (often assisted by a team e.g. in the PLANNING SECTION and LOGISTICS SECTION).

External staff is mobilized, from Total and external assistance, to reinforce the IMT and set-up the Local Incident Command Post(s), working site teams and staging areas on the shore.

Protection and clean-up operations onshore are supervised by competent personnel (Total, contracted assistance and specialized companies) and carried out by contracted personnel and locally hired workers.

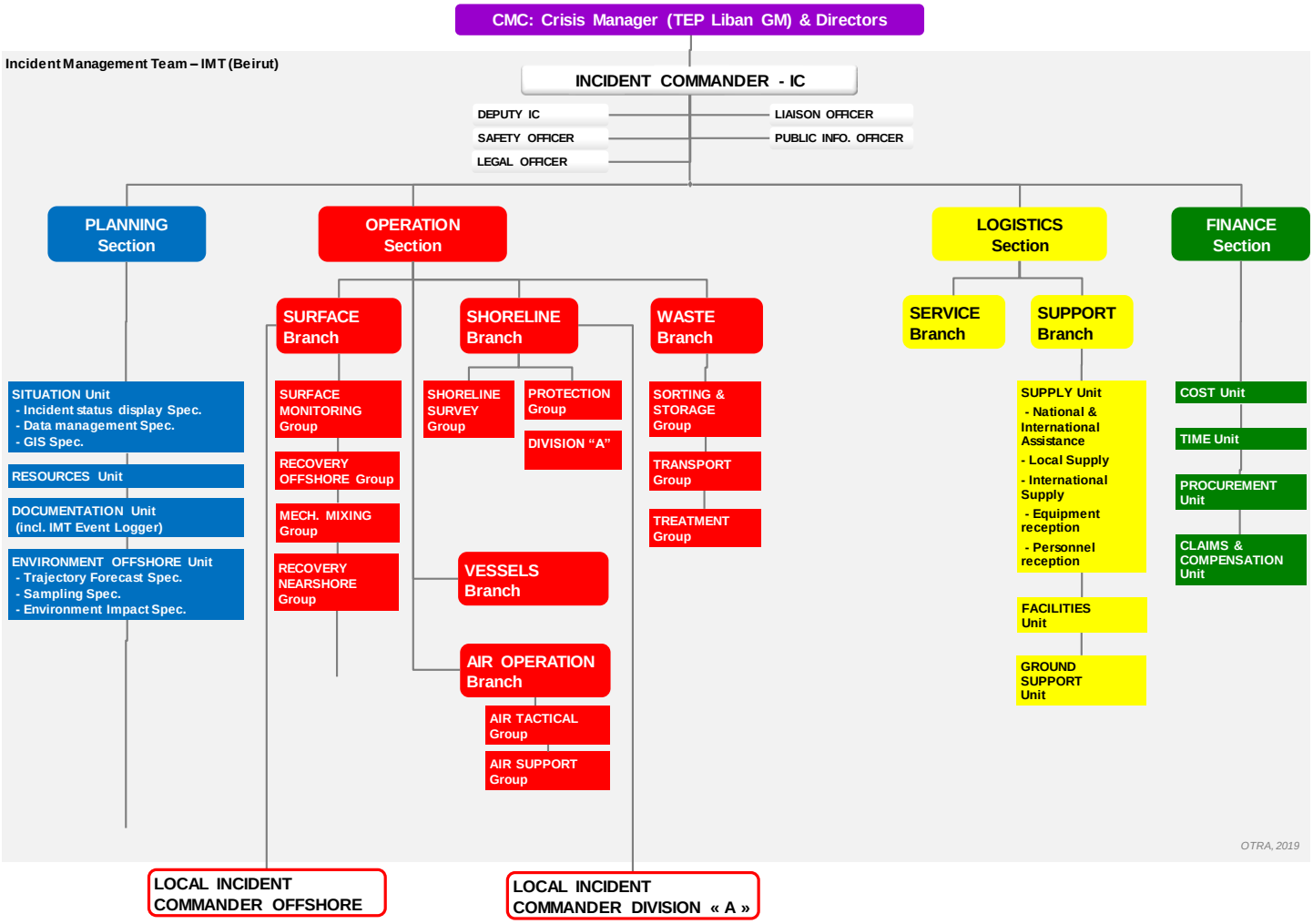


Figure 11: Possible TEP Liban IMT for Tier 2 spill maritime spill and (limited) shoreline operations

In addition to the IMT functions mobilized for a maritime Tier 2 offshore spill, the following modifications are made:

PLANNING SECTION

▶ PLANNING SECTION CHIEF:

- Reinforces as needed the SITUATION UNIT, DOCUMENTATION UNIT, ENVIRONMENT OFFSHORE UNIT;
- Activates the ENVIRONMENT ONSHORE UNIT;
- Considers activating the TECHNICAL SUPPORT UNIT (turtles, shore birds, coastal environment: vermetid terraces, sea grass meadows, etc.);
- Incorporates oiled shoreline surveyors (SCAT specialists).

OPERATIONS SECTION

▶ OPERATION SECTION CHIEF:

- Reinforces as needed the groups of the SURFACE BRANCH;
- Reinforces as needed the VESSELS BRANCH and AIR OPERATIONS BRANCH;
- Activates a SHORELINE BRANCH with:
  - SHORELINE SURVEY GROUP for shoreline survey,
  - PROTECTION GROUP for protection operations,
  - Shoreline DIVISION "A" to coordinate clean-up in coastal area "A", Shoreline DIVISION "B" etc.,
- Activates a WASTE BRANCH to manage oil recovered at sea and oily waste from shoreline clean-up with:
  - SORTING & STORAGE GROUP immediately,
  - TRANSPORT GROUP as soon as possible,
  - TREATMENT GROUP in a later stage.
- Activates an OILED WILDLIFE BRANCH, if needed (see next section for a full description).

LOGISTICS SECTION

▶ LOGISTICS SECTION chief:

- Re-enforces the SUPPORT BRANCH to mobilize assistance and set-up shoreline clean-up work sites:
  - SUPPLY UNIT is expanded.
  - FACILITIES UNIT is expanded to manage the support sites for onshore operations.
- Activates the SERVICE BRANCH to provide support for shore operations, with at least the:
  - COM' & IT UNIT.

FINANCE SECTION

▶ FINANCE SECTION chief:

- Re-enforces the PROCUREMENT UNIT, COST UNIT and TIME UNIT;
- Activates the CLAIMS & COMPENSATION UNIT to manage claims arising from shoreline pollution.

2.7 Organization for at-sea Tier 3 spill from/ close to the rig with shore response

This organization, set-up for Tier 3 off- and onshore operations, is similar to the Tier 2 organization and:

- Expanded (with support of the Total group CSC and assistance);
- Significantly reinforced (personnel from Total and external specialized organizations);
- Sustained on a longer period (rotations of personnel to sustain response for weeks or more);
- May liaise with other Total emergency organization set-up in neighbouring countries for transboundary spill (not displayed on the figure below).

IMT, including 40-50 staff or more, expands in the TEP Liban offices and – if needed – in other facilities in Beirut (e.g. Total Liban M&S).

A similar organization may be (partially) mobilized to assist for major spills from a PSV or at the logistics base.

The National OSCP is activated. A NOSIC is designated to supervise all operations. Governorate shoreline response plan(s) is/are activated for protection/ clean-up operations. NOR is activated to manage crisis issues and facilitate provision of assistance. The regional emergency protocol of the Barcelona convention is activated to manage transboundary spill and/ or request assistance. For an example of transboundary organization, see:

"Transboundary spill – Possible organization", p.38.

2.7.1 Organization overview

Figure below illustrates the organization for maritime Tier 3 spill with offshore & shore response, and the possible interfaces with authorities.

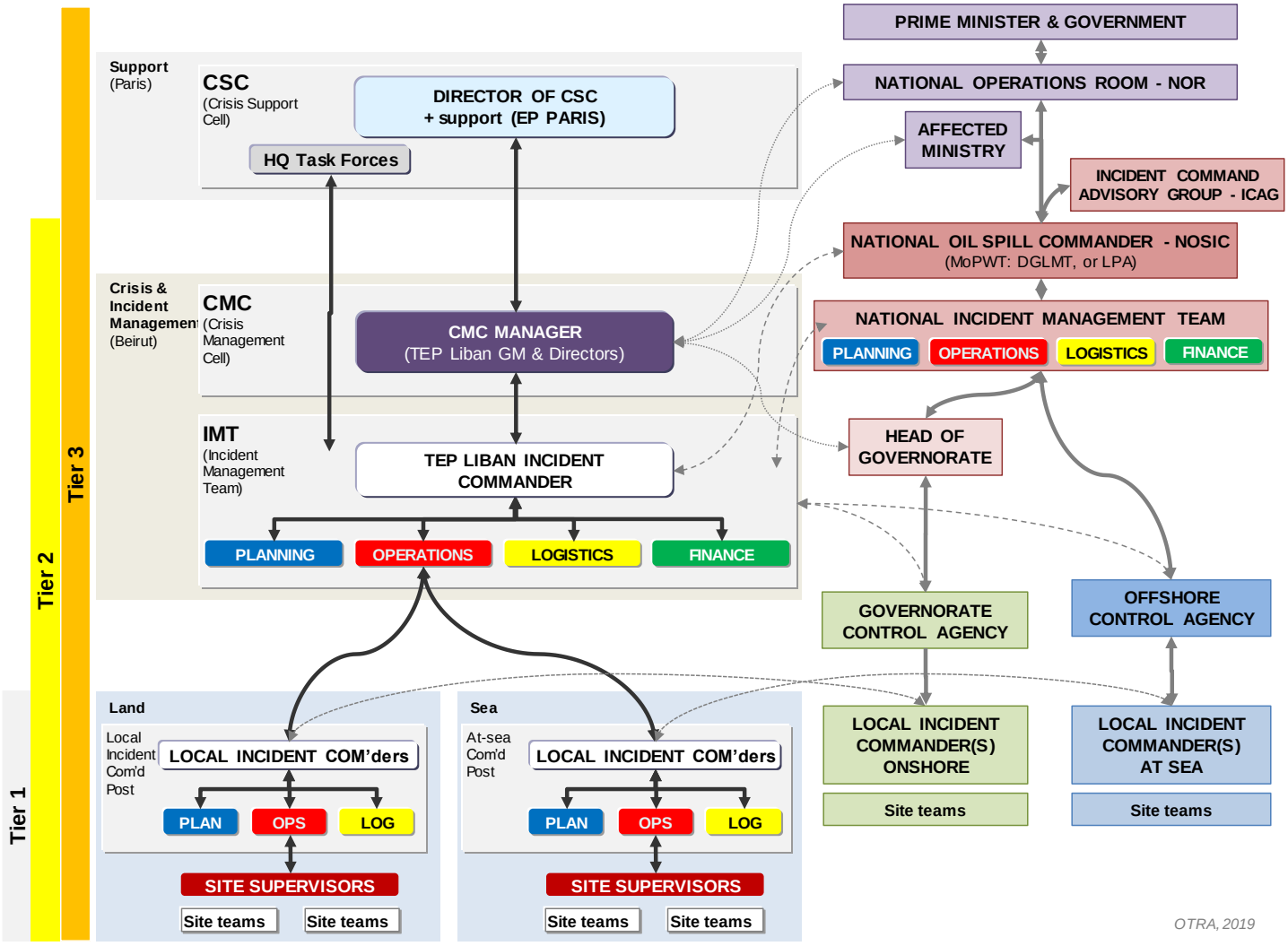


Figure 12: Possible TEP Liban organization for maritime Tier 3 spill with offshore & onshore response, and interfaces with authorities

2.7.2 Incident Management Team IMT (head office)

Figure below illustrates a full-blown IMT structure for Tier 3 oil spill response offshore.

Most units are managed by a unit leader with the assistance of unit members.

See "IMT full blown Tier 3/ Blow-out detailed organization", p.68

Additional assistance is mobilized to reinforce the IMT and set-up additional Local Incident Command Posts on the shore.

Supplementary contracts are set-up with local companies and international organizations to provide personnel, resources, and logistical support.

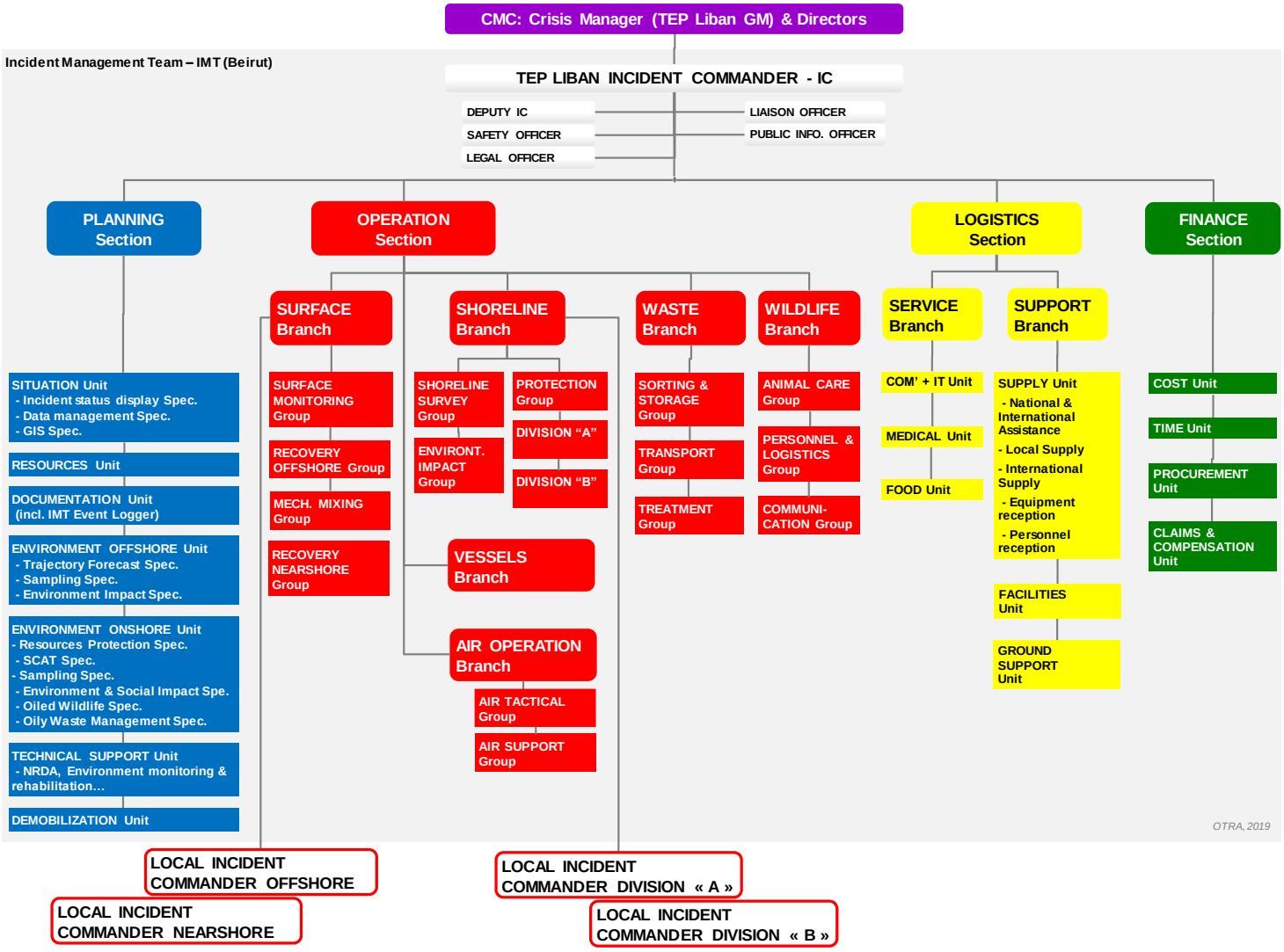


Figure 13: Full-blown IMT organization for Tier 3 spill with offshore & onshore response

In addition to the IMT functions mobilized for a Tier 2 offshore and shoreline spill, the following modifications are made:

PLANNING SECTION

▶ PLANNING SECTION CHIEF:

- Reinforces the units;

- Mobilizes (or reinforces) the ENVIRONMENT ONSHORE UNIT;
- Develops the information management capabilities of the SITUATION UNIT (GIS, database, etc.);
- Mobilizes TECHNICAL SUPPORT UNIT as needed: specialists of marine offshore/ coastal/ shore environment and fauna etc.

OPERATIONS SECTION

▶ OPERATION SECTION CHIEF:

- Reinforces the SURFACE, SHORELINE (or mobilizes) and WASTE branch;
- Reinforces the ENVIRONMENT IMPACT GROUP;
- Reinforces the VESSELS BRANCH and AIR OPERATIONS BRANCH;
- Mobilizes, on request of the PLANNING SECTION, the OILED WILDLIFE BRANCH;
- Designates additional Local Incident Commanders as needed (offshore, nearshore and onshore).

LOGISTICS SECTION

▶ LOGISTICS SECTION CHIEF:

- Reinforces the units (offshore and onshore), and specifically:
  - the SUPPLY UNIT to manage the local, regional and international assistance,
  - the FACILITIES unit, and GROUND SUPPORT UNITS for the shoreline response.
- Activates fully the SERVICE BRANCH to support shore operations, with:
  - COM' & IT UNIT;
  - MEDICAL UNIT;
  - FOOD UNIT.
- Request representatives of OSRL (and other major provider of assistance) to join the IMT to facilitate the mobilization and management of assistance.

FINANCE SECTION

▶ FINANCE SECTION CHIEF reinforces the units.

2.8 Organization for un-controlled blow-out

This level of mobilization is implemented for an uncontrolled blow-out situation and fully described in the TEP Liban BOCP (2019). Overall structure is similar to a Tier 3 organization (see previous section), and:

- Is expanded with new functions for blow-out, e.g. subsea monitoring…;
- Integrates the Blow-Out Local Task Force in the Operations section;
- Is reinforced at all levels;
- Is organized to sustain response over a long period.

This level of mobilization is achieved through a rapid and continuous escalation process including the steps described in the previous sections as transitions.

2.8.1 Organization overview

The complexity of the sub-sea response operations may warrant the set-up of a dedicated IMT for the subsea intervention, after few days, to coordinate all subsea operations, in liaison with the Local IC(s) for subsea operations.

Figure below illustrates such a possible organization with two IMT's.

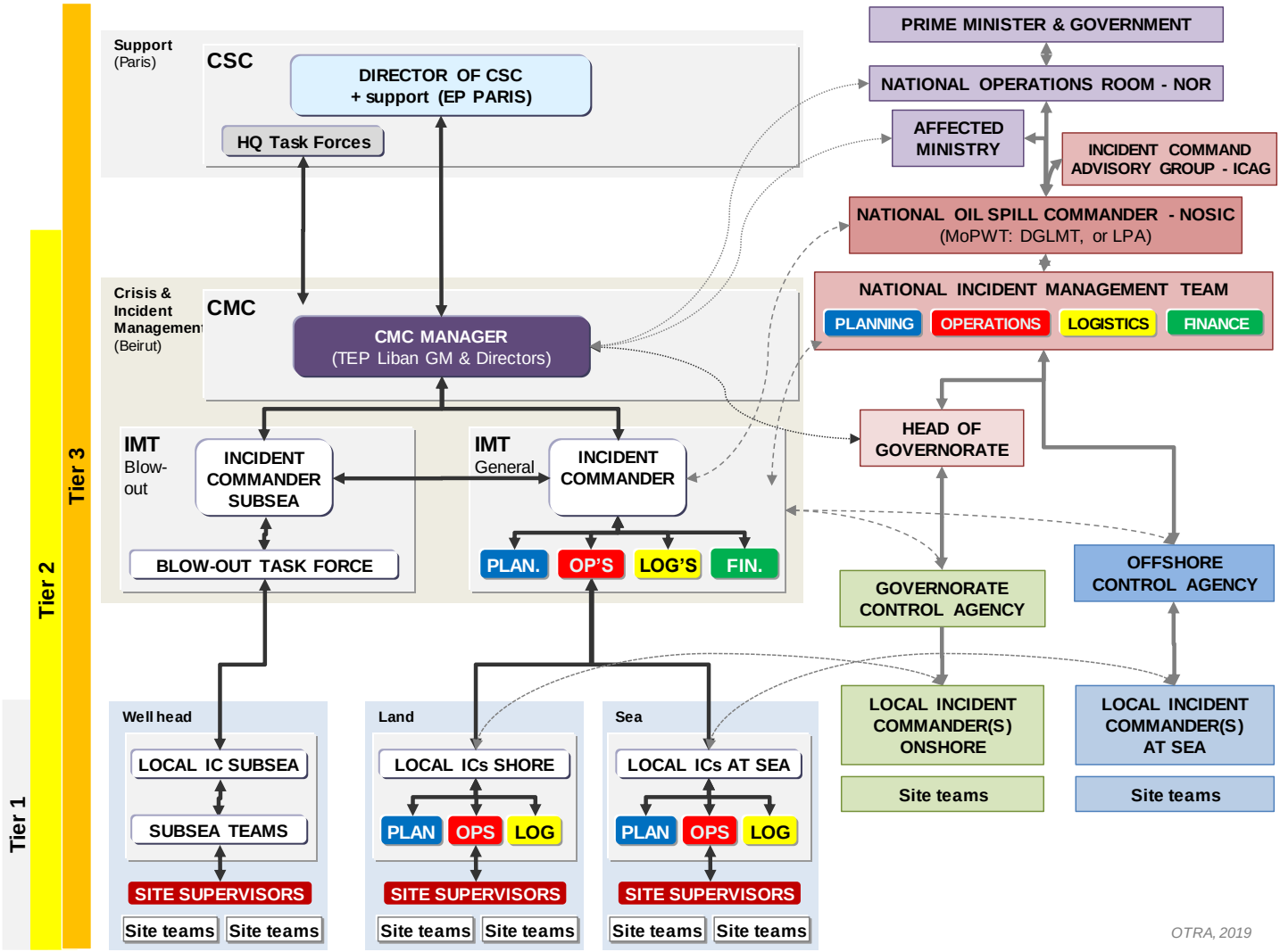


Figure 14: Possible TEP Liban organization with 2 IMT's for a complex blow-out with spill response offshore & onshore, and interfaces with authorities

2.8.2 Incident Management Team IMT (head office)

Figure below displays a possible IMT for blow-out and offshore/onshore response, including the blow-out response branch in the OPERATION SECTION.

As discussed in the previous section, the IMT may be split latter into a general emergency IMT (including oil spill management) and a specific IMT dedicated to subsea intervention and well control.

Units are managed by a Unit Leader assisted by a team. Some units are organized into “sub-units” with dedicated managers and teams. IMT will gradually expand, possibly to over a total of 100 personnel.

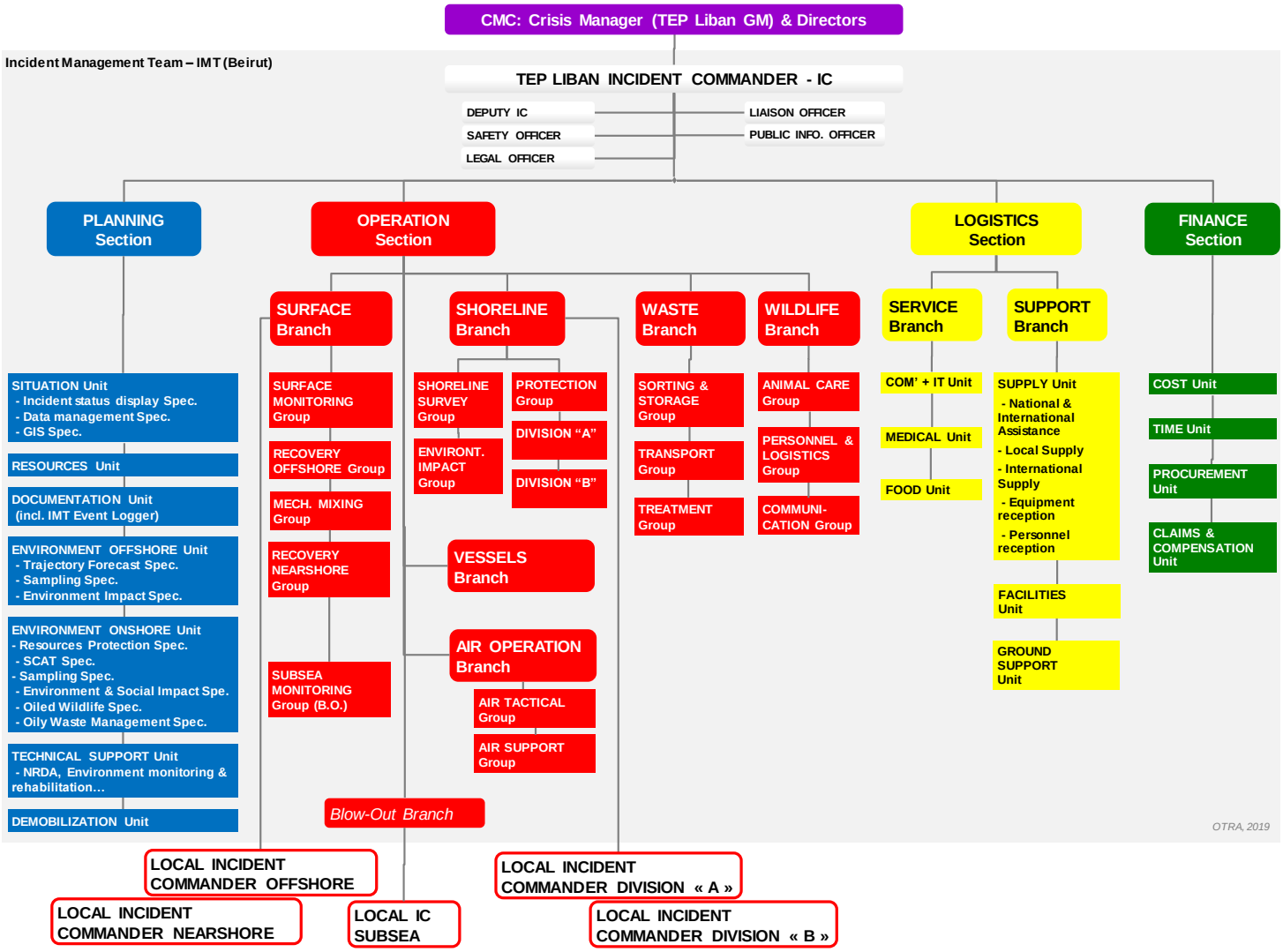


Figure 15: Possible IMT organization for a complex blow-out with spill response offshore & onshore

In addition to the functions mobilized for a Tier 3 spill (without blow-out), the following modifications are made:

PLANNING SECTION

▶ The PLANNING SECTION CHIEF:

- Reinforces the information management capabilities of the SITUATION UNIT (GIS, database, etc.) to include subsea information and coastal/ shoreline information on a large geographic area;
- Mobilizes subsea expertise to reinforce the ENVIRONMENT OFFSHORE UNIT: subsea monitoring/ sampling, subsea oil plume modelling, impact assessment, blow-out response alternative techniques etc.;
- Reinforces the ENVIRONMENT ONSHORE UNIT;
- Mobilizes experts for TECHNICAL SUPPORT UNIT as needed.

OPERATIONS SECTION

▶ The OPERATION SECTION CHIEF:

- Integrates initially the BLOW-OUT BRANCH;
- Integrates in the SURFACE BRANCH: SUBSEA MONITORING UNIT;
  - *Note. Oil blow-out flow rate evaluation and dispersant injection at the well head location are the responsibilities of the BLOW-OUT BRANCH and dealt with in BOCP of TEP Liban*.
- Reinforces units of the WASTE BRANCH as needed;
- Reinforces the VESSELS BRANCH and – critical – the AIR OPERATIONS BRANCH (monitoring, aerial surveillance, personnel transfer);
- Designates additional Local Incident Commanders as needed (subsea).

LOGISTICS SECTION

▶ The LOGISTICS SECTION CHIEF:

- Reinforces the units of the SUPPORT BRANCH and activates the SERVICE BRANCH if needed;
- Sets-up additional staging areas in airports and at sea as needed.

FINANCE SECTION

▶ FINANCE SECTION CHIEF:

- Reinforces the units.

2.9 Transboundary spill – Possible organization

Figure below illustrates the possible organization for a transboundary spill and interfaces (dotted lines) of:

- TEP Liban with Lebanese authorities according to the national organization;
- Lebanon authorities and other Mediterranean country (e.g. Cyprus),
  - directly and
  - through REMPEC (Emergency Protocol of the Barcelona Convention activated);
- An E.U. Mediterranean country, potentially affected, liaising with E.U. and EMSA (e.g. Cyprus here).

Figure is indicative, based on the best understanding of arrangements in place at the time of writing.

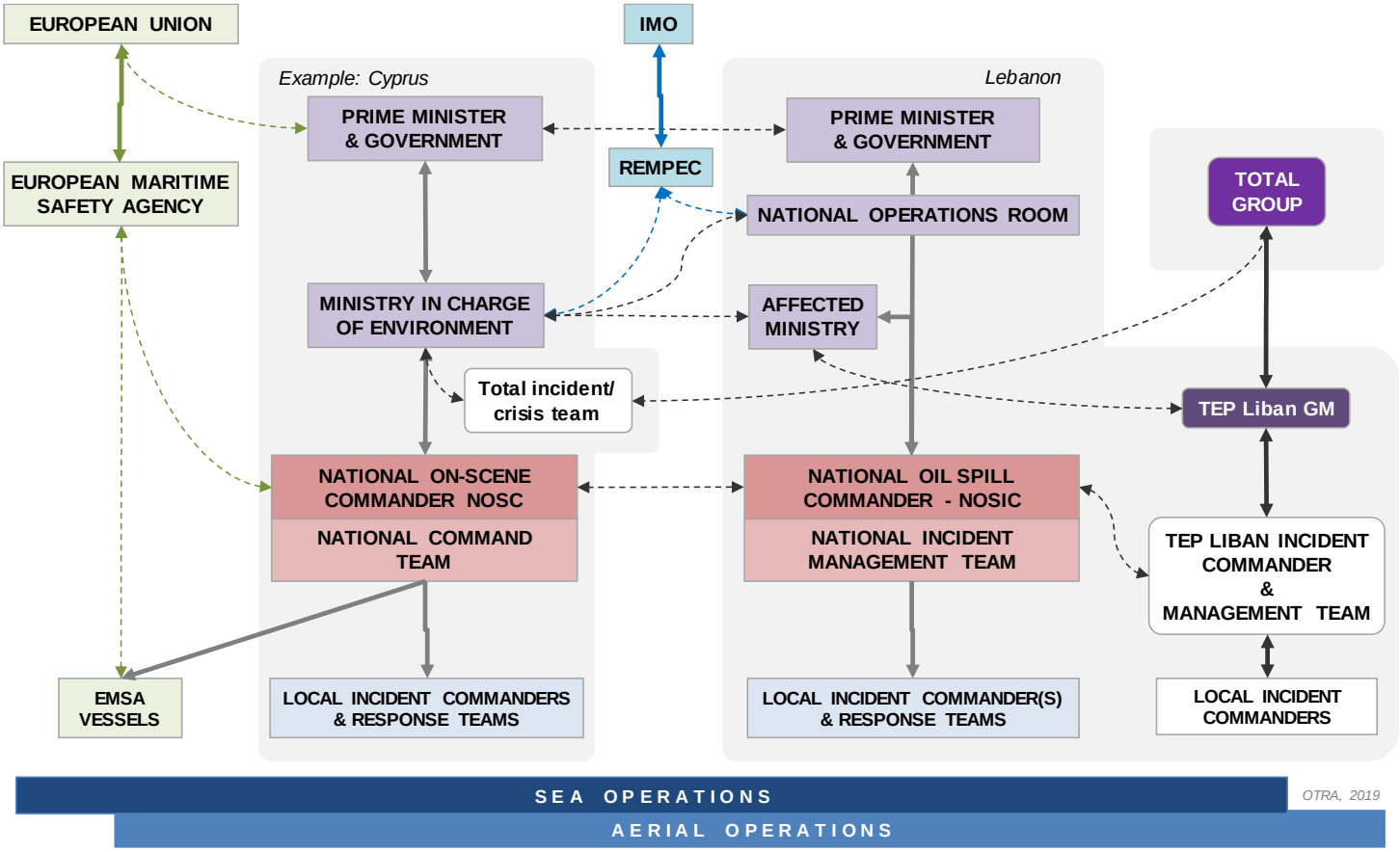


Figure 16 : Possible organization for transboundary spills

/!\ All proposed interfaces with TEP Liban and Total Group are to be confirmed; as there is currently no detailed organization in the NOSCP and conventions for the transboundary spill management involving O&G offshore exploration.

Total will provide assistance in the other countries as needed and requested.

/!\ The set-up by Total Group of specific incident/ crisis management organizations in other countries may be warranted. These organizations, not the responsibility of TEP Liban, are not covered in the present document.

3. IMMEDIATE ACTIONS

3.1 IMT immediate actions – Quick reference

Table below lists the IMT immediate responsibilities to initiate the first day(s) response for Tier 2 and 3 spills (mainly offshore – main risk for TEP Liban) in addition to the set-up of a robust incident management system.

	TIER 2	ADDITIONAL FOR TIER 3 / BLOW-OUT
INCIDENT COMMANDER	- Risk assessment expedited. Health & Safety ensured on site. - Validate initial response on site & provide support to site. - Confirm the incident level, initial evaluation & need for TEP Liban full OSCP activation. - Define the initial incident objectives. - Validate response & monitoring tactics for the current day. - Ensure notification of authorities + contractors + partners + Total + assistance in country. - Request response & monitoring tactics for next day(s) in an Incident Action Plan. - Coordinate incident management & scale up the IMT.	- Request immediate support personnel. - Mobilize additional resources (Total H.Q., OSRL, etc.). - Air monitoring for Health & Safety.
PLANNING SECTION	- Provide to the IC: initial evaluation of the spill (location, volume, product, Tier level) and of health & safety risks. - Set-up & update regularly the Incident Situation Board with consolidated information. - Confirm initial monitoring & response tactics on site is adequate or propose alternative. - Ensure ARGOS buoys are launched + request aerial surveillance + ask oil sampling - as needed. - Provide initial predictions (drift & behaviour). - Activate SPILLWATCH service (Total H.Q.). - Request advice and WebGIS mapping from Total H.Q. - Identify PEARL impacts: P, E & A (R & L by the CMC). - Advise Operations section on the strategy for the next days. - Develop a full monitoring & prediction plan for the next days. - Consolidate the Incident Action Plan document for next day. - Prepare notification forms to authorities & send once approved + Daily situation report (by end of day). - Keep track of all incident resources available to TEP Liban (personnel, equipment & support). - Consolidate the list of external resources to mobilize immediately based on the approved tactics.	- Activate OilMap from OSRL. - Consider activating other models (e.g. MOTHY from MétéoFrance…). - Prepare subsea monitoring. - Request immediate support personnel. - Collect ROV video imagery of blow-out and request estimation of flow rate (Blow-Out Local Task Force). - Request continuous air quality monitoring for the tactical zoning.
OPERATION SECTION	- Be the main contact point with the Local IC. - Provide immediate support to the site. - Confirm/ Define tactics and zoning for the current day. After IC approval, mobilize available TEP Liban resources (personnel, vessels, equipment etc. to rig) + other if available. - Provide regular information to the IMT about situation, conditions & on-going operations on site + weather predictions.	- Set-up mechanisms & personnel to prepare and coordinate aerial operations (surveillance, personnel transfer). - Ask for control of aerial & maritime traffic + flight authorization for surveillance. - Request immediate support personnel.

	- Define tactical plan and zoning for the next day(s), with needed resources. - Designate Local IC + personnel on site for the next day(s) to coordinate operations (and set-up communication channel if needed). - Define escalating organization and personnel on site for the next days. - Coordinate the implementation of response & monitoring operations on site in liaison with the Local IC(s) + transfer of additional resources to the response site.	- Define tactical zoning with operational constraints and results of air quality monitoring.
LOGISTICS SECTION	- Be the main contact point with assistance providers. - Identify assistance providers in country. - Call & notify assistance providers in country and request their capabilities. - Call & notify local contractors as needed (additional vessel, management of recovered oil etc.). - Mobilizes personnel to assist on site & to reinforce IMT. - Set-up a tracking system to follow-up the mobilization of resources.	- Call OSRL & Send OSRL Notification form. - Send OSRL Mobilization authorization form. - Mobilize the 5x5 OSRL personnel (5 personnel free of charge for the first 5 days). - Mobilize OSRL (or other) equipment + personnel as needed. - Identify assistance providers in region. - Set-up staging areas for resources as needed. - Identify available vessels in the region with the given specifications. - Identify additional aircrafts (surveillance). - Request immediate support personnel.
FINANCE SECTION	- Check Terms & Conditions of assistance agreements and of local contracts. - Set-up a tracking system to track the time &/or quantity used of the mobilized external resources. - Ensure availability of cash & set-up of rapid payment procedures. - Estimate cost of initial response (first days to first week).	- Check Terms & Conditions of OSRL contracts (SLA & Supplementary agreements). - Check Terms & Conditions of contracts with other local, regional & international contractors. - Request immediate support personnel. - Manage separately SLA & Supplementary Agreement contracts.

The immediate actions are detailed in the next sections (focusing on offshore spill from the drilling unit):

1 **Alert and initial assessment.**

2 **Immediate assistance to the site.**

3 **OSCP Activation, IMT mobilization & internal notification.**

4 **Health & safety in the vicinity of the spill.**

5 **Notification of authorities and Total H.Q.**

6 **Notification of assistance and mobilization authorization.**

Incident Action Planning cycle and incident management are described in the section 4 “MANAGEMENT”.

3.2 Alert and initial assessment – Spill on the drilling unit

▶ **The RSES** (on the drilling unit):

- Carries out initial actions as per
  - 🗎 *TEP Liban OSCP Vol. 1.2 "Action Plan for the Drilling Unit"*.
- Alerts immediately by phone, whatever the origin and magnitude of spill, his hierarchy (drilling superintendent or other) and the TEP Liban Duty Officer - DO[10]; and informs them of any risks and specific Health & Safety risks, safe-guarding measures in place or needed.
- Completes the TEP Liban Internal Spill Notification form with best available information.
- Sends as soon as possible the notification to the DO and hierarchy, even if information is missing.
- When applicable:
  - cross-checks the notification information with the Master of the Drilling unit; to ensure he reports similarly the incident to the maritime authorities (and with the OIM who reports to the drilling company).
  - Requests a copy of the notification sent by the Master.

▶ **The TEP Liban Duty Officer,** with the site, collects further information to consolidate the notification form:

- Source of incident ? Risk of escalation?
- Nature of spilled hydrocarbon?
- Safety measures in place?
- Exclusion zone in place?
- Risk for close vessels? Assets?
- Response on-going? Planned?
- Source controlled: volume spilled?
- Source continuous: flow rate & spilled volume at instant « t »?
- Direction and speed of wind and of current?
- Observed drift of the slicks?
- Observed behaviour of oil(at sea/ on land)?

▶ **The TEP Liban Duty Officer** also requests a copy of the notification sent to the Authorities by the captain in case of spill from a close PSV[11].

3.3 Immediate assistance to the site

▶ **Operations Manager** ensures that immediate assistance is provided to the site as needed (aerial surveillance, technical advice, etc.).

3.4 OSCP Activation, IMT mobilization & TEP Liban notification

The general alert procedure is defined in the ERP of TEP Liban. Oil spill specific actions are described below.

▶ **The TEP Liban Duty Officer**:

- Forwards the incident notification & latest spill information to the Operations Manager and HSE Manager.

▶ **HSE Manager**:

- Consolidates incident facts and confirms the Tier level to the Operations Manager.
- Follows the immediate response on site and advises the Operations Manager on:
  - adequate tactics, air quality monitoring and aerial surveillance;

[10] Drilling superintendent should be designated as Duty Officer for most of the drilling campaign.

[11] In case of spill at the Logistics base, the DO requests a copy of the notification from the Logistics base manager.

  - the need to activate the OSCP;
  - the adequate level of TEP Liban mobilization.
- Prepares the POLREP notification form for the authorities based on the Internal notification form received from the site (see below: “Notification of authorities and Total H.Q.”).
- Informs Total/ PSR/ HSE/ GCA and request the activation of SPILLWATCH (compulsory for Tier 2 & 3).

▶ **Operations Manager**:

- Follows the immediate response on site and gains a full understanding of the incident, risks and initial on-going operations on site.
- Activates if needed the TEP Liban OSCP Vol. 1.1 Action Plan (present document) and affiliate ERP; and:
  - Requests the Duty Officer to mobilize the IMT and assumes the position of Incident Commander,
  - Informs the RSES of the TEP Liban OSCP and ERP activation, confirms the RSES is the Local IC, and provides him the name of the Operations section chief, IMT contact point for the RSES.
- Informs the TEP Liban GM of incident facts, Tier levels, first actions and OSCP activation.

▶ **General Manager**:

- Approves the activation of the TEP Liban OSCP.
- Assumes the position of TEP Liban Crisis Manager, mobilizes and leads the CMC.

3.5 Health & safety in the vicinity of the spill

▶ **RSES**:

- Identifies current and possible risks for Health & Safety of personnel on site and responders;
- Ensures that all vessels and personnel in the vicinity of the spill are informed of the incident and specific measures in place, e.g. vessels to avoid the slick and/ or cloud of vapour/ gas.
- Ensures that adequate:
  - Air quality monitoring is implemented on site (explosivity, VOC/BTEX, H2S etc.);
  - Initial Health & Safety measures are implemented on site (exclusion zone, PPE etc.).

▶ **HSE manager:**

- Ensure adequate health & safety measures are enforced on site.
- If needed, provides guidance on Health & Safety measures and monitoring to implement.

▶ **Operations manager** for Tier 2/ 3 spill at sea (after or with notification of authorities – see below):

- Ensure instructions are broadcasted to all TEP Liban chartered vessels to avoid the incident area.
- Requests JMOC and/ or Port authorities, to broadcast a Notice to Mariners (or similar) for all vessels to avoid the slick, considering its current location and expected drift for the next 6-12 hours.

Later, the PLANNING SECTION advises on the need:

- for JMOC and/ or Port Authorities, to update the Notice To Mariners (with forecasted drifts);
- for a fishing ban, or to stop/ relocate activities that can be directly affected by the spill;
- to limit and control the access to some coastal areas where oil groundings may be expected.

3.6 Notification of authorities and Total H.Q.

/!\ GM authorizes all initial external contacts for Tier 2 & 3 spills.

Principles (adapted from Section 4.1 "Notification and activation" of the NOSCP 2017, Ver. 1, Vol A):

- Any oil spill in port and marine waters should be reported immediately to the JMOC **irrespective of the quantity spilled** (as per NOSCP 2017).
- TEP Liban reports any spill caused by drilling activity in Block 4 and of unknown origin close to the rig.
  - JMOC is first alerted by phone. POLREP form (NOSCP 2017, Vol. D, Annex 3) is sent as soon as possible, with the best available information. The notification process of authorities is presented in the figure below. JMOC is the operational focal point for spills in water, which cascades the notification to other agencies as needed.
  - JMOC forwards the alert to the DGLMT, MoE and affected ministry (i.e. LPA in case of a spill from the drilling unit). They will assess the situation, assign the Tier Level, decide of the activation of the NOSCP, mobilization of the NOSIC, national incident management organization and ICAG.
- Any type of spill (at-sea, port and land) is reported by TEP Liban notifies to LPA.
- The captain of PSV reports spills from a PSV to the JMOC. The Logistics base operator reports spills to the JMOC and Beirut Port Authorities. TEP Liban informs the LPA, based on the information received.

External contacts are in:

Operational Support n°12, section "National emergency contacts for notification".

Internal notification and POLREP forms are in:

Operational Support n°13: section "Forms".

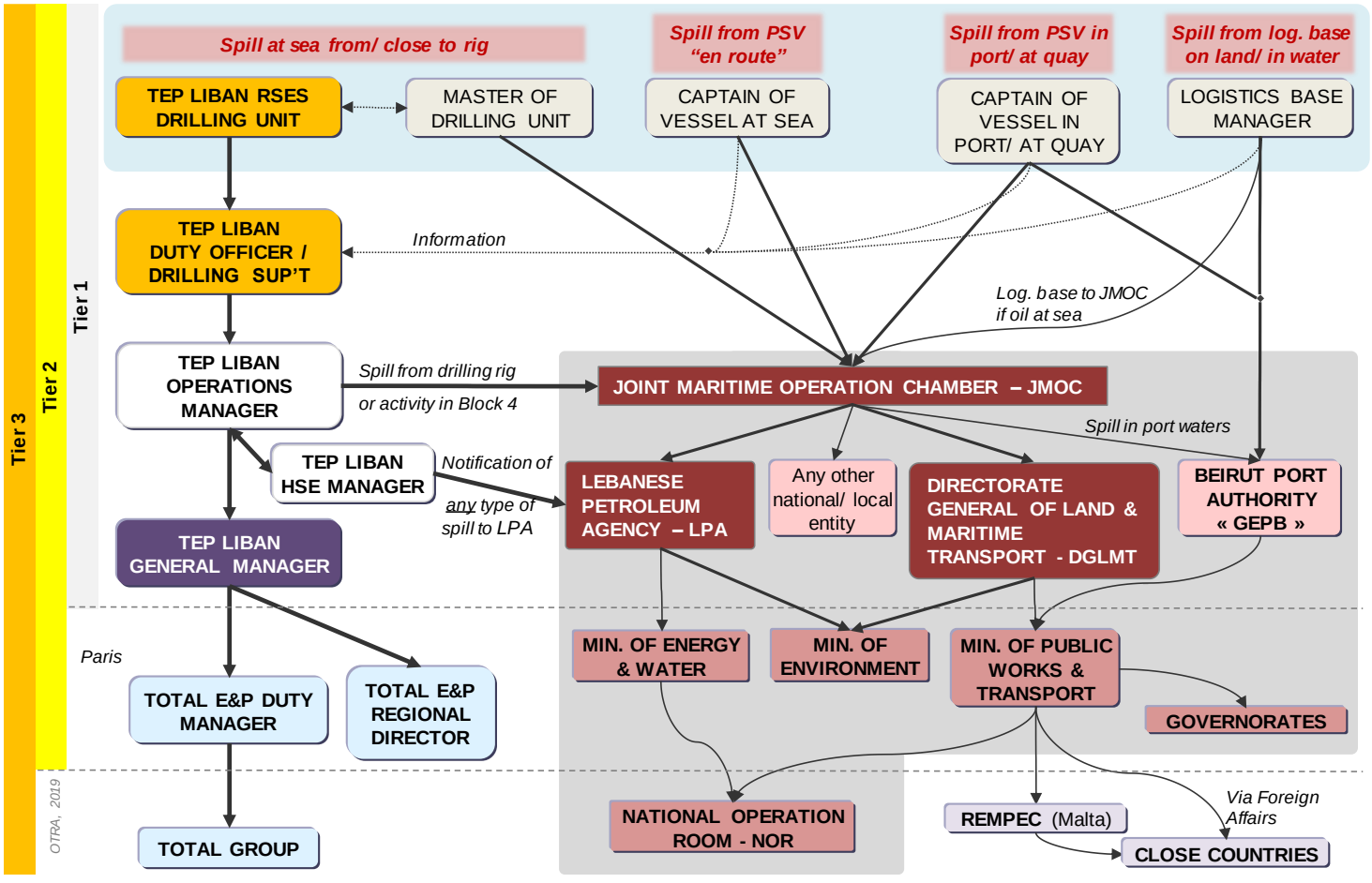


Figure 17 : TEP Liban oil spill alert and notification procedure

FOR A SPILL FROM/ CLOSE TO THE DRILLING UNIT

▶ **Operations Manager**:

- Receives the alert from the Duty Officer and consults the HSE Manager.
- Requests approval of the GM to make external contacts for Tier 2 or 3 spills (pre-approved for Tier 1).
- Defines the responsibility of TEP Liban for the initial notification, depending on spill origin and location.
- Agrees on key information to disclose to authorities, in consultation with the HSE Manager.

▶ **TEP Liban person designated by the Operations Manager** (himself, HSE Manager, LIAISON OFFICER, other) calls the JMOC to inform of the incident and that the POLREP form will be sent as soon as possible.

▶ **HSE Manager**:

- Advises the Operation Manager for the notification, depending on spill origin, and risk of groundings depending on MetOcean conditions.
- Informs (phone call) the LPA about the spill.
- Prepares the POLREP notification form, to be validated by the Operations Manager (any spill) and by the GM (Tier 2 & 3 spills).
- **Ensure the notification form is sent to JMOC and LPA as soon as possible for spills over 1 bbl** (and within 24 hrs if spill < 1 bbl).
- Ensures that the notification form is received and understood by the JMOC and LPA.

Note. For other spills, HSE Manager checks the information and notification form sent to the authorities.

▶ **General Manager**:

- Approves the spill notification form before sending (for Tier 2 & 3).
- Calls Total E&P Duty Manager.
- Informs the partners of TEP Liban about the incident.
- May call competent ministries or directors of national agencies depending on type & level of incident, to:
  - Ensure notification has been forwarded by JMOC;
  - Request information on the activation of the National OSCP and current mobilization.

FOR OTHER SPILLS : PSV, LOGISTICS BASE, LAND…

▶ **Operations Manager**:

- Receives the alert from the Duty Officer and consults the HSE Manager.

▶ **HSE Manager**:

- Informs (phone call) the LPA about the spill.
- Collects further information from the site: status of incident and first response measures, possible ned for assistance etc. and a copy of the notification form sent by the site to JMOC or other authority.
- Sends, for information, a POLREP notification form (validated by the Operations Manager - any spill, and by the GM - Tier 2 & 3 spills) **to LPA as soon as possible for spills over 1 bbl** (and within 24 hrs if spill < 1 bbl).

The notification and activation process of authorities' is presented in the figure next page.

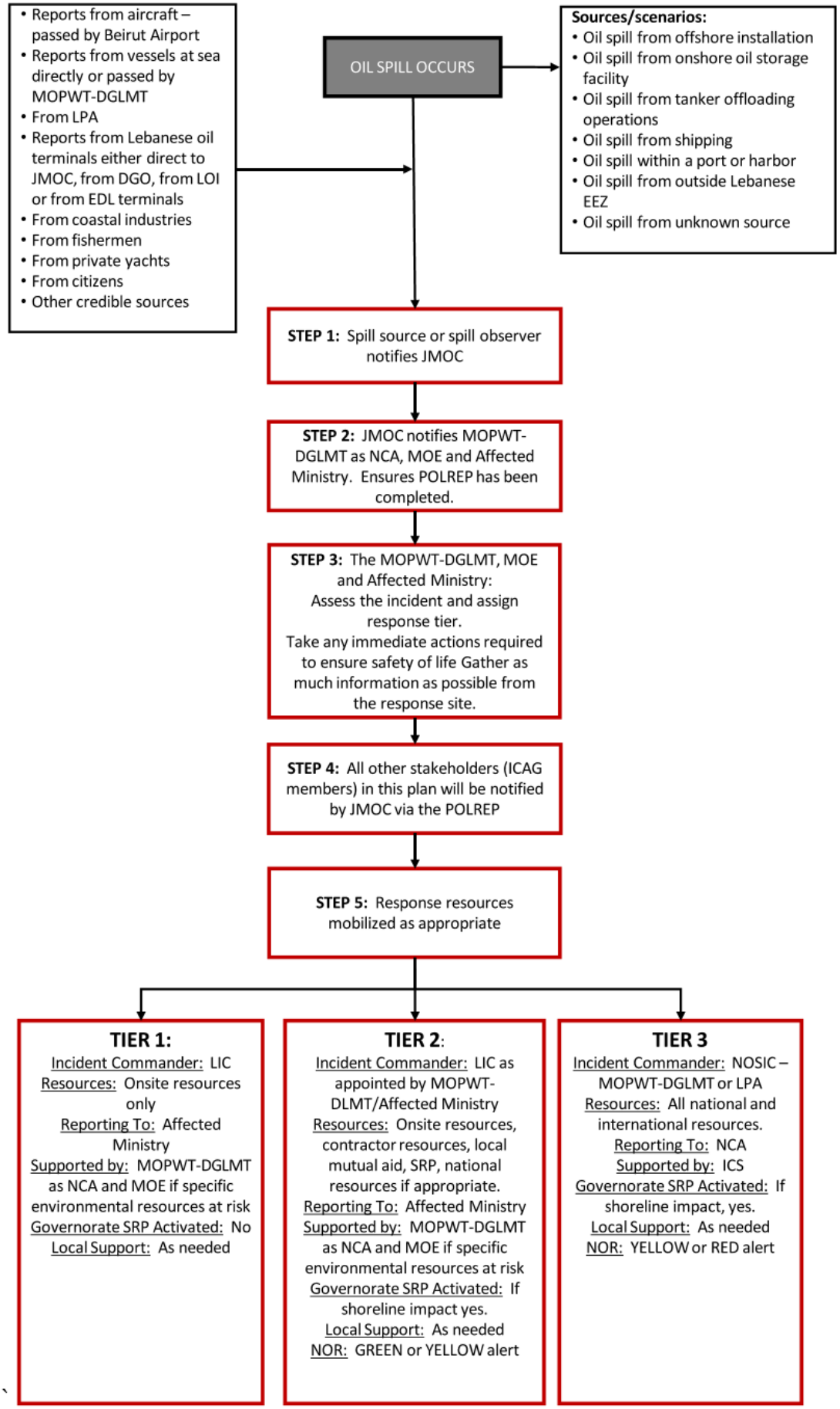


Figure 18 : Lebanon oil spill notification and activation process (Extract from NOSCP, Vol A, Section 4.1 "Notification and activation")

3.7 Notification of assistance & Mobilization authorization

/!\ GM authorizes all initial external contacts for Tier 2 & 3 spills.

/!\ The Incident Commander approves the assistance providers to contact and information to disclose.

Mobilization of assistance is an escalating process:

Tier 2 Resources in country (& close countries)	• Assistance of oil industry in Lebanon; • Local specialized companies, land-maritime-aerial transport company, vessel charterer; • Logistical support company, public works company, waste treatment company etc. • Option: Total E&P Cyprus

Tier 3 International resources	• Total Group support;
	• OSRL (Southampton) through 2 agreements:
	  ○ Service Level Agreement SLA to access oil spill response resources at sea, on shore, port and inland;
	  ○ Supplementary Agreement to access Subsea Well Intervention Service SWIS (blow-out).
	• Cedre, French organization specialized in oil spill and HNS incident (agreement with Total);
	• Ship and aircrafts brokers;
	• International freight forwarders;
	• Specialized oil spill response companies etc.

The present section describes the notification and activation/ mobilization authorization (when applicable) of assistance providers mainly with agreements in place with Total.

The mobilization process (after notification and mobilization authorization) is outlined in:

🗎 *"Mobilization of external assistance in Lebanon", p.59.*

Assistance for offshore response is detailed in:

🗎 *Operational Support n°4 "OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES, AND COORDINATION"*.

3.7.1 TEP Liban Call-Out Authorities – COA

TEP Liban Call-Out Authorities (personnel authorized to sign the OSRL Mobilization Authorization and mobilize other assistance with and without agreements in place) are:

- **General Manager;**
- **Operations Manager;**
- **HSE Manager.**

3.7.2 Assistance of in-country oil industry

TEP Liban may request the assistance of the in-country oil industry (Total Liban M&S, oil storage, other as available).

u LOGISTICS SECTION informs the in-country oil industry of the incident and possible mobilization, and requests information on their current capabilities and constraints that may delay rendering of assistance.

3.7.3 Assistance of Total E&P Cyprus

TEP Liban may request the assistance of TEP Cyprus, by establishing direct contact with TEPCY first.

TEP Cyprus (involved in offshore drilling project) has a small team in Nicosia, Cyprus.

Limassol port in Cyprus is 245 km, 132 NM, from Beirut port (approximately 12hrs sailing for a PSV or tug).

3.7.4 Total Group support

Notification and mobilization of HQ spill response technical assistance (Contacts in Total E&P Emergency booklet or "Livret d'urgence"). Assistance includes:

- Satellite RADAR imagery and forecast service (SPILLWATCH);
- Surface and subsea monitoring plan & tools: blow-out flow rate estimation, oil tracking in water column;
- Environmental Monitoring Plan;
- GIS and web mapping service, integrating SPILLWATCH;
- Guidance on response strategy, day to day tactics, type and level of resources to mobilize, etc.

▶ PLANNING SECTION :

- Notifies HQ spill response experts who will mobilize the Oil Spill Support Cell - OSSC – Tier 2 & 3.
- Requests availability of Total experts to support the PLANNING SECTION in Lebanon – Tier 3.

Activation of SPILLWATCH service

▶ PLANNING SECTION activates SPILLWATCH (compulsory for Tier 2 or 3) through HQ spill response experts.

- Procedure: 🗎 *Operational Support n°6, section "Instructions for SPILLWATCH Activation"*.
- Form: 🗎 *Operational Support n°13, section 1.4 "SPILLWATCH Activation form".*

Notification and mobilization of FOST

▶ LOGISTICS SECTION sends the FOST mobilization request form (signed by a Call-Out Authority) if FOST mobilization is required.

- Form: 🗎 *Operational Support n°13, section "FOST mobilization request"*.
- *Note. OSRL notification form is sent to FOST to provide information*.

Notification and mobilization request of response resources and logistical support

▶ LOGISTICS SECTION calls the Total Oil Spill Support Cell (OSSC) to request:

- Support for the mobilization of external resources and transport to Lebanon – Tier 2 & 3.
- Support for the mobilization of vessels and aircrafts as needed.

3.7.5 OSRL

/!\ Use only English for all phone calls, mail, contracts etc. with OSRL.

Information about advice from OSRL is in:

ⓘ *File « tis-techadvisoryservice.pdf » in …\ Vol Ops Support \ OSRL Equipment & Mob Plan*

Notification and Mobilization authorization forms are in:

🗎 *Operational Support n°13: section "FORMS"*.

🛈 *WORD File « osrl-oper-for-00173-notification-form.doc » in …\ Vol Ops Support\ OSRL Forms*

▶ LOGISTICS SECTION informs OSRL Duty Manager of the incident (by phone) and possible mobilization; and requests availability of services.

Southampton, UK: +44 (0)23 8033 1551

▶ LOGISTICS SECTION sends the "OSRL Notification form" to OSRL, even incomplete (copy to DG/PSR/HSE/GCA).

- Form is signed by the Incident Commander (or deputy).
- *Note. For blow-out, the notification form is common for surface spill and blow-out*.

▶ LOGISTICS SECTION sends the "Mobilisation Authorization Form" to OSRL (copy to Total EP/DSO/LSO and DG/PSR/HSE/GCA, see contacts in this year's latest edition of "Livret de l'Urgence de l'EP").

- Form has a specific P.O. number for the mobilization of surface resources (OSRL Service Level Agreement – SLA terms & conditions).
- Form is signed by a TEP Liban Call Out Authority.
- Do not delay sending the form. Equipment is specified in a next step (mail).

/! In case of blow-out requiring activation of SLA and Supplementary Agreement:

- One notification call is made to OSRL and one Notification form sent.
- One Mobilization authorization form is sent to OSRL with:
  - A PO number for surface resources (invoicing with SLA);
  - Another PO number for SWIS (invoicing with Supplementary Agreement).

Note. Additional blow-out forms, prepared by the Blow-out Local Task Force, signed by a Call-Out Authority, are sent to OSRL:

- *"Subsea Well Response Equipment Identification and Configuration Form";*
- *"ATTACHMENT 6 - Form of Deployment Indemnity"*.

3.7.6 Cedre

▶ PLANNING SECTION may call Cedre to request advice and availability of experts.

Tel: +33 2 98 33 10 10

▶ LOGISTICS SECTION sends the "Mobilization of Cedre" form (signed by a Call-Out Authority) upon request of the PLANNING SECTION.

Form in:

🗎 *Operational Support n°13: section "FORMS"*.

3.7.7 Other assistance providers – Without agreements in place

To mobilize assistance without pre-existing agreements (local contractors, regional/ international contractors, etc.), specific contracts are required.

▶ LOGISTICS SECTION informs the potential assistance providers of the incident and possible mobilization, and requests information on their current capabilities and constraints that may delay rendering of assistance.

u LOGISTICS SECTION requests information on possible contract arrangements, specific terms & conditions, rates and invoicing process.

► FINANCE SECTION reviews terms & conditions proposed.

4. INCIDENT MANAGEMENT

Incident management process and steps for oil spill are in line with the TEP Liban ERP and with international guidelines for Incident Management System – IMS [12],

Terminology reminder:

[Adapted from National Incident Management System, Third Edition, October 2017, FEMA]

OBJECTIVES	What must be accomplished based on best knowledge of the current situation, observed and potential impacts and available resources (including assistance). E.g. Mid- to long- term validity (week to few weeks).	Incident Commander
STRATEGIES	General plan of action to achieve one or more objectives, and description of actions and resources required. E.g. Mid-term validity (few days to few weeks).	OPERATIONS SECTION with advice of PLANNING SECTION
TACTICS	Define how actions are performed to implement a strategy: who, where, when, how, with what? E.g. Short-term validity (24 hrs to few days).	OPERATIONS SECTION
INCIDENT ACTION PLAN IAP	Written document defining objectives, strategies, tactics, allocating tasks and resources, etc. E.g. Short-term validity (24 hrs usually).	PLANNING SECTION

Strategies should (Source : FEMA Incident Action Planning Guide, Jan. 2012):

- Be feasible, practical, suitable, and likely to achieve the desired outcome;
- Meet acceptable safety norms;
- Be cost effective;
- Reflect sound environmental practices;
- Consider political implications.

4.1 Incident Action Planning general process

(Adapted from National Incident Management System, Third Edition, October 2017, FEMA)

The incident action planning process and IAP document are central to managing incidents, synchronizing operations and ensuring that they support incident objectives.

A clear and concise IAP document is developed for each operational period (usually 24 hrs for oil spill) to:

- Inform of the incident objectives, strategies and tactics for the coming days;
- inform of the actions planned for the operational period, and of other operational information (e.g. weather, constraints, limitations etc.);
- Identify work assignments;
- Inform of the overall organization and designated personnel for each position.

[12] *- Guidance document on the implementation of an Incident Management system (IMS), IMO, 2012*
- Incident management system for the oil and gas industry. Good practice guidelines for incident management and emergency response personnel, IPIECA/OGP, 2014
- Incident Management Handbook, OSRL Limited, 2012

Initial IAP for the first day is summarized in a short document (E-mail), confirmed in the **ICS Form 201— Incident Briefing** (detailed next section) and communicated to all.

The IAP for the next day is also captured in the ICS 201 Form. A set of more detailed forms are used for larger/ more complex incidents (detailed after).

Note. Similar ICS form 201 is used in the NOSCP 2017 Ver. 1 (Vol. D, Annex 3).

The management starts with the initial reaction (alert to initial briefing and actions). The **operational planning cycle** for oil is then based on a period of usually 24 hrs including:

- Implementation on site of the approved IAP (produced day before);
- Preparation of the IAP for the next day and approval;
- Preparation, logistics & refuelling/ replenishment etc. for next day during the night.

The steps below[13] can be used as guidance for large incident. For intermediate incident (Tier 2), the process can be simplified, e.g. tactics and planning meetings merged.

/!\ It is critical that the IMT simultaneously coordinates on-going operations and plans for the next days.

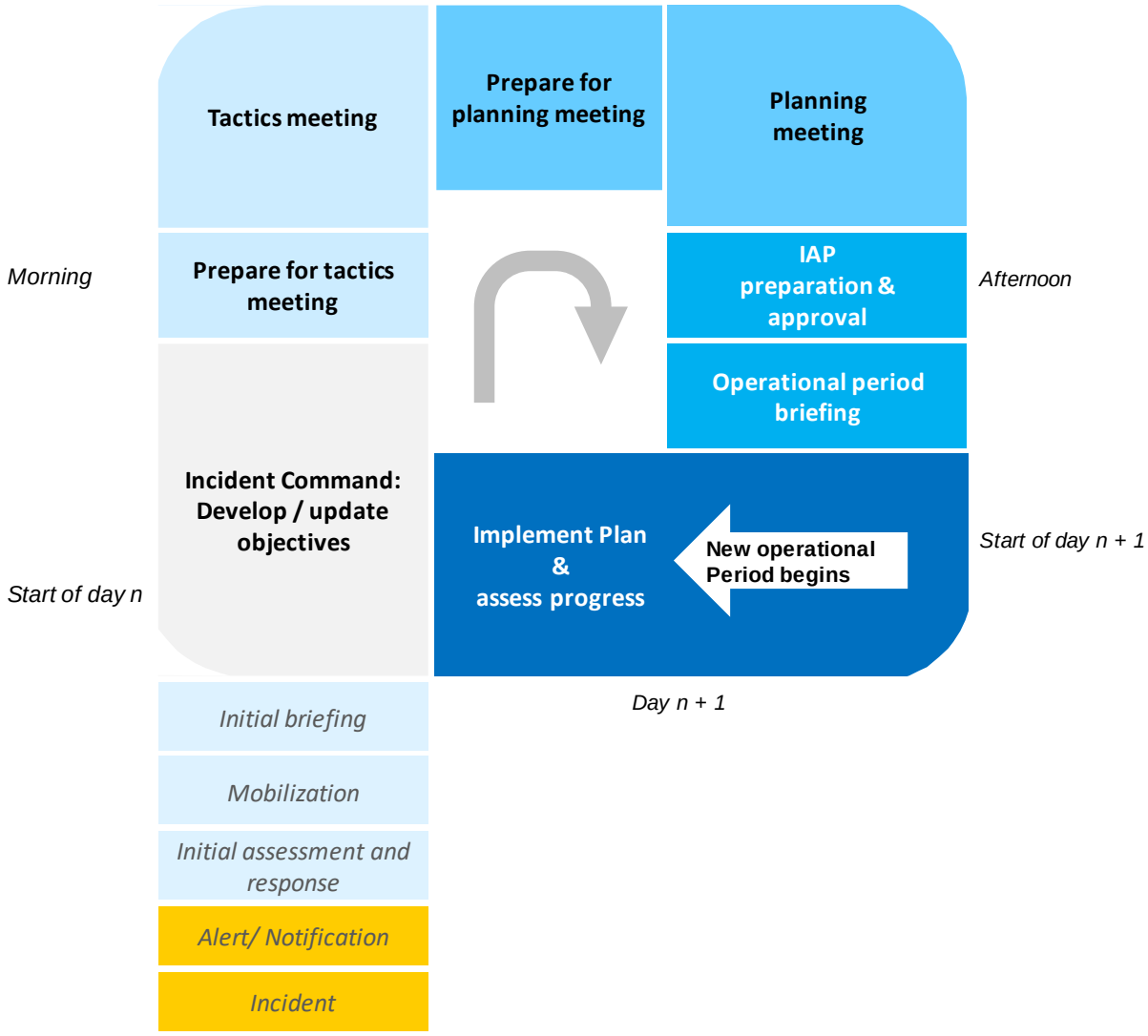


Figure 19 : Incident Action Planning cycle (24 hrs)

[13] Adapted from "National Incident Management System", Third Edition, October 2017, FEMA and "FEMA Incident Action Planning Guide", January 2012, FEMA

DEVELOP/ UPDATE OBJECTIVES – *What do we want to achieve?*	
- Define or review incident objectives for the operational period. Note. Planning Section to provide predictions and propose objectives (PEARL).	INCIDENT COMMANDER
PREPARE FOR TACTICS MEETING	
- Develop strategies, tactics for the next operational period and define the resources needed (for the next days). Note. Planning Section to provide status of resources and propose alternative strategies if applicable.	OPERATIONS SECTION CHIEF + staff
TACTICS MEETING – *What tactics, actions & resources to reach objectives?*	
- Review the proposed tactics developed by Operations Section and plan the assignment of resources. Possible use of ICS forms: - 215 Operational Planning Worksheet - 215a Incident Action Plan Safety Analysis	OPERATIONS SECTION CHIEF + LOGISTICS SECTION CHIEF + PLANNING SECTION CHIEF, + SAFETY OFFICER, + RESOURCES UNIT + other as needed.
PREPARE FOR PLANNING MEETING	
- Identify logistical support needs and assign specific operational resources to accomplish the proposed plan.	Collaborative work: PLANNING, OPERATIONS & LOGISTICS SECTIONS
PLANNING MEETING – *How to implement tactics? Task assignment?*	
- Final review and approval of operational plans and resource assignments developed during the Tactics Meeting (to build the IAP).	IC + section chiefs as needed
INCIDENT ACTION PLAN – IAP, PREPARATION & APPROVAL	
- Approval of the IAP and confirmation of structure and content.	IC
- Finalization & assembly of the IAP. - Reproduction and dissemination of the IAP.	PLANNING SECTION
OPERATIONAL PERIOD BRIEFING – *Communicate instructions to all.*	
- Presentation of the incident objectives, current situation, tactics and information related to communications or safety.	IC
- Local IC's & Supervisors brief personnel on their respective assignments as per the IAP.	Local IC's

4.2 Incident Action Planning for oil spill

Oil spill IAP addresses impacts on People, Environment, Activities (of TEP Liban) and other usage and activities. The IAP, integrated in the general IAP in case of multiple incidents, is the product of a collaborative work between all IMT sections, carried out in logical steps outlined below. A summary table to manage these steps is proposed next page.

SITUATION & FACTS	Facts are provided by the personnel on site and survey teams to the OPERATIONS SECTION, consolidated and displayed in the IMT by the PLANNING SECTION to build a "Common Operating Picture".
ASSESSMENT & PREDICTIONS	PLANNING SECTION analyses the situation, estimates the Tier level, provides the first predictions (coming hours to 24 hours) and cross-checks predictions versus latest observations.
IMPACTS IMMEDIATE & POSSIBLE	PLANNING SECTION identifies the immediate impacts (focusing initially on Health & Safety) then, with the predictions, the possible impacts (later and/ or further away) using P E A approach.
STAKEHOLDER MAPPING	For the IMT, stakeholder mapping is the organization charts of the IMT, all site teams, CMC, and links with Total H.Q., and interfaces with authorities, assistance providers and all external stakeholders involved incident management. *Note. CMC carries out a comprehensive "stakeholder mapping" involving all crisis issues*.
RESPONSE OBJECTIVES	PLANNING SECTION proposes response objectives to the IC for approval, considering the immediate and possible impacts. The approved objectives will drive the response strategy.
STRATEGIES	The OPERATIONS SECTION, in collaboration with the PLANNING SECTION, elaborates the response strategy. The PLANNING SECTION develops the monitoring & prediction "strategy"; and ensures that the overall strategy complies with regulations and does not create additional damage (Spill Impact Mitigation Assessment SIMA).
TACTICS	After the strategy is approved, the OPERATIONS SECTION elaborates the response daily tactics. Resources needed are listed by the PLANNING SECTION. Items are submitted for approval to the IC.
INCIDENT ACTION PLAN	The PLANNING SECTION writes the document of the Incident Action Plan with support from the other IMT sections; and submits the document to the IC.

Tactics (offshore and onshore) that may be implemented are detailed in the Operational Supports:

- *N°4 "OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES, AND COORDINATION"*
- *N°7 "SHORELINE SPILL SURVEY & RESPONSE STRATEGIES, AND COORDINATION"*

Incident Action Plans addressing impacts on reputation, potential liabilities etc. are dealt with by the CMC (Crisis communication plan, business continuity plan, financial exposure plan etc.).

Table 1 : Logical process to develop an Incident Action Plan for oil spill (including FISA)

SITUATION & FACTS	ASSESSMENT & PREDICTIONS	IMPACTS IMMEDIATE & POSSIBLE	STAKEHOLDER MAPPING	RESPONSE OBJECTIVES	STRATEGIES PER OBJECTIVES	TACTICS PER STRATEGY	INCIDENT ACTION PLAN
PLANNING	→	→	→	**IC** →	**OPERATIONS** (+ SUPPORT OF PLANNING) →		**PLANNING**
Pollutant **Spill location** **Volume** **Observed drift & behaviour** **Direct cause & risk of escalation** **Timeline of events** **Simplified Cause Tree Analysis**	- Analysis & understanding - Direct **consequences** - **Tier Level** - **Prediction of drift & behaviour** +1 to 4-5 days - Potential for **escalation?**	On **people?**	Organization chart of CMC, IMT, & Local IC Post + teams on site + interfaces with local, regional, national & international organizations	For **people**?	To protect **people**?	*Tactic A, B… + list of resources* *etc.*	**Incident Action Plan**
		On **environment, usage & activities?**		For **environment**?	To limit impacts &/ or protect/ restore the **environment**?	*Tactic C, D + list of resources* *etc.*	
		On **assets & activities of Total?**		For **assets & activities**?	To limit impacts on/ maintain **assets & activities**?	*Tactic E, F + list of resources* *etc.*	**Continuity of activities on site** (if/ when possible).
		On reputation?		*Dealt with by CMC*			*Dealt with by CMC*
		On liability?		*Dealt with by CMC*			*Dealt with by CMC*

Figure below describes an example of the first steps in the TEP Liban IMT sections to develop the first IAP's.

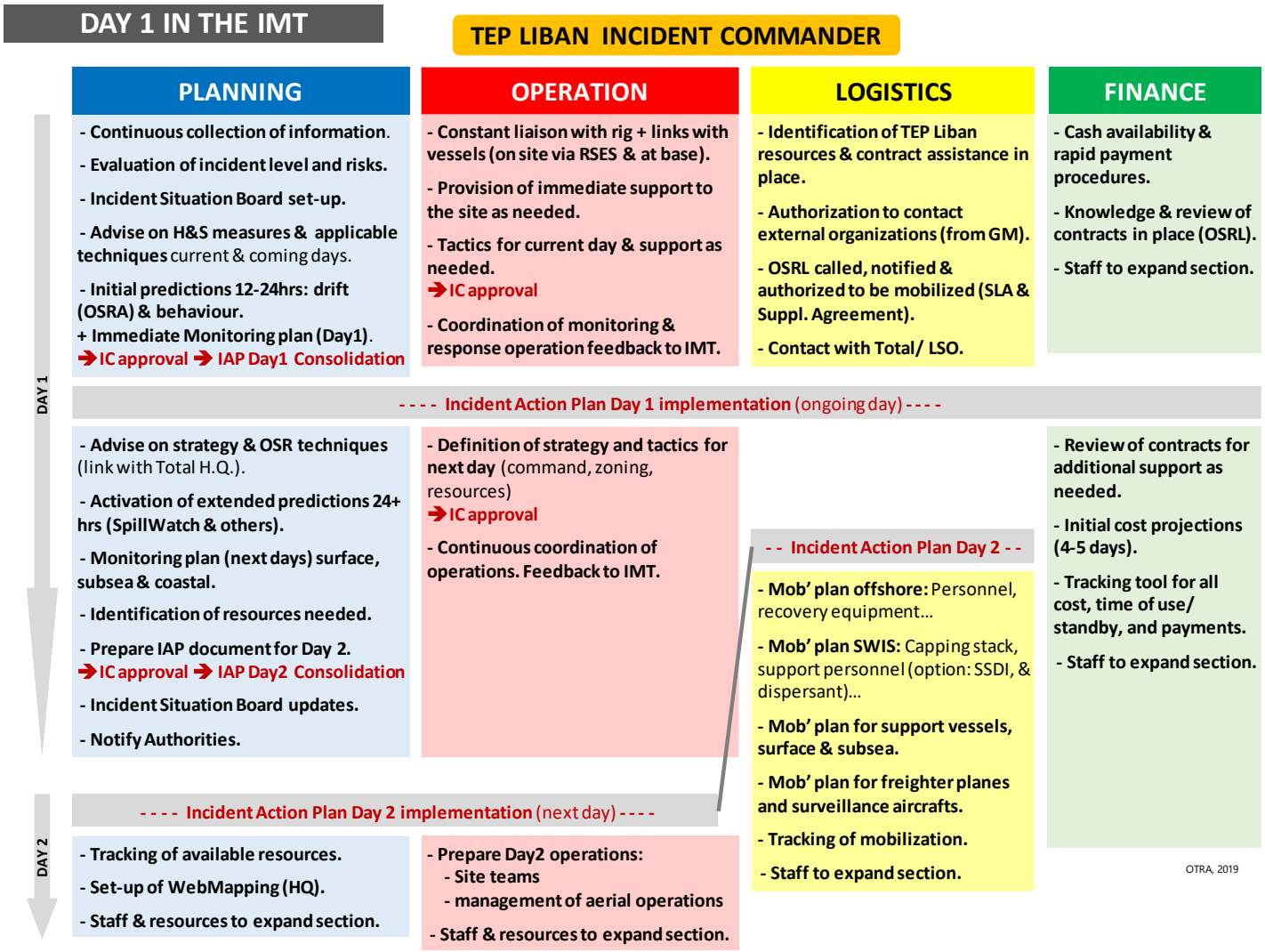


Figure 20 : Example of Day 1 & 2 IMT activities to develop & implement IAP's for a blow-out situation

4.3 Content of an IAP for Tier 2 / 3 spill

SIMPLE INCIDENT ACTION PLAN: "ICS FORM 201 — INCIDENT BRIEFING"

The **ICS Form 201—Incident Briefing** serves as the IAP template until a more comprehensive document is needed. For most Tier 2 incidents, a detailed 201 form suffice with:

- Status of the incident and on-going operations;
- Situation maps;
- Response objectives (on-going and planned);
- Operational period (usually 24 hours for oil spill response), may be less initially;
- Strategies, tactics and tasks;
- Organization in IMT and on site;
- Resources engaged and to engage, and assignment;
- Optionally: communication plan, health & safety measures, etc.

See Operational Support n°13, section "Incident Action Plan ICS 201 - Template for Oil Spill Response"

FULL INCIDENT ACTION PLAN: SET OF ICS FORMS

For more complex incidents, the IAP is composed of a set off ICS forms: 200, 202, 203, 204 et 205.

The IAP also includes:

- A clearly laid out strategy (plan of action for the coming weeks) to justify the assistance mobilization;
- Outline of tactics for the next days to anticipate the response actions and site organizations.

See Operational Support n°13, section "Full Incident Action Plan for Tier 2 & 3 – List of ICS forms"

See Affiliate Emergency Response Plan for templates of forms.

4.4 Information management

This section provides guidance for the information management during an incident.

Clear terminology and English are used as much as practically possible. Abusive use of acronyms avoided.

4.4.1 Types of information

Two main types of information co-exist during an incident:

PRE-INCIDENT INFORMATION

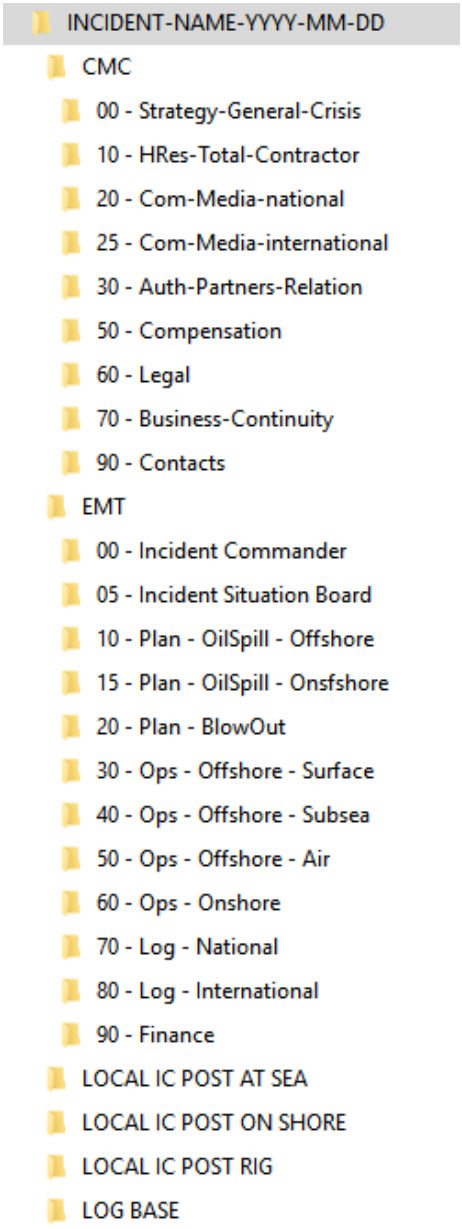
Generated before any incident, during the preparedness phase

- Comprehensive, up to date, available, known by & accessible to personnel, e.g. ERP, BOCP, OSCP, maps, layouts, contact list, forms, contracts, procedures, instructions etc.
- Available in paper-back (IMT room) and electronic format:
  - Stored on the file server of TEP Liban, logically organized and accessible to all IMT members and site teams.
  - Best option: dedicated website or web portal (e.g. SharePoint).

INCIDENT-SPECIFIC INFORMATION

Generated during the incident

- Examples: reports, photos, drift, model, e mails, complaints, requests, contracts, offers, action plan, technical documentation, measures, satellite image etc.
- Documents are dated, versioned and authors identified.
- Documents are tracked: "For review", "For approval", "Approved", "Sent", "Completed", "Outdated" etc.
- Incident-specific information is stored in one location, with sub-folders organized, e.g. per sites and teams (see example on the right).
- Access to the folders is limited depending on the user (Total or external organization) and position (CMC, IMT, site, etc.



4.4.2 Information from & to the sites

Information exchange between the IMT and sites is continuous and bi-directional.

▶ Sites & Local IC's send mainly two types of reports to the IMT:

- **Situation Reports** (often called SITREP): reports produced every end of day, containing an overview of the incident status during the past operational period and confirmed/ verified information relating to the incident and operations on site (who, what, when, where, and how).
- **Status Reports**: "spot" reports when needed, less formal than SITREPs and non-periodic, with critical &/or time-sensitive information, in the addition to the SITREP's.

▶ IMT, in addition to regular communication with the sites, sends the approved IAP daily to the sites.

4.4.3 Information sharing & "Common Operating Picture"

▶ PLANNING/ SITUATION UNIT sets-up the Incident Situation Board in the IMT.

A template is proposed in the figure below (included in the blue square).

▶ PLANNING/ SITUATION UNIT sets-up a "Common Operating Picture" (up to date, consolidated and synthetic information on the incident and operations shared with all involved in the incident and crisis management: IMT, CMC; sites, Local IC Posts). Key information is sent regularly to the OSSC (Paris) who consolidates and cascades the information within the emergency organisation in Total Group.

COP is maintained through multiple tools: time-outs, Incident Situation Board and other display boards in the IMT and CMC, and Geographic Information System and dedicated geographic tools (Automatic Identification System to locate the vessels in real time, WebGis implemented by Total H.Q. to share predictions etc.)

▶ PLANNING/ SITUATION UNIT ensures that a dedicated GIS is set-up for any Tier 3 and for Tier 2 with oil onshore, with the support of Total Group. A GIS structure to support the Common Operating Picture is proposed in:

Operational Support n°13, section "TEMPLATES".

▶ Each IMT section displays the relevant information to share in the IMT (boards / electronic display) and maintains it up to date.

▶ All TEP Liban and Total M&S Liban personnel are regularly updated on the incident. The type and level of information that may be disclosed outside of TEP Liban is agreed.

Figure below provides an example of information boards for the IMT organized per section, to be adapted.

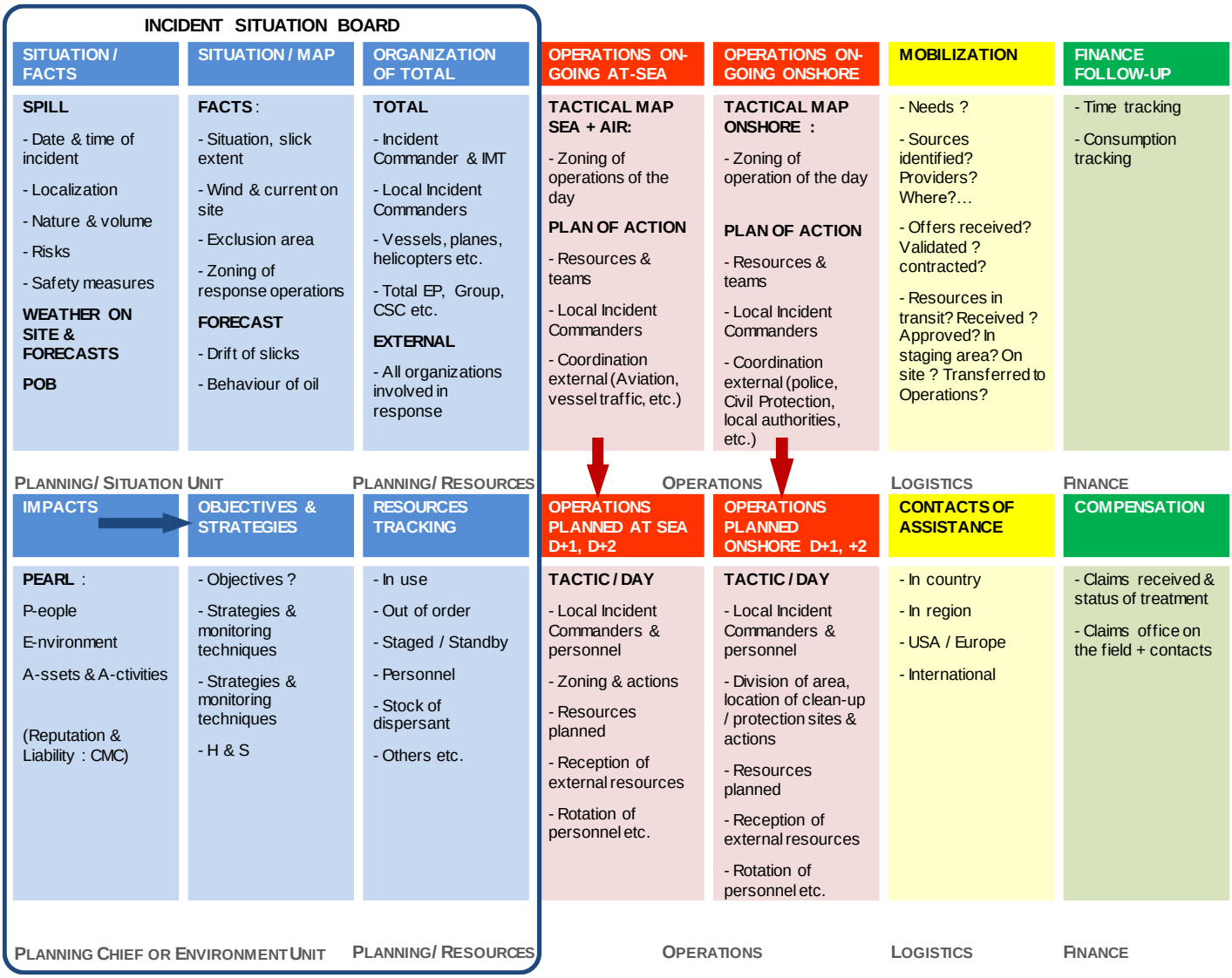


Figure 21 : Example of incident Situation Board & other boards for all IMT sections

4.5 Implementation of IAP & response coordination

▶ OPERATION SECTION disseminates the approved IAP to the Local IC's and coordinates the overall implementation of the IAP (with the Local IC's involved on site).

▶ OPERATION SECTION ensures a continuous feedback about on-going operations and provides information to:

- PLANNING SECTION to update the Common Operating Picture and to track resources on the sites;
- LOGISTICS SECTION to track resources arrived on/ departing from the operations sites;
- FINANCE SECTION to track the use/ stand-by times of resources, and update cost projects.

▶ LOGISTICS SECTION informs the IMT of ETA and real arrival and availability of assistance.

▶ OPERATION SECTION follows all contractors involved on site and their activities:

- Designation of a unique focal point for each provider/ contractor to manage contract issues;
- Daily reporting per contractor and per site or activities with corresponding time-sheets;
- Link with TEP Liban supervisors on site, etc.

4.6 Mobilization of external assistance in Lebanon

LOGISTICS SECTION is the contact point between assistance providers and TEP Liban, coordinates the mobilization of assistance until it is transferred under the operational command of a Local IC or OPERATION SECTION (or PLANNING SECTION for experts or other).

Whether agreements are in place with assistance providers or not, the overall mobilization process is similar.

REQUESTING ASSISTANCE

▶ PLANNING / RESOURCES UNIT consolidates the list of resources to request (with detailed specifications: type, amount, packaging, lifting gear, accessories etc.) and identifies – as much as possible – possible assistance providers.

▶ Incident Commander approves the list and proposed assistance providers. CMC approves the significant costs (planes, vessels, etc.). CMC provides some financial autonomy to the IMT to manage contracts.

▶ LOGISTICS / SUPPLY UNIT sends the request to the assistance providers.

ACCEPTANCE OF ASSISTANCE OFFERS

▶ LOGISTICS / SUPPLY UNIT receives and technically approves the offers of assistance, after ensuring the specifications of offered assistance complies with the requests (in consultation with OPERATION SECTION and PLANNING SECTION).

▶ A Call-Out Authority approves the resources to mobilize and associated costs; and signs the contracts or order to mobilize, rent, purchase goods, support & services etc.

Note. OSRL Mobilization Authorization is already signed and sent at this stage.

▶ LOGISTICS / SUPPLY UNIT:

- Sends the list of resources to mobilize to the providers (with order or contract).
- Liaises with the assistance provider to prepare the mobilization documents (forms, purchase orders, contracts, customs & immigration etc.).
- Agrees with the assistance provider on a point of transfer of responsibility, i.e. when TEP Liban takes over the received equipment or integrates a vessel under the operational coordination of a Local IC. Same process applies for the mobilization of personnel in country.

MOBILIZING & RECEIVING RESOURCES

▶ LOGISTICS / SUPPLY UNIT:

- Organizes the transport of the equipment, depending on the applicable Terms & Conditions.
- Manages the reception of:
  - Personnel: immigration, airport reception, transport, translator, hotel, catering etc.
  - Equipment and consumables: transport, offloading, storage in reception/ stand-by areas, customs clearance etc.
  - Vessels, aircrafts etc.
- Checks the received equipment (inventory, status, ancillaries, etc.) compared to the request. Inventory and status are documented with photos.
  - Any discrepancy/ damage/ lack is reported immediately to the provider and responsibilities for the damage cleared (provider, transporter, TEP Liban).
  - Each equipment is identified by TEP Liban to be tracked during the operations.
- Requests specialized technicians to assist deploying the equipment (from the provider preferably).

u LOGISTICS / SUPPLY UNIT informs the OPERATION SECTION of the availability of equipment and other support. A transfer point (location and time) of the resources to the Local IC's is agreed with the OPERATION SECTION.

▶ LOGISTICS / SUPPLY UNIT:

- Manages the resources until they are transferred to the OPERATION SECTION.
- Stores offshore oil spill response equipment (boom etc.) at the Logistics base, before it is taken over by the OPERATION;
- Transfers onshore clean-up equipment in:
  - staging areas under the responsibility of a Local IC,
  - a main stand-by area (under the responsibility of the LOGISTICS SECTION).

4.7 Rotation of personnel

▶ SECTION CHIEFS set-up a rotation planning for the personnel of their section (and site personnel for the OPERATION SECTION).

For demanding/ stressful positions, a maximum working period of 2 to 3 weeks is considered reasonable, followed by a leave period of variable duration, depending on the available personnel to organize rotations. Leave period may be short in the first weeks (4-5 days) and can increase when additional personnel are brought in.

Handovers are organized on at least half-day for positions with high responsibilities and/ or technical level.

Rotations of personnel are also adapted if night shifts are required (particularly for the OPERATION SECTION).

4.8 External "incident" communications

▶ IMT sends daily regular information (approved by the CMC) to the JMOC, DGLMT and LPA.

See Operational Support n°13, section "FORMS"

▶ Incident Commander, IMT members, and personnel on site (particularly on shore) may communicate with external stakeholders as needed: national/ Governorate/ local authorities, contractors, specialized companies, local communities etc. information that can be disclosed is pre-agreed.

▶ TEP Liban external communication (under the CMC) provides to the IMT:

- Communication material and level of information to disclose to external stakeholders;
- Summary on the media coverage of the incident – if any.

▶ Total personnel involved on site in the incident management inform regularly the Local IC's or Section chiefs about on-going contacts with authorities and other stakeholders.

4.9 Cost control

▶ FINANCE SECTION/ COST UNIT tracks the daily use and consumption of response resources.

▶ FINANCE SECTION/ TIME UNIT tracks the daily working times of personnel and stand-by/ use times of the equipment and support (vessels, helicopters, trucks etc.).

u FINANCE SECTION/ PROCUREMENT UNIT supervises and approves all purchase orders and contracts; and ensures all payments.

▶ FINANCE SECTION CHIEF ensures the daily consolidation of the cost summary up to date and cost projections.

4.10 Claims for compensation

ⓘ NOSCP 2017 Ver. 1 Vol. A:

- Section 6.2.2 "Legal requirements" states that: "For spills originating from offshore operations The Offshore Petroleum Resources Law (OPRL) and Petroleum Activities Regulations (PAR) both require offshore operators be liable for clean-up activities in the event of a pollution incident."
- Section 6.2.3 "Types of incidents covered" reminds the different damages that may be compensated for within the scope of the NOSCP (aligned on the provisions of the CLC 92 Convention):
  - ***"Clean up and preventative measures**: Compensation will be paid for the cost of reasonable clean-up measures and other measures taken to prevent or minimize pollution damage.*
  - ***Property damage**: Compensation is payable for reasonable costs of cleaning, repairing or replacing property that has been contaminated.*
  - ***Economic loss**: Compensation is payable for loss of earnings suffered due to the oil spill, whether or not equipment is contaminated.*
  - ***Environmental damage**: Compensation is payable for the costs of reasonable reinstatement measures aimed at accelerating natural recovery of environmental damage and also for approved scientific studies, for example to monitor the environmental recovery of the area*."
- *Section 6.2.4 "Claims management" provides some general principles for claims management*.

Table below outlines possible compensation regimes.

SPILL ORIGIN & PRODUCT SPILLED	WHO PAYS?	REGULATIONS	DAMAGES COVERED?
TEP Liban drilling activities - Condensate, MGO, drilling mud, utility oil	TEP Liban	**National**	Case by case basis
Supply vessels at sea - MGO, drilling mud, utility oils	Ship owner or operator		
Logistics base (water or land) - MGO, drilling mud, utility oil	Base operator or bunkering company or Drilling/ Support company depending on responsibility		
Tanker vessels (*) - "Persistent" oil	Ship owner	**CLC 1992 & FUND 1992 (**)**	Clean-up costs, damage to socio-economic activities and human-use

(*) TEP Liban may assist Lebanon authorities in case of spill from a tanker and ask for compensation.

(**) IMO Conventions

For claims addressed to TEP Liban:

▶ CMC defines the compensation strategy (fines or penalties are not included here).

▶ FINANCE SECTION/ CLAIMS UNIT manages the compensation process accordingly to the strategy defined by the CMC.

▶ Specialized services of Total Group can assist (e.g. DARAG services in Paris).

4.11 Ending oil spill response operations

Offshore and in Beirut port, ending of Tier 2 or 3 response operations is proposed by the TEP Liban IC, approved by the GM, and then proposed for final approval to the Authorities: affected ministry (LPA for a spill offshore from the drilling unit, DGLMT for other offshore and port spills).

Onshore, ending of clean-up operations:

- Tier 2 is discussed with and approved by the Governorate(s) for each cleaned area, after a site visit with representatives of all parties (including local communities).
- Tier 3 is approved by the Governorate(s) and the National Oil Spill Incident Commander (NOSIC).

To decide if the clean-up level achieved is acceptable, i.e. if clean-up "end points" are reached, it is essential that they are defined and agreed with authorities before the clean-up starts to:

- "*Define the conditions beyond which further active treatment is likely to provide no net environmental benefit and may delay recovery of impacted habitats and natural resources;*
- *Define the targets that must be achieved before active treatment may cease. As such, these criteria signal the transition from active response-related clean-up to maintenance and monitoring, or final sign-off;*
- *Provide OPERATION SECTION with clear targets for when treatment activities are done;*
- *Provide Shoreline Clean-up Assessment Technique Teams with criteria with which to inform their recommendations of the most appropriate treatment options and evaluate results of treatment activities;*
- *Provide those responsible for the follow-up remediation with guidelines that are consistent with those provided to emergency responders*."[14]

End points can be:

- **Quantitative**: use metrics related to oil distribution, thicknesses, type, etc. (ex: < than 10% Stain) as much as practically possible;
- **Qualitative**: describe the presence/ character of oil (ex: does not rub off on contact);
- **Analytical**: criteria for sediment and water quality (ex: less than x ppm THC);
- **Interpretive**: impact (ex: stop when further treatment will result in excessive habitat disruption).

ⓘ NOSCP 2017 Ver. 1 Vol. A, section 6 "Termination and demobilisation" provides the key steps of the demobilisation process by the national Incident Management Team.

4.12 Final report and technical feedback

TEP Liban, in coordination with the teams involved, develops a report (REX) as per CR EP HSE 094 including:

- Causes of the incident;
- Characteristics of the incident: spilled material, fate and behaviour of the spilled product;
- Areas or installation affected by the spill and consequences;
- Response equipment mobilized and used (date, quantity, volume, contractor, etc.);
- Volume of oil dispersed and/or recovered using the different techniques;
- Personnel mobilized per area, person in charge, contractor;
- Evacuation, treatment and final disposal of recovered oil;

[14] Source: Developing Clean-up Endpoints for Inland Oil Spills, 2014 INTERNATIONAL OIL SPILL CONFERENCE, Whelan A., Clark J., Andrew G., Michel J., Benggio B., pp. 1267-1280

- Potential environmental and social/ economic assessment of the impact of the incident;
- Potential environmental monitoring program method and results;
- Mitigating measures, response strategy modifications, equipment acquisition recommendations;
- Estimated costs;
- Preventive measures implemented and/ or envisaged;
- Status of preparedness,
- Initial phase (alert, communication, assessment, mobilization, etc.),
- Leadership,
- TOTAL internal and external communication network (oil companies, government, local authorities...),
- Crisis management, legal, financial issues,
- Expertise required, available and effectively used, problems encountered, unsolved questions,
- Usefulness of OSCP, handbooks, forms and logs, etc.

The TEP Liban OSCP is updated according to the findings of the REX.

4.13 Environmental and societal impact monitoring

▶ PLANNING SECTION, at the end of the response operations and on a case-by-case basis, assesses the need for an environmental and/ or societal post-spill damage and rehabilitation monitoring program.

These programs may be set-up at short- (weeks to months), mid- (few months to 1 year) to long term (>1 year).

See Operational Support n°7, section "ENVIRONMENTAL AND SOCIETAL IMPACT MONITORING".

5. CRISIS MANAGEMENT – FOR CMC ONLY

5.1 Crisis & incident management – Overview

Figure below outlines the simultaneous management of the incident by the IMT, and of the crisis by the CMC, and the parallel and simultaneous development and implementation of Action Plans (IAP and Crisis actions plans). F.I.S.A. items are reminded (Facts, Impacts, Situation, Actions).

Crisis management procedures and responsibilities are described in the ERP of TEP Liban, as well as the information channels between IMT and CMC.

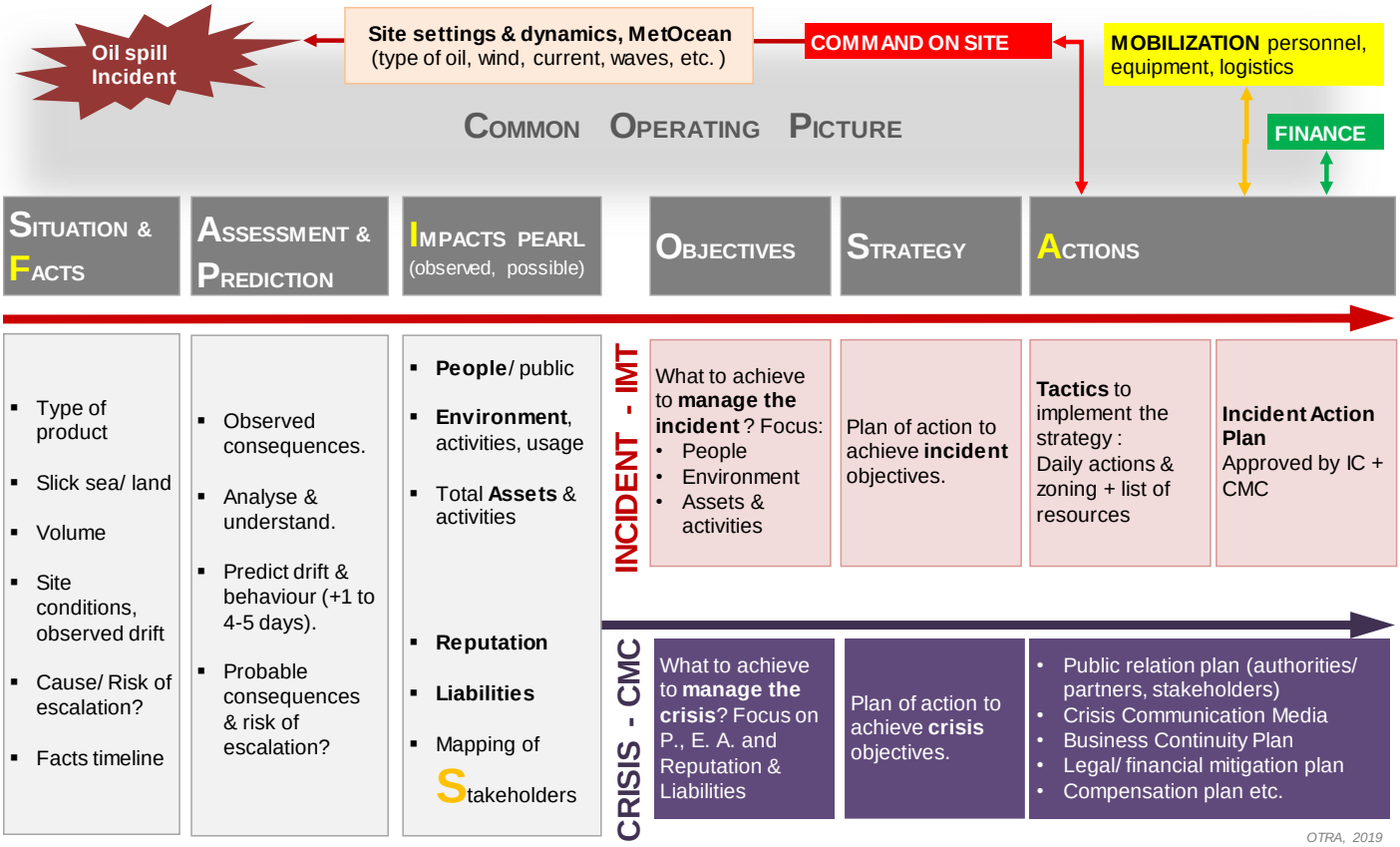


Figure 22 : Incident management & development of Incident Action Plans by the IMT, crisis management & development of Crisis Action Plan by the CMC, and establishment of a Common Operating Picture COP

5.2 CMC organization

The CMC, headed by the GM, is staffed with TEP Liban and Total Liban M&S personnel for the first 24-48 hrs and reinforced with Total personnel as soon as possible.

Figure below proposes a possible initial CMC organization, to adapt.

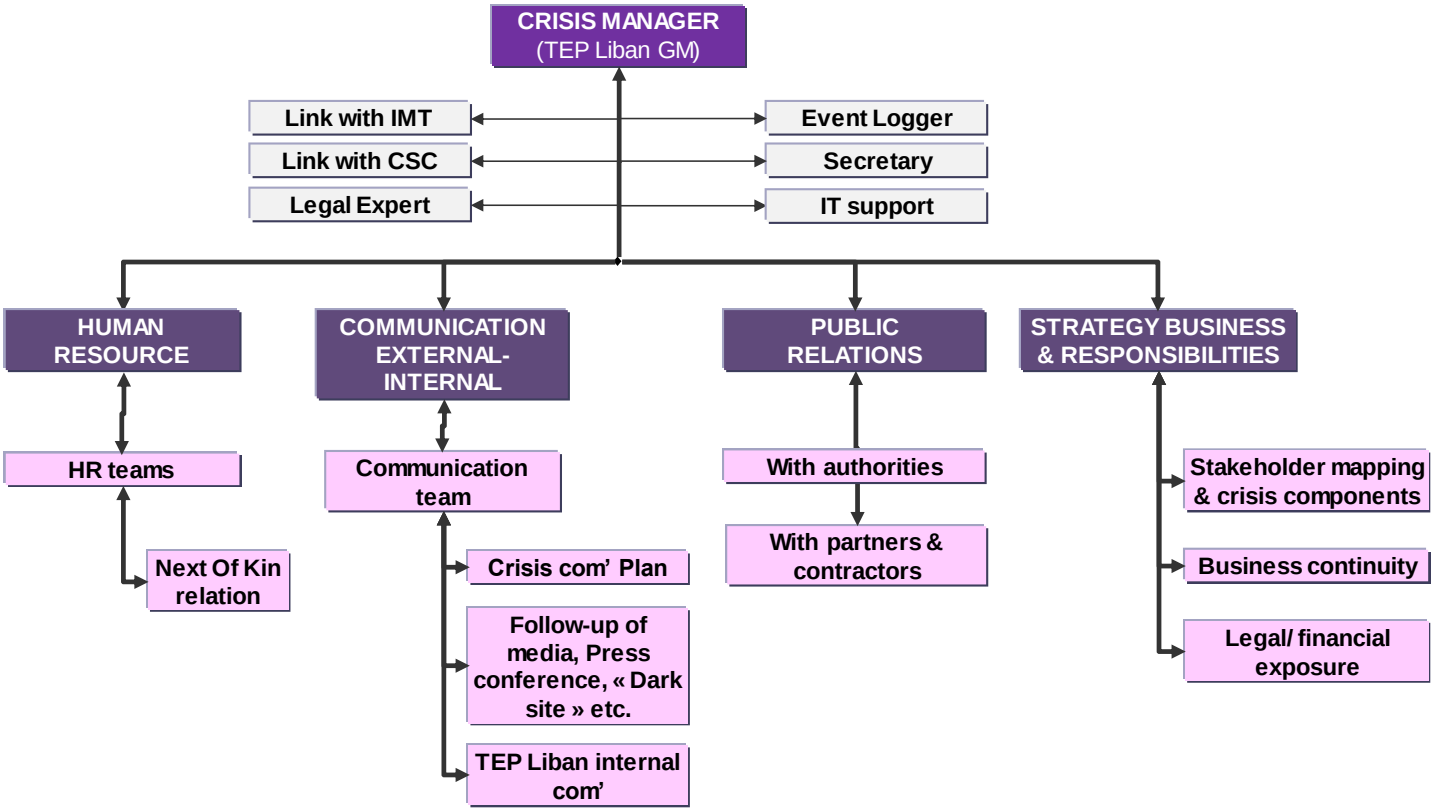


Figure 23 : Proposal of structure of CMC for TEP Liban for Tier 2/ 3 oil spill

▶ **HUMAN RESOURCE** manages all relations with families and Next Of Kin.

▶ **COMMUNICATION** manages all external communication with the media and public (including internal information for Total personnel) and is the responsibility of Total Liban M&S.

▶ **PUBLIC RELATION'S** develops a crisis communication strategy with key stakeholders, and manages all relations with authorities, business partners, key contractors etc. and is the responsibility of Total Liban M&S.

▶ **STRATEGY BUSINESS & RESPONSIBILITIES** evaluates the situation, identifies the components of the crisis, and develops the Crisis Action Plans as needed: business continuity plan, legal exposure plan, compensation plan, etc.

/!\ Total Liban M&S also manages all security issues.

5.3 CMC initial actions

▶ CMC initially approves:

- the activation of the full TEP Liban OSCP and others contingency/ emergency plans as needed;
- the initial contacts with external organizations and level of information to disclose;
- the call to and initial notification of the authorities (Tier 2 & 3).

▶ CMC, based on the feedback of IMT:

- Notifies Total H.Q. and partners;
- Approves the response strategies and tactics;
- Validates the mobilization of assistance (country, region, international...)
- Identifies the initial key stakeholders and crisis components.

See Operational Support n°13, section "TEMPLATES".

▶ CMC issues the first press release within 1 hour (Tier 2 or 3); links with the Communication team of Total Group to prepare the second press release, request the set-up of the Dark site and prepare a robust Crisis Communication strategy.

See Operational Support n°13, section "TEMPLATES".

5.4 Crisis management

▶ CMC supports the IMT at all level of the response continuum if requested: for the setting-up of response objectives and strategy, the coordination of offshore response, shoreline protection and clean-up, oil spill waste management, oiled wildlife management, environmental impact monitoring, mobilization of assistance, etc.

▶ CMC provides support to the IMT and Local IC Post for interfaces with external organisations including the Authorities, Total, external providers, contractors, etc.

▶ CMC manages all crisis-related and high-level issues, in constant liaison with the CSC (Paris).

▶ CMC carries out a full mapping of stakeholders (country, region and international).

▶ CMC identifies all crisis components using the P-E-A-R-L approach.

▶ CMC sets up the high-level interfaces and communication channels:

- National Operations Room – NOR if mobilized;
- Ministries, head of national agencies, head of governorates etc.;
- Head management of partners;
- Head management of contractors;
- Head management of key assistance providers if needed (e.g. OSRL), etc.

▶ CMC integrates Total Liban Marketing & Services competent personnel for crisis management.

▶ CMC ensures that Total Group provides adequate assistance in country and facilitates the ramp-up of the incident management system (IMT and personnel on site).

▶ CMC requests from Total Group the set-up of incident & crisis management system in close countries in case of (risk of) transboundary incidents.

▶ CMC develops a Crisis Action Plan, to address the identified crisis components (business continuity, legal/ financial exposure, public relations etc.).

▶ CMC develops rapidly a global cost tracking and projection system.

▶ CMC develops a Crisis Communication Plan for Lebanon:

- Communication to country media (regional/ international communication is managed by Total H.Q.),
- Communication to local NGO's and other stakeholders;
- Communication on local information/ opinion websites and social networks.

u CMC identifies potential claims for compensation that may arise from the incident, identify potential claimants and develops a compensation strategy for all parties affected if needed (claims management, compensation evaluation and mechanisms, types of damage covered, consideration of damage to the environment etc.).

5.5 Emergency & crisis management support from Total H.Q.

▶ Total will mobilize for Tier 3 situation a Crisis Support Cell - CSC to provide support to TEP Liban and coordinate overall incident and crisis management at international level.

▶ CSC will ensure incident and crisis management in-country is adequate, efficient and in accordance with Total rules and with applicable regulations.

▶ CSC will provide support personnel to TEP Liban (from other TEP Affiliates or entities, Total H.Q. and external organizations):

- Personnel for the ramp-up and running of the IMT, CMC and of the support locations (staging areas etc.): IT specialists, logisticians, etc.;
- Oil spill response specialized personnel for the IMT, surveyors, Local IC's, etc.;
- Specialized personnel for crisis management (e.g. crisis communication).

▶ CSC will facilitate the provision of assistance to TEP Liban and manage (through the Oil Spill Support Cell):

- Mobilization of dispersant in country (cargo planes);
- Mobilization of additional equipment;
- Mobilization of additional vessels and aircrafts in country;
- Mobilization of expertise and set-up of re-enforced offshore monitoring capabilities for large Tier 3/ blow-out (aerial surveyors, subsea monitoring, blow-out flow rate evaluation etc.).

▶ CSC will set-up an organization in neighbouring countries for transboundary spills monitoring if and when needed.

▶ CSC will coordinate the cross-boundary operations between all involved countries for transboundary spills; coordinate the overall crisis management and facilitate the mobilization and transfer of assistance between countries.

▶ CSC will approve the TEP Liban Crisis communication plan for Lebanon and manage the global crisis communication strategy (at regional and international level):

- French, regional and international media;
- Set-up & management of "Dark Site";
- Provision of technically approved inputs, wordings and support material for external communication about the incident, its potential impacts, the chosen strategy and on-going operations: What is a dispersant? Effects of oil on the environment? Potential risks for Health due to oil exposure and to use of dispersant deep-sea? Etc. (responsibility of the Total Crisis Communication team);
- Internal communication in the Total Group etc.

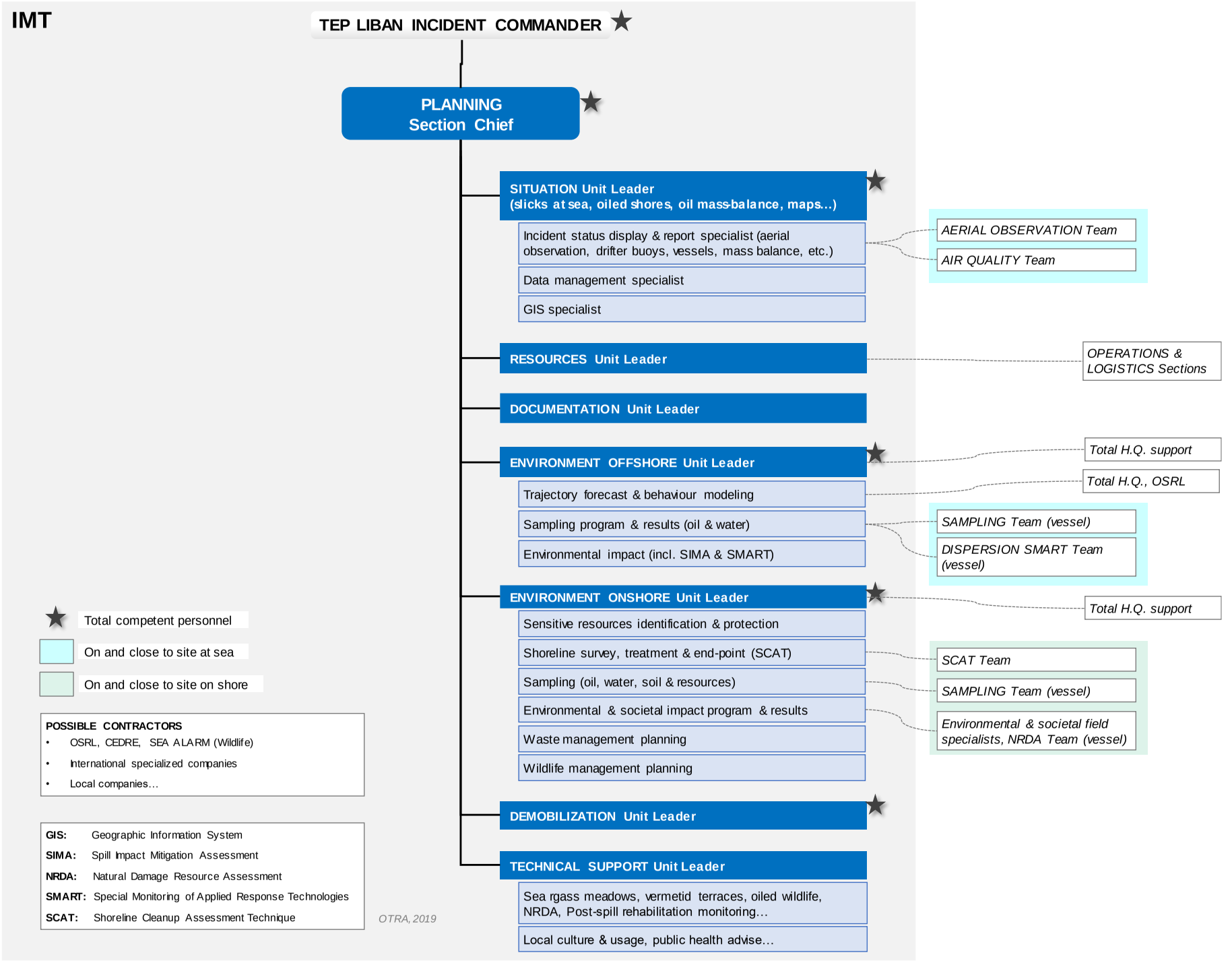
6. APPENDICES

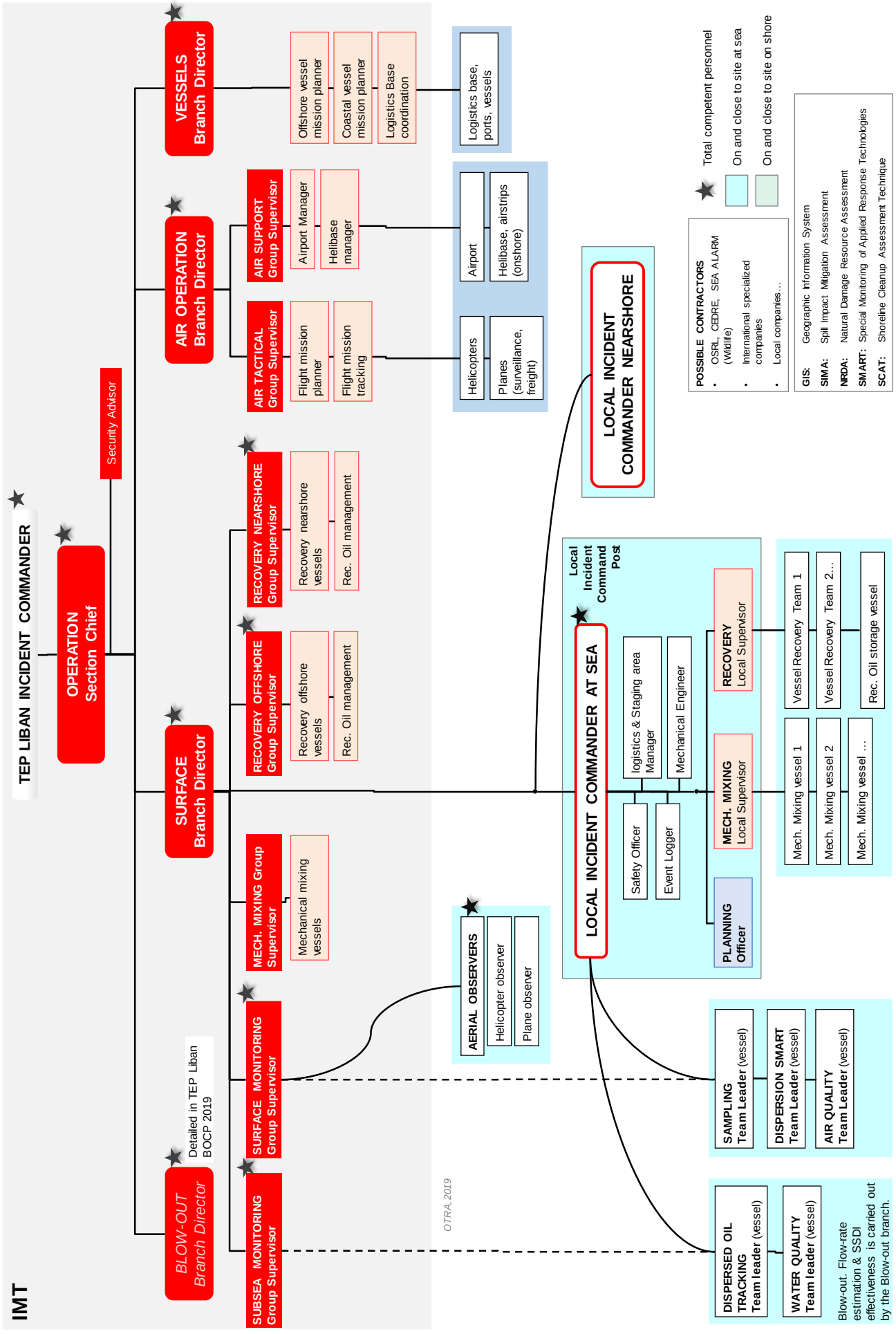
The full-blown organization, IMT responsibilities and job tickets provided in the section are designed for offshore response, and possible response on the shore in case of groundings of residual oil, after a spill caused by drilling activities in Block 4.

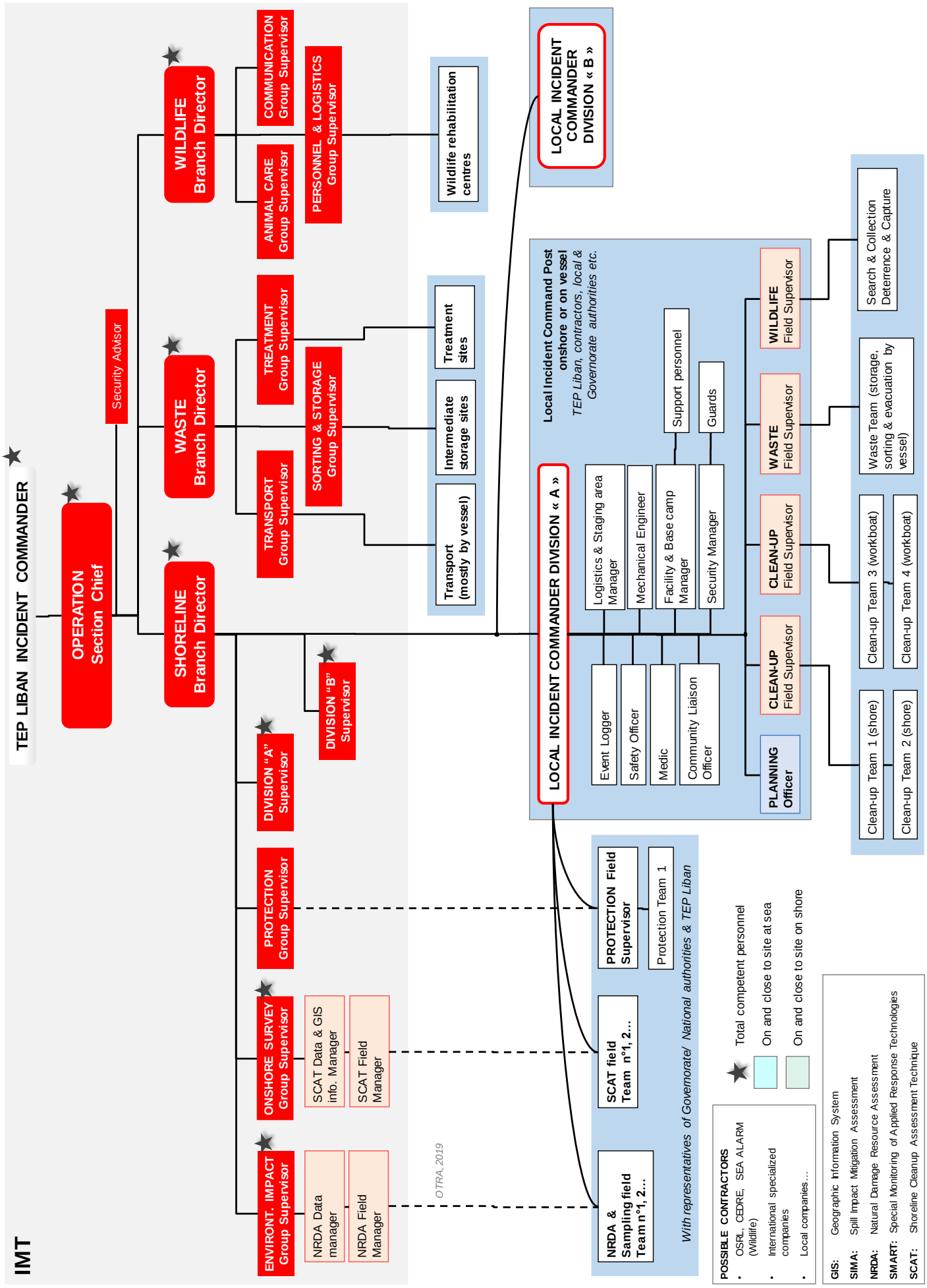
Should TEP Liban need to provide assistance for spills originating from PSV or at the Logistics (managed by the responsible party), a similar organization may be set-up.

6.1 IMT full blown Tier 3/ Blow-out detailed organization

See next pages.







IMT

TEP LIBAN INCIDENT COMMANDER ★

LOGISTICS Section Chief ★

SERVICE Branch Director ★

- **COM' Unit Leader**
  - Communication network & equipment (radio, Sat, etc.)
- **MEDICAL Unit Leader**
  - Site Medical Plan set-up & support (incl. MEDEVAC)
- **FOOD Unit Leader**
  - CMC, IMT, support sites, base, other sites as needed

SUPPORT Branch Director ★

- **SUPPLY Unit Leader** ★
  - Supply ordering Manager — *Total H.Q. support*
  - National + International Assistance Manager (with agreement) ★
  - Local Supply Manager (personnel, equipment, vessels/ barges…) ★
  - International Supply Manager ★
- Equipment Manager (reception, stand-by storage & transfer to Staging areas) ★
- Personnel Manager (visa, reception, transport, food & lodging, access…) ★
- **FACILITIES Unit Leader**
  - IMT & CMC room manager ("régisseur")
  - Base camp set-up/ Demob. Manager
  - Staging area set-up / Demob. Manager
  - Security Manager
  - Water, food & energy
- **GROUND SUPPORT Unit Leader**
  - Traffic plan, transport vehicle & maintenance (base, airport, office etc.)

FINANCE Section Chief ★

- **COST Unit Leader**
- **TIME Unit Leader**
  - Equipment time recorder Manager
  - Personnel time recorder Manager
- **PROCUREMENT Unit Leader** ★
- **CLAIMS & COMPENSATION Unit Leader** ★
  - Claims collection Manager
  - Claims analysis Manager

Airport, Port (Logistics Base, others), reception & stand-by areas

Claims office(s) on site Manager

Airport, airstrips, helibase, port, Local Incident Command Post, staging areas etc.

★ Total competent personnel

On and close to site at sea

On and close to site on shore

POSSIBLE CONTRACTORS

- OSRL, CEDRE, SEA ALARM (Wildlife)
- International specialized companies
- Local companies…

OTRA, 2019

GIS:	Geographic Information System
SIMA:	Spill Impact Mitigation Assessment
NRDA:	Natural Damage Resource Assessment
SMART:	Special Monitoring of Applied Response Technologies
SCAT:	Shoreline Cleanup Assessment Technique

6.2 IMT sections, units & groups: overview of responsibilities

IMT Functions:	*Responsibilities:*
INCIDENT COMMANDER	- Establishes the ICS organization needed to manage the incident and IC Post(s). - Establishes consolidated incident objectives, priorities, and strategic guidance, and update them every operational period. - Selects a single section chief for each position based on current incident priorities. - Establishes a single system for ordering resources. - Approves a consolidated IAP for each operational period. - Ensure incident safety. - Approve the requests of external resource and integration of external personnel. - Order demobilization as needed. - Ensure after-incident reports are issued with lessons learned and best practices.
Safety officer	- Monitor incident operations and advises the IC on all matters relating to operational safety, including the health and safety of incident personnel. - Coordinate closely with all section chiefs regarding operational safety and health and safety of responders. - Ensure the ongoing assessment of hazardous environments, development of the incident Safety Plan, coordination of safety efforts, and implementation of measures to promote safety of personnel & operations. - Alter, suspend, or terminate any activities that are immediately dangerous to life and health of personnel.
Legal officer	- Advise on legal matters such as those related to emergency declarations, liabilities, rights and restrictions pertaining to media access, etc.
Liaison officer	- Act as a conduit of information and assistance between incident personnel and authorities, and other agencies involved.
Public information Officer	- Provide technical approved information to the Crisis Communication team (in CMC) for use for external communication. - Provide support to the IC to facilitate communication with Media, local communities and authorities (for onshore operations). - Check the technical validity of the communication material produced by the Crisis Communication team (in CMC) before dissemination.
PLANNING SECTION CHIEF	- Oversees incident-related data gathering and analysis regarding spill, incident operations and assigned resources. - Supervise the development of spill offshore monitoring plan, onshore survey plan, and environmental monitoring plan. - Propose alternative strategies and develop oiled wildlife management plan, oil spill waste management plan. - Facilitates incident action planning process and meetings. - Prepares the IAP for each operational period.
Situation Unit	- Collect, process, and organize situation information. - Prepare situation summaries. - Develop spill offshore monitoring plan. - Develop/ consolidate projections and forecasts of spill drift and oil behaviour (with advice from Environment offshore unit).
Resources Unit	- Track the location and status of all resources assigned to the incident under the responsibility of Operations section and Local IC's.

	- Ensure all assigned resources are checked in once transferred under the responsibility of Operations section or Local IC's. *Note. Logistics Section tracks resources that are mobilized to Lebanon, before transfer under the responsibility of Operations section or Local IC's*.
Documentation Unit	- Maintain incident files and data for legal, analytical, and historical purposes (e.g. major steps taken to resolve the incident). - Provide duplication services. - Prepare the documents of the IAP. & act as Event Logger.
Environment Offshore Unit *	- Propose reinforced monitoring plan (tracking actions/techniques, spill assessment, sampling and analysis etc.). - Propose reinforced/ improved prediction and modelling effort. - Propose actions to assess spill response efficiency (e.g. SMART protocol). - Provide justification of offshore spill response strategy (and SIMA if needed). - Propose marine oiled wildlife management. - Propose offshore environmental impact evaluation actions and need for post-spill environmental monitoring.
Demobilization Unit	- Develop an Incident Demobilization Plan that includes specific instructions for all personnel and other resources to be demobilized.
Technical Support Unit	- Special expertise and skills activated only when needed, e.g. NRDA specialists, coastal environment rehabilitation etc.
OPERATIONS SECTION CHIEF	- Manages all tactical incident activities and oversees implementation of the IAP. - Develops response tactics based on agreed strategy. - Organizes the Operation Section and personnel on site, with the Branch Directors.
SURFACE BRANCH DIRECTOR	- Manages tactical incident activities and IAP implementation for surface maritime response operations (recovery, burning and subsea/ surface monitoring) with the Local IC's. - Develops surface response tactics based on agreed strategy. - Organizes the Surface branch and personnel on site. *Note. Local IC retains operational command on site*.
Surface/ Surface Monitoring Group supervisor	- Facilitate and coordinate surface (vessel and aerial) monitoring activities with the survey monitoring teams on site.
Surface/ Mechanical Mixing Response Group	- Facilitate and coordinate offshore oil mechanical mixing activities with the teams on site.
Surface/ Recovery Offshore Response Group	- Facilitate and coordinate offshore oil recovery activities with the teams on site.
Surface/ Recovery Nearshore Response Group	- Facilitate and coordinate nearshore oil recovery activities with the teams on site.
Surface/ Subsea Monitoring Group supervisor	- Facilitate and coordinate mid- and long-range subsea monitoring activities (tracking of dispersed oil & water/ environment quality parameters) with the survey teams in Lebanon waters (applicable for blow-out).
VESSELS BRANCH DIRECTOR *	- Coordinate all maritime traffic & use of vessels. - Provide advice for the safe use of vessels & zoning of maritime operations:

	- transport of equipment and personnel, transfer of recovered oil; - surveillance, mixing, recovery; - local and international arrivals and departures of external vessels in area of operations, etc.
AIR OPERATION BRANCH DIRECTOR	- Coordinate all aerial traffic & use of aircrafts. - Provide advice for the safe aerial operations & zoning of simultaneous aerial & maritime operations: - transport, surveillance; - local and international arrivals and departures; - ground support, etc.
Air Operation/ Air Tactical Group Supervisor	- Coordinates all aerial traffic, with the assistance of a Helicopter/ Fixed-Wing Coordinators, in liaison with the Civil Aviation Authorities: - transport; - surveillance; - local/ international arrivals and departures etc.
Air Operation/ Air Support Group Supervisor	- Ensures ground support is available for all aircrafts mobilized (fuel, GPU, entrance in/ exit of airport and rest room for crew, parking, dispersant staging area etc.). - Maintain a liaison with airports and fixed-wing bases. - Establish and operate bases for helicopters. - Ensures timekeeping for aviation resources assigned to the incident.
WASTE BRANCH DIRECTOR	- Implement and coordinate all operations for the collection, transport, intermediate storage, treatment and final disposal of recovered oil and oily waste. - Develops waste management tactics & operations.
WILDLIFE BRANCH DIRECTOR	- Implement and coordinate all operations for oiled wildlife management. - Develops oiled wildlife management tactics & operations.
LOGISTICS SECTION CHIEF	- Provide external facilities, services, people, and material to initiate and maintain incident management. - Participate in the IAP's development and supervise the Logistics Section's branches and units.
SUPPORT BRANCH DIRECTOR	- Coordinates all logistical support activities. - Ensure timely provisions of support. - Organizes the Support Branch and personnel on support sites.
Support/ Supply Unit Leader	- Oversee the ordering, receiving, and checking of all incident-related resources (personnel, equipment, consumables, logistical support etc.). - Oversee the inventory, transfer to staging areas &/or transfer to Operations section of mobilized resources as requested. - Oversee the management of mobilized external personnel.
Support/ Supply Unit/ National & International contracted Assistance *	- Manages the ordering, receiving in Lebanon port/ airport/ other, and checking of resources from national providers with existing contracts, and contracted international assistance (e.g. OSRL).
Support/ Supply Unit/ Local Supply *	- Manages the ordering, receiving in Lebanon port/ airport/ other, and checking of resources from national providers with no existing contracts.
Support/ Supply Unit/ International Supply *	- Manages the ordering, receiving in Lebanon port/ airport/ other, and checking of resources from international providers with no existing contracts.

Support/ Supply Unit/ Equipment Manager *	- Receive and distribute the external resources from the closest port or airport (or national provider) to the Staging/operation area. - Transfers the resource under the command of the Local IC or Operations section.
Support/ Supply Unit/ Personnel Manager *	- Organize the reception of external mobilized personnel and provide full & safe working/ living environment.
Support/ Facilities Unit Leader	- Set up, maintain, and demobilize all facilities used in support of incident operations. - Provide facility maintenance and security services needed for incident support. - Set up the Incident Command Post (IMT room), Local IC Posts, base camps, staging areas etc. and ensure the maintenance of those facilities. - Provide and maintain personnel support facilities, including areas for eating, sleeping, sanitation and showers.
Service/ Ground Support Unit Leader	- Provide ground transportation in support of incident operations. - Provide transportation in shore shallow waters (small shallow draft vessels). - Maintain and repair vehicles and mobile ground support equipment. - Supply fuel for vehicles & equipment; and develop and implement the Land/ Incident Traffic Plan. - Maintain a transportation pool of vehicles (e.g., cars, buses, pickup trucks) suitable for transporting personnel. - Provide information to Resources Unit on the location and status of vehicles assigned to the Ground Support Unit.
FINANCE/ ADMIN. SECTION CHIEF	- Monitor expenditures, use of resources (time) and ensure compliance with applicable laws, policies, and procedures (in close coordination with Planning and Logistics Sections to reconcile all financial documents with operations carried out/ supplies ordered). - Assist to set-up contracts and ensure payments. - Set-up a system to manage claims; and ensure timely management of compensation. - Determines—given current and anticipated future needs—the need for establishing specific subordinate units.
Cost Unit	- Track & record cost data. - Analyse cost data and recommend cost-saving measures. - Maintain information on the actual costs of all assigned resources. - Provide cost projections for overall response operations.
Time Unit	- Ensure daily recording of incident personnel and equipment time. - Verify these records, check them for accuracy.
Procurement Unit	- Administer all financial matters pertaining to leases, assistance and vendor contracts. - Coordinate with Logistics section to identify sources for equipment & contract arrangements. - Prepare and sign resources rental/ purchase agreements or contracts, and check documentation associated with rental/ purchase contracts.
Claims & Compensation Unit	- Responsible for financial concerns resulting from property damage, injuries, or fatalities at the incident. - Maintain files on damages, injuries and others associated with the incident and obtain written witness statements. - Maintain logs on the claims, obtain witness statements, and document investigations. - Evaluates the claims and manages the claims settlement/ compensation process, as per instructions received from Total.

Note. Positions with "" are addition compared to the general structure of an Incident Management Team (in the ICS model).*

6.3 Job tickets: Incident Commander and IMT section chiefs

/!\ Job tickets are provided as guidelines for Tier 2 & 3 incidents to adapt case-by-case.

For general responsibilities during emergency, see the TEP Liban Emergency Response Plan (Version 2019).

The present section details the job tickets for the IC and section chiefs, next sections proposes job tickets for the IMT sections and personnel offshore and onshore, all listed below.

See next pages.

6.3.1 Job ticket: Incident Commander / Head of IMT

RESPONSIBILITIES	PERSONNEL		
See "Full-blown IMT structure and responsibilities ", p.15	TEP Liban Operations Manager (initial)		
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
O Request immediate risk assessment (type of incident & product + H2S, BTEX, VOC, fire, etc.) and initial safety measures to enforce.	Safety Officer & RSES		
O Review the initial assessment and validate Tier Level.			
O Confirm the suitability of first response engaged on site by RSES.	**▶PLANNING SECTION**		
O Ensure an immediate (maritime) exclusion area around the spill is enforced before air quality monitoring.	**▶OPERATION SECTION**		
O Provide immediate assistance to the site(s).	**▶OPERATION SECTION**		
MOBILIZATION & FIRST RESPONSE			
O Mobilize the initial IMT members. **O Provide the initial situation briefing & code-name the incident.** **O Structure the IMT as needed for the incident and approve the response organization on site.** **O Ensure all IMT members know their position, role, deliverables & hierarchy.**			
O Review the initial situation, observed & possible impacts and first predictions. **O Define the initial response objectives.** **O Approve monitoring + response tactics proposed for the current day.**	**▶PLANNING SECTION** **▶ OPERATION SECTION**		
ALERT			
O Ensure other operators/ contractors immediately at risk are notified.			
O Ensure JMOC & LPA are informed by phone (after GM approval). **O Ensure Notification form (approved) is sent as soon as possible to JMOC & LPA.** **O Ensure OIM/ Master notification form is consistent.** **O For a spill close to the shore or going onshore, ensure governorates are notified (by the authorities).**	**▶PLANNING SECTION**		
O Request – if needed – an initial maritime exclusion area from JMOC.			
INCIDENT ACTION PLANNING			
O Ensure "P" planning cycle is implemented for the next period (12-24hrs):			
O Ensure "P" planning cycle is implemented for the next period (12-24hrs): - **OBJECTIVES DEFINED**			
- **TACTICS MEETING** - Initial assessment & predictions + initial monitoring strategy. - initial response strategy, tactics & response operation zoning; - outline of strategy, tactics & resources to mobilize (next 5 - 10 days).			
- PLANNING MEETING - Full action plan with resources to mobilize & tasks assignments.			
- **OPERATIONAL BRIEFING** & dissemination of approved IAP			
O Designate the Local IC(s) offshore (taking over from RSES for next days). **O Define operations & areas allocated to each Local IC: subsea, maritime…** **O Decide what initial resources will:** - be placed under the command of the Local IC (e.g. vessels); - remain under the command of the IMT (e.g. helicopters)			
O Validate Incident Action Plan : response, monitoring & mobilization.			
ASSISTANCE			

□ **Request authorization from GM to <u>contact & notify</u> external assistance.**			
○ **Ensure the external assistance is notified:** - Tier 2: local contractors (Option: TEPCY); - Tier 3: Tier 2 + OSRL, international contractors, charterers, Cedre, etc.	▶LOGISTICS SECTION		
○ **Ensure mobilization forms are signed by a Call Out Authority.** ○ **Inform CMC about the cost estimate for the initial assistance mobilization.**			
○ **Instruct Logistics section to organize the mobilization of assistance in country (once approved).**	▶LOGISTICS SECTION		
DAILY MANAGEMENT OF RESPONSE	**Tools**	**Priority**	**Status**
○ **Oversee all response & support operations.** ○ **Supervise the arrival, dispatch and use of external assistance.**			
○ **Request regular feedback from the sites.** ○ **Ensure information is consolidated and disseminated into the IMT.** ○ **Provide information summary to the CMC** (via person in charge of liaison or by direct briefing in the CMC).			
○ **Review daily situation reports, assessment, predictions, impacts, objectives, strategy and tactics.**			
○ **Follow the daily Planning Cycle:** **OBJECTIVES ➔TACTICS MEETING ➔ PLANNING MEETING ➔** **➔ OP'S BRIEFING ➔ APPROVAL & DISSEMINATION OF IAP** ○ **Validate the Incident Action Plan (for next day); and submit to CMC if any major changes/ expenditures.**	Meetings organized by Planning section.		
○ **Request some financial autonomy to engage contracts.**			
○ **Ensure the Incident Action Plan is received and accepted by the Local IC('s), and resources are available.**			
○ **Understand the national incident organization and set-up interfaces.** ○ **Report daily to the Authorities (JMOC & LPA).** ○ **Inform daily the Block 4 partners.**			
○ **Send a TEP Liban representative in the National Incident Management team.** ○ **Receive a representative from the authorities in the TEP Liban IMT.**			
○ **Coordinate maritime traffic + exclusion areas with maritime authorities, aerial operations with civil aviation authorities.**			
○ **Follow-up the mobilization of resources, arrival in country, on site and activation.**			
○ **Propose end of operations (advice of Planning section + GM approval).** ○ **Down-size & stand down the IMT. Organize debriefing + "lessons learnt".**			
MANAGEMENT OF IMT	**Tools**	**Priority**	**Status**
○ **Request from all section chiefs their need for specialized personnel.** ○ **Request the personnel immediately from Total H.Q. & assistance.**			
○ **Consider transferring the IMT in another facility (or expand in existing facility) for large Tier 3 spills.**	Planning/ Resources unit		
○ **Ensure a communication network is set-up for operation nearshore and onshore (offshore, logistics base, head office, contractors in country).**			
○ **Understand national incident organization set-up & who to interface with:** - national level for emergency management (with IMT sections); - Governorate level and local level (with Local IC Posts).			
○ **Ensure the rotation of personnel is planned for all sites and the IMT.**	Planning/ Resources unit		

6.3.2 Job ticket: IMT/ Planning section chief

RESPONSIBILITIES	PERSONNEL		
See "Full-blown IMT structure and responsibilities ", p.15	Designated by the IC.		
IMMEDIATE ACTIONS	**Tools / In charge**	**Priority**	**Status**
○ **Identify immediately any risks for Health & Safety.** ○ **Propose immediate monitoring of air quality if needed.** ○ **Propose Safety safeguarding measures (exclusion zones etc.).**			
○ **Mobilize key initial units:** - Situation unit + Environment Offshore unit (Tier 3) + Aerial Observer.			
○ **Provide to the section the latest information about the incident situation, initial operations and conditions on site.**			
○ **Confirm to the IC the Tier Level 1, 2 or 3.** ○ **Confirm suitability of first response.** Propose alternatives if applicable.			
○ **Provide to the IC:** - key facts for the initial call to the JMOC & LPA. - JMOC notification form, to be approved by the GM (Tier 2 & 3). (& call LPA after IC approval).	See "Notification of Authorities".		
○ **Advise the IC on the need to contact external assistance.**			
○ **Set-up the Incident Situation Board + incident map in the IMT room.**	▶ **SITUATION UNIT**		
○ **Provide:** - initial drift prediction for 6-12 hrs with wind forecast and observed currents; - initial information on window of (mechanical) dispersibility.	▶ **SITUATION UNIT**		
○ **Propose the initial monitoring actions for the current day:** - air quality on site (for health & safety)? - aerial surveillance (helicopter) with competent observer? - launching of ARGOS buoy(s)? Sampling of hydrocarbons? + others depending on risks (e.g. ROV video)?	**TACTICS MEETING** ▶ **SITUATION UNIT**		
○ **Call Total H.Q. to activate** SPILLWATCH (satellite RADAR monitoring + spill modelling) + WebGIS mapping intranet site.	See Op. Sup n°6		
Blow-out. Request Total H.Q. to mobilize subsea blow-out monitoring kit (OSRL) with vessel and experts + to activate subsea oil plume modelling.			
Tier 3. Consider other models: OilMap model from OSRL, MOTHY model from Météo-France (CleanSeaNet model from EMSA).	▶ **ENVIRONMENT OFFSHORE UNIT**		
AFTER RECEPTION OF 1st MONITORING & MODELLING RESULTS	**Tools/ In charge**	**Priority**	**Status**
○ **Initiate and facilitate the "P" Incident Action planning process in the IMT.**			
○ **Provide to the IMT consolidated information on the incident, on-going operations, wind & current on site, drift prediction.** ○ **Review model results & reliability compared to local conditions.**	▶ **SITUATION UNIT**		
○ **Maintain Incident Situation Board + incident map updated.** ○ **Display monitoring and modelling results on Google Earth and WebGIS.**	▶ **SITUATION UNIT**		
○ **Assess the likely movements of oil slicks at +2-4 days and identify risk of groundings.**	▶ **SITUATION UNIT**		
○ **Provide the monitoring action plan (for the next day) for approval.**	**PLANNING MEETING** ▶ **SITUATION UNIT**		
○ **Evaluate all potential impacts using PEARL approach & predictions.** ○ **Provide reviewed response objectives to the IC, considering the impacts.**	▶ **ENVIRONMENT OFFSHORE UNIT**		
○ **Propose alternatives strategy/ techniques if needed.**	▶ **ENVIRONMENT OFFSHORE UNIT**		

□ **Define overall and external resources needed for the initial response.**	▶ **RESOURCES UNIT**		
O **Consolidate the first IAP for the next period with approved tactics developed by the Operations section.** O **Disseminate the IAP for the next period, once approved by the IC.**			
Tier 3/ Blow-out. Prepare a reinforced monitoring Action Plan.	▶ **ENVIRONMENT OFFSHORE UNIT**		
O **Activate ENVIRONMENT ONSHORE UNIT if risk of oil groundings.**			
MANAGEMENT OF SECTION	**Tools/ In charge**	**Priority**	**Status**
Tier (2) 3. Activate the Resources Unit to: - Provide the status of monitoring & response resources available to TEP Liban. - Develop the organigram of TEP Liban response organization (to display in IMT) + interfaces with external stakeholders (contractors, assistance…). - Define external resources and support needed to implement the tactics.	▶**RESOURCES UNIT**		
Tier (2) 3. Activate the Documentation Unit to start collecting process of all key documents, reports etc. paper & electronic versions.	▶ **DOCUMENTATION UNIT**		
Tier 3. Request immediate mobilization of support personnel to reinforce the section and plan the rotation of personnel.	See "FORMS".		
O **Ensure Finance Section is informed of all cost commitments of section.**			
DAILY MANAGEMENT OF RESPONSE	**Tools/ In charge**	**Priority**	**Status**
O **Propose daily & next day monitoring tactics & alternative strategies if needed.**	**TACTICS MEETING**		
O **Ensure all National legal requirements are complied with & ensure compliance of the response with the NOSCP.** O **Advise the IC on environmental issues and societal.**			
O **Provide internal daily reports for IMT, CMC & Total H.Q.** O **Provide external daily & weekly reports for authorities: JMOC & LPA (to be approved by IC).**	▶ **SITUATION UNIT**		
O **Update monitoring & modelling displayed information:** slick observations, oil behaviour, monitoring, weather forecast, drift & behaviour predictions…	▶ **SITUATION UNIT**		
O **Provide the updated offshore surface/ subsea monitoring for approval.**	**PLANNING MEETING** ▶ **SITUATION UNIT**		
O **Update status of monitoring & response resources available or in use.** O **Balance needed vs. available resources.**	▶ **RESOURCES UNIT**		
O **Update the organization charts (IMT, sites and external interfaces).**	▶ **RESOURCES UNIT**		
O **Collect key documents, reports etc. (paper & electronic versions).**	▶ **DOCUMENTATION UNIT**		
O **Ensure the daily dissemination of the approved IAP to all sites.**	▶ **DOCUMENTATION UNIT**		
O **Daily assessment of the efficiency of the response + monitoring/ activities.** O **Advise on needed for re-enforced monitoring & modelling activities.**	▶ **ENVIRONMENT OFFSHORE UNIT**		
O **Prepare facts on potential environmental offshore impacts of spill and justification of response strategy (SIMA).**	▶ **ENVIRONMENT OFFSHORE UNIT**		
FINAL ACTIONS	**Tools/ In charge**	**Priority**	**Status**
O **Advise the Incident Commander on when to stop response operations.**			
O **Ensure that cleaned sites meet the end points criteria before demobilization.**			
O **Check the final disposal and treatment of recovered oil + oily waste.**			
O **Coordinate wildlife & environmental rehabilitation programs with national agencies – if needed.**			
O **Supervise the preparation of the Demobilization Plan.**			
O **Send the final report to the authorities after approval of GM.**			

6.3.3 Job ticket: IMT/ Operation section chief

RESPONSIBILITIES	PERSONNEL		
See "Full-blown IMT structure and responsibilities ", p.15	Designated by the IC.		
IMMEDIATE ACTIONS	**Tools/ In charge**	**Priority**	**Status**
○ **Designate Directors depending on incident (or assume responsibilities):** - Surface branch + Vessels branch + Air operations branch.			
○ **Establish immediately liaison with the Total RSES/ Rep. on site.** ○ **Designate an IMT contact point with the RSES and later the Local IC's.**			
○ **Ensure assistance is immediately provided to site(s) as needed.** ○ **Follow-up and approve the on-going response initiated on site.** ○ **Ensure that contractors are briefed on their responsibilities.**			
○ **Ensure safety measures are enforced (e.g. air quality monitoring).**	▶PLANNING SECTION		
○ **Provide information to the Planning section:** status of incident, escalation risk and volume spilled, wind & current on site etc.	▶SURFACE BRANCH DIRECTOR		
○ **Organize the immediate release of TEP Liban vessels/ helicopters from active operational assignments if requested, after IC approval.** ○ **Organize the transfer of resources to the incident site.**			
○ **Develop tactics, after discussion with Planning Section:** - detailed tactics + zoning of operations for next day; - outline of tactics for next days; - type/ amount of resources needed (for next days, 5-10 days if blow-out).	TACTICS MEETING ▶SURFACE BRANCH DIRECTOR		
○ **Provide information to consolidate the 1st IAP (to Planning section)**	PLANNING MEETING		
○ **Display in the IMT a map of current operations + planned (next day).**	▶SURFACE BRANCH DIRECTOR		
○ **Appoint a Local IC for spill response at sea if needed to relieve the RSES.** ○ **Establish contact between Local IC & assistance joining the response.**			
Tier 3. Request immediately personnel for offshore site + IMT/ Operations.			
Tier 3. Request if needed the set-up of staging area at the airport or port.			
DAILY MANAGEMENT OF RESPONSE	**Tools/ In charge**	**Priority**	**Status**
○ **Review daily tactics & zoning at sea/ onshore for the next period.**	TACTICS MEETING ▶SURFACE BRANCH DIRECTOR		
○ **Develop on shore response tactics if needed.**	▶SHORE BRANCH DIRECTOR		
○ **Update regularly the map of on-going + planned operations.**	▶ALL BRANCHES		
○ **Approve tactics and assignments of resources for the next operational period.**	PLANNING MEETING		
○ **Coordinate daily all tactical operations at sea with the Local IC(s).** ○ **Feedback the progress, efficiency and problems encountered on site.**	▶SURFACE BRANCH DIRECTOR		
- Coordinate directly aerial response operations.	▶AIR OPERATIONS BRANCH DIRECTOR		
- Liaise with Local IC At Sea to coordinate the maritime activities. Inform them of coming assistance and arrangements for the coordination.	▶SURFACE BRANCH DIRECTOR		
- **/!\ Zoning and coordination of subsea, maritime and aerial operations.** - **/!\ Authorization of flight plans with Civil Aviation.**	▶ SURFACE BRANCH DIRECTOR		
○ **Appoint Local IC(s) for shoreline on a clearly defined geographic area.**			
○ **Develop shoreline branch in the IMT if requested by the authorities.**			
○ **Develop the Waste Branch + Wildlife Branch in the IMT (as needed).**			

□ **Coordinate the oil spill waste management activities.**	**▶WASTE BRANCH DIRECTOR**		
○ **Implement the management of oil recovered at sea:** storage on vessels, decantation, transport, offloading and treatment etc.	**▶SHORE BRANCH DIRECTOR**		
○ **Coordinate shoreline clean-up activities.**	**▶ WILDLIFE BRANCH DIRECTOR**		
○ **Coordinate the oil wildlife management activities.**	**▶ WILDLIFE BRANCH DIRECTOR**		
○ **Coordinate the transfer of resources provided by the Logistics section to the area of responsibility of the Local IC(s).** ○ **Liaise with the operational management of contractors involved on site.**	**▶ALL BRANCHES**		
MANAGEMENT OF SECTION	**Tools/ In charge**	**Priority**	**Status**
○ **Ensure Finance Section is informed of all cost commitments of section.**			
○ **Provide all supporting documents & forms to the Planning section for the daily finalization of the IAP.**			

6.3.4 Job ticket: IMT/ Logistics section chief

RESPONSIBILITIES	**Personnel**		
🗎 See "Full-blown IMT structure and responsibilities ", p.15	Designated by the IC.		
IMMEDIATE ACTIONS	**Tools/ In charge**	**Priority**	**Status**
O Mobilize personnel for Support/ Supply unit, depending on incident. *Note. Service branch is needed for shoreline operations*.			
O Provide information to IMT on available resources from Local/ Regional/ International contractors/ assistance.	**▶ SUPPLY UNIT**		
Tier 2 & 3. After authorization of GM, and as per instructions: **O Call assistance (local contacts, TEPCY, etc.).** **Tier 3:** **O Send to OSRL 1st: Notification form, 2nd: Authorization mobilization form, signed by a Call-Out Authority.** **O Mobilize other assistance as needed.**	**▶ SUPPLY UNIT** + Service Level Agreement SLA; - Supplementary Agreement (blow-out response)		
O Display in the IMT an overview of the status of mobilization process.	**▶ SUPPLY UNIT**		
Tier 2. Initial mobilization. **O Follow-up mobilization of local support + Authorities (if mobilized).** **O Mobilize additional vessels + local contractors (Rec. Oil management).**	**▶ SUPPLY UNIT**		
Tier 3. Initial mobilization. **O Follow-up mobilization of OSRL.** **O Mobilize additional vessels & planes as needed.** **O Anticipate procedures for emergency Customs Clearance & Immigration.**	**▶ SUPPLY UNIT**		
Tier 3. Request immediately personnel for IMT/ Logistics section + OSRL Rep. + staff to manage reception & staging areas.			
Tier 3. Identify suitable facilities for an expanded IMT if needed.			
/!\ Ensure all contractors are informed of their responsibilities and liabilities.			
DAILY MANAGEMENT OF RESPONSE	**Tools/ In charge**	**Priority**	**Status**
O Coordinate the mobilization of assistance in country, reception, staging **+ Hand-over to Operations section.**			
O Request some financial autonomy to engage contracts.			
O Supervise the set-up of facilities and provision of ground support.			
O Set-up a tracking system to follow-up assistance request & offers, mobilization, contract execution.	**▶ SUPPLY UNIT**		
O Update the overview of the mobilization status in the IMT.			
O Mobilize assistance after technical approval (by IMT) **+ approval of contract Terms & conditions (by Finance section).**	**▶ SUPPLY UNIT**		
O Prepare administrative formalities for: **- emergency custom clearance;** **- Immigration issues for personnel.**	▶ Equipment Manager ▶ Personnel Manager		
O Organize and follow the transit, reception, staging and dispatch to the sites of assistance for at sea response. **O Organize the logistics chain to sustain operation (consumables, fuel, personnel, waste evacuation etc.)**.	**▶ SUPPORT/ SUPPLY UNIT/**		
O Organize and follow the transit, reception, staging and dispatch to the sites of the assistance for onshore response. *O Organize the logistics chain to sustain onshore operations (if needed).*			
Tier3. Transfer the IMT in another location if needed (full-blown IMT).			
MANAGEMENT OF SECTION	**Tools/ In charge**	**Priority**	**Status**

□ **Ensure that Finance is advised of all cost commitments.**			
O **Liaise with Finance to review terms & conditions of contracts.**			
O **Provide logistics input for the daily update of the IAP.**			
FINAL ACTIONS	**Tools/ In charge**	**Priority**	**Status**
O **Oversee the demobilization of the resources.** O **Ensure all assistance equipment is cleaned, repaired or replaced, if necessary, and returned to the provider.**			

6.3.5 Job ticket: IMT/ Finance section chief

RESPONSIBILITIES	Personnel		
See "Full-blown IMT structure and responsibilities ", p.15	Designated by the IC.		
IMMEDIATE ACTIONS	**Tools/ In charge**	**Priority**	**Status**
○ **Mobilize key units depending on incident (or assume responsibilities):** - Procurement unit - immediately; - Cost unit & Time unit as soon as possible.			
○ **Ensure immediate availability of cash and timely payment procedures.**	▶**PROCUREMENT UNIT**		
○ **Gain knowledge of contracts/ agreements & legal/ financial implications:** - Local contractors, vessel mobilization & chartering; - OSRL Service Level Agreement SLA (+ Supplementary Agreement if blow-out).	▶**PROCUREMENT UNIT** See Op. Sup. n°4		
○ **Validate terms & conditions of local contracts.** *Note. OSRL contracts are already approved by Total HQ.*	▶**PROCUREMENT UNIT**		
○ **Set-up a cost:** **- tracking tool for all resources mobilized.** **- analysis / projection tool to anticipate the level of cost.**	▶**COST UNIT**		
○ **Set-up a time tracking tool of equipment and personnel.**	▶**TIME UNIT**		
Tier 3. Request personnel from Total + Specific advice (Total/ DARAG).			
DAILY MANAGEMENT OF RESPONSE	**Tools/ In charge**	**Priority**	**Status**
○ **Oversee all financial & administrative aspects of the incident.**			
○ **Provide financial and cost analysis information as requested**			
○ **Meet with assistance / Contractors Rep. as needed, with Logistics section.**			
○ **Liaise with representatives of insurers (vessel, rig…) if applicable.**			
○ **Update cost tracking with mobilized resources & check invoices.**	▶**COST UNIT**		
○ **Update time tracking with mobilized resources & check invoices.**	▶**TIME UNIT**		
○ **Timely issue purchase orders.** ○ **Manage payments of all invoices.**	▶**PROCUREMENT UNIT**		
○ **Review & approve contracts managed by Logistics section, in compliance with national laws and Total regulations.** ○ **Assess the insurance policies applicable.**	▶**PROCUREMENT UNIT**		
○ **Prepare cash/ payment options for teams on the shore.**	▶**PROCUREMENT UNIT**		
○ **Ensure compensation and claims procedure is setup (by CMC).** ○ **Envisage opening "claims office" for large incidents.** ○ **Ensure all claims are received, managed, tracked and feedback is regularly provided to the claimants for a reasonable settlement.**	▶**CLAIMS & COMPENSATION UNIT**		
MANAGEMENT OF SECTION	**Tools/ In charge**	**Priority**	**Status**
○ **Provide financial inputs for the Incident Action Plan.**			
○ **Expand rapidly the section to manage claims and compensation matters.**			

6.4 Job ticket: CMC

/!\ Job ticket is provided as guideline of tasks for Tier 2 & 3 incidents, to adapt case-by-case.

RESPONSIBILITIES		
Responsible for the overall management of the crisis in country, liaison with the CSC in Paris, with Lebanon authorities (LPA, MoEW and NOR if activated), with partners, **and for the management of the crisis communication in country.**		
TEP LIBAN GM - FOR TIER 2 & 3 SPILLS	**Priority**	**Status**
Approve the initial call & Notification form to the JMOC & LPA (Tier 2 & 3). **Approve the first call to the Total EP Duty Manager.** **Authorize first calls to external organizations: OSRL, Cedre etc. and agree on level of information to disclose**		
Request from Total H.Q. the activation of the CSC in Paris for Tier 3 spills.		
CALL OUT AUTHORITY	**Priority**	**Status**
Approve the mobilization of OSRL, Cedre and other sources of assistance. **Signs the assistance mobilization forms with P.O. numbers.**		
MANAGEMENT	**Priority**	**Status**
Ensure to have a comprehensive and up-to-date understanding of the situation: - The incident & impacts status and response actions on-going, through a regular & summarized feedback from the IMT; - The possible evolution of the incident and potential impacts (forecast & modelling).		
Provide support to the IMT, and facilitate all financial/ contractual issues: - mobilization of expertise in Lebanon: EP, Total Group and external, - fast cash flow to mobilize the assistance, - some financial autonomy for the IC and Logistics section to engage contracts, etc.		
Request immediately from Total H.Q. (for Tier 3) some support personnel for the IMT & CMC, and site operations, to arrive in country as soon as possible.		
IMPACTS, CRISIS MANAGEMENT OBJECTIVES AND STRATEGY		
Identify the crisis components/impacts according to P.E.A.R.L.: **- People** **- Environment** **- Activities** **- Reputation** **- Liabilities (financial exposure of TEP Liban to penalties, claims, environmental liability, etc.)**		
Map all stakeholders, identifying - type (public, private, authority, media, NGO etc.), - geographic area of authority or influence, - attitude for the incident (neutral/ support/ hostile).		
Define key crisis management objectives and respective strategy, e.g. - media communication; - business partners relation; - public & authorities' relations; - transboundary issues; - business continuity; - legal/ financial exposure limitation, etc		
SUPPORT TO INCIDENT MANAGEMENT		
Approve the strategy, tactics and resources mobilization for incident management from the Incident Commander.		
Facilitate the mobilization of assistance and external resources in country, e.g. obtain government authorization for emergency Customs clearance and Immigration (Visas), as needed.		

Anticipate the drift of the slick out of the Lebanon EEZ, and the need to set-up a transboundary incident management system. **Request Total H.Q. to set-up a full incident management system in countries at risk**.		
COMMUNICATION		
Set-up constant liaison with Total Regional Direction and Total CSC in Paris.		
Liaise with high level stakeholders. - TEP Liban Partners; - Ministries: MoEW (LPA), MoPWT (DGLMT), MoE and others as requested: Interior, Defence…; - Authorize interfaces between the IMT and local authorities; - CEO's of contractors/ other companies involved and/ or at risk.		
Ensure a clear communication with authorities about: - the spill (e.g. representatives of authorities for aerial surveillance, access to survey results etc.), - the response (e.g. embed representatives of national authorities in the IMT, etc.), - the effects (access to oil and water sampling results, etc.).		
Set-up a clear Media Crisis Communication strategy. **Request expertise to assist the TEP Liban Public Relations/ Com' team to manage the Crisis Communication.** **Ensure the TEP Liban Public Relations/ Com' team has ability to "Listen" to the Media & social networks.**		
COMPENSATION		
Establish a strategy and communication for the management of claims for compensation (from affected local communities, fishermen, hotels, etc. in case of oil grounding). - Clarify the liabilities of TEP Liban (vs. shipowner, rig company, logistics base operators etc.). - Mechanism to manage the claims. - Assessment and settlement of the economic loss. - Strategy in case of claims from the authorities to cover environmental damage.		
For a spill from a tanker (and TEP Liban participates to the response), convention CLC 92 and fund 92 are applicable (i.e. TEP Liban can claim for compensation of the cost of the response operations and economic loss from the insurer of the tanker).		
- Request expert support from Total for the claims handling.		
- Liaise with the insurers of the tanker and representatives of the ITOPF (expert for the insurer of the tanker owner).		
- Liaise with the representatives of the FIPOL (major incident).		
- Investigate potential compensation.		
Approve the ending of the response operations.		

6.5 Job tickets: IMT/ Planning section

See list of job tickets and page numbers in:

“Job tickets: Incident Commander and IMT section chiefs”, p.77

6.5.1 Job ticket: Planning/ Oil Spill Situation Unit Leader

RESPONSIBILITIES	**PERSONNEL**		
See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS - OFFSHORE	**Tools**	**Priority**	**Status**
Collect, validate and disseminate in the IMT the initial data on the incident.			
Confirm the nature of oil spilled. **Display available information on spilled product (characteristics + MSDS).**	Op. Sup. 1 “OILS AND PRODUCTS”		
Assess the volume of oil spilled (Site information + 1st observations).	OSRA Quantification		
Request immediately (if few m3’s confirmed or probable): - Aerial surveillance (helicopter); - launching of ARGOS buoy; - Sampling of oil.			
Assess the initial drift of the slick. - Drift direction and speed with observed currents and forecasted wind for 24hrs. - Evaluate the threat for other vessels and time for impact.	OSRA Trajectory		
Assess the likely behaviour of oil spilled. **+ Window of opportunity for mechanical mixing.**	Op. Sup. 3 “Fate of oil at sea” + ADIOS 2.0		
Provide information to Planning Section Chief for notification call.			
Prepare the surface monitoring action plan for the 1st period: - Aerial surveillance mission(s)? - Launching of ARGOS buoys? Sampling, other actions.	Implemented by Operations/ Surface/ Surface monitoring		
Prepare the Notification to JMOC. **Provide to Planning section chief.**	Lebanon authorities oil spill notification form.		
Set-up the initial “Incident Status Board” in the IMT.			
DAILY MANAGEMENT OF RESPONSE	**Tools**	**Priority**	**Status**
Prepare the surface monitoring action plan for the next period.			
Collect & consolidate the monitoring offshore results: Aerial surveillance, observation from vessels, drifting buoy + Sat. images + balloons / drones.			
Collect & consolidate the prediction/ modelling offshore spill results: drift:+ behaviour & mass balance + weather + etc. **Compare results with observations & discard inconsistent predictions.**			
Regularly update the Incident Situation Boards to maintain a near real-time Common Operating Picture of offshore situation.	All boards		
Regularly update the GIS & maps: slick position, drift predictions, drifting buoy positions, zoning of operations, locations of Local IC Post(s), staging areas, etc.	Google Earth & ArcGIS		
Issue the daily and weekly oil spill Situation Reports, internal & external.			
Regularly update the Incident Situation Boards & GIS + maps to maintain a near real-time Common Operating Picture of onshore situation: maps of shore oiling, sampling locations, shore divisions, Local IC posts, clean-up sites, waste storage sites, staging areas, etc.			
FINAL ACTIONS	**Tools**	**Priority**	**Status**
Prepare the draft oil spill report for review by Planning chief.			

6.5.2 Job ticket: Planning/ Resources Unit Leader

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
INITIAL RESPONSE	**Tools**	**Priority**	**Status**
Provide the status of monitoring & response resources available to TEP Liban.			
Develop the organigram of TEP Liban response organization (names & contacts). **Display in the IMT & sent to sites.** **Identify all interfaces with external stakeholders (authorities, contractors, assistance & external).**			
Define the overall needed resources and support to implement the tactics for the next period and coming days. **Compare with existing resources (in affiliate) and define resources to mobilize from assistance (external).**			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Update the status of monitoring & response resources available to TEP Liban.			
Balance needed vs. available resources. **List the needed external resources (type & quantity).** **Identify potential providers (in country, OSRL, etc.) and mobilization time.**			
Update the organigram of TEP Liban response organization.			

6.5.3 Job ticket: Planning/ Documentation Unit Leader

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
INITIAL RESPONSE	**Tools**	**Priority**	**Status**
Start collecting process of all key documents, reports etc. in paper & electronic versions.			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Continue collecting all key documents, reports etc. in paper & electronic versions & archive.			
Set-up an archiving system for paper & electronic documents.			
Consolidate the document of the IAP, once content is approved.			
Ensure the daily dissemination of the IAP.			

6.5.4 Job ticket: Planning/ Environment Offshore Unit Leader

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Plan re-enforced offshore oil & water sampling program – if needed + oil analysis protocol and labs.	Op. Sup. 3 Monitoring and Modelling		
Propose re-enforcement of surface monitoring plan – if needed. **Propose specific subsea monitoring for a blow-out.**	Op. Sup. 3 Monitoring and Modelling “OS-Monitoring-Plan_****.xlsx		
DAILY MANAGEMENT OF RESPONSE	**Tools**	**Priority**	**Status**
Review, adapt or reinforce the surface monitoring plan: improvements surface monitoring actions if needed + mobilization of additional personnel &/or additional expertise.	Missions coordinated by Operations/ Surface/ Surface monitoring Group.		
Follow-up & reinforce the oil (and water) sampling action plan as needed.			
Assess the mechanical dispersibility of hydrocarbons + effectiveness of mechanical mixing operations (observations & sampling)			
Assess effectiveness of recovery operations (estimation of the oil in recovered oil and water mix, sampled from the tanks of the recovery vessels).			
Justify the offshore response strategy.			
- Ensure all environmental aspects of response comply with National rules and regulations.			
- Monitor the response operations (efficiency, potential environmental impacts) and provide advice on the need to re-evaluate the strategy.			
- If needed, carry out a Net Environmental Benefit Analysis (or SIMA Spill Impact Mitigation Assessment) of the response options to justify the choice from an environmental perspective.	Former NEBA, now SIMA		
- Propose at-sea “end-points”: i.e. when to stop response operations at sea?			
BLOW-OUT. Develop subsea monitoring plan to track oil dispersed in the water column; and evaluate environmental effects.	With Operation/ Surface/ Subsea Monitoring group		
Assess potential environmental impacts. - Potential effects offshore. - Potential threatened shoreline area, estimated time to reach the shoreline.			
Manage post-spill monitoring and rehabilitation. - Consider a sampling program to assess the water quality after the spill. - Coordinate post spill monitoring.			

6.5.5 Job ticket: Planning/ Environment Onshore Unit Leader

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Identify coastal areas at risk with of slick positions, drift predictions, and sensitivity maps.	See Situation Unit.		
Before oil comes ashore, identify sensitive sites to protect in priority.			
- Inventory sensitive resources, sites, areas, habitats or activities which could be affected by the oil slicks.	Coastal Sensitivity Maps		
- Study the need for protection (opened/ closed river mouth? Lowest sensitivity?).	Google Earth + information from local authorities		
- Study the feasibility for protection. - Request a survey to re-assess site morphology and conditions if needed.			
- Prioritize the sensitive sites and provide to Response Planning Unit.			
Prepare Shoreline Clean-up Assessment SCAT.			
- Define need for shoreline survey and plan and information to collect.	Op. Sup. 8		
- Organize the SCAT teams. - Request mobilization of competent personnel.	External expertise (local, OSRL, Cedre)		
Anticipate clean-up operations.			
- Identify the types of coast at risk (sand beach, rock, marsh…).	Coastal Sensitivity Maps + Photos/ Videos.		
- Identify the best suited clean-up technique per type of shore.	Op. Sup. 7 & 8		
- Define the main resources needed and the clean-up end points.	Op. Sup. 7 & 8		
- Advise on the development of the Operations section/ Shoreline branch.			
DAILY MANAGEMENT OF RESPONSE	**Tools**	**Priority**	**Status**
Update the planning of the Shoreline Clean-up Assessment teams.			
- Request aerial survey of the affected shoreline.			
- Identify the areas to survey by land and confirm segments, after the aerial survey.			
- Plan SCAT missions: treatment recommendations, end-points, environmental implications and follow-up of clean-up work.	Coordinated by Operations/ Shoreline/ Onshore survey Group.		
- Collect and analyse daily SCAT reports. - Provide data to the OS Situation Unit (to integrate into the GIS).			
Advise for clean-up operations to Operations/ Shoreline branch.			
- Define the priority sites to clean-up and clean-up strategy: delimitation of work sites? Clean-up technique? Level of clean-up to achieve?	Last SCAT reports.		
- Collate and analyse the clean-up site daily reports.			
- Organize (with Operations section) the site reception with local and national authorities after the clean-up operations and before the full demobilization.			
Propose oiled wildlife management strategy. - protection, capture and rehabilitation of oiled wildlife.			
Propose oil waste management strategy. - temporary/ intermediate waste storage, segregation, tracking, storage, treatment & final disposal.			
Justify the onshore response strategy.			

- Monitor the response operations (efficiency, potential environmental impacts) and provide advice on the need to re-evaluate the strategy.			
- Ensure the clean-up techniques do not generate adverse side-effects on the environment and activities.			
- Provide environmental justification on the onshore oil spill response strategy. If needed, carry out a NEBA/ SIMA of the response options to justify the choice from an environmental perspective.			
Plan environmental and societal impact assessment (NRDA).			
- Assess the need for Natural Resource Damage Assessment.			
- Plan program for Natural Resource Damage Assessment, including sampling and management/ analysis of samples, with legal witness.			
- Consider the mobilization of NRDA teams to assess damage on: - seawater, groundwater and air quality; - sediment, wildlife; - human health, sensitive environmental/ cultural/ economic resources.			
Manage post-spill monitoring and rehabilitation.			
- Coordinate coastal and onshore post spill monitoring programs.			
- Coordinate post spill monitoring and resource rehabilitation programs (coastal area and on shore) if and when required.			
- Develop and implement consultation programs for the communities or activities which may be affected by the incident.			

6.6 Job tickets: IMT/ Operations section

See list of job tickets and page numbers in:

“Job tickets: Incident Commander and IMT section chiefs”, p.77

6.6.1 Job ticket: Operations / Surface Branch Director

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Provide immediately support and assistance to the Local Incident Commander(s) as needed.			
Set-up an emergency communication network between the sites offshore and the IMT.			
Designate the Surface branch/ supervisors of the various groups as needed (when workload exceeds capabilities of Surface Branch director) and coordinate their work: - Surface monitoring; + Subsea monitoring (if blow-out); - Recovery offshore (option: near shore).			
Confirm the tactics for the first day.			
Define the response strategy and, accordingly, the tactics for the next operational period with detailing zoning, tactics & resources to engage.			
Develop, as soon as possible, an outline of strategy & associated tactics for the coming 3-5 days (extend to 5-10 days for large incidents).			
DAILY MANAGEMENT OF RESPONSE	**Tools**	**Priority**	**Status**
Act as the contact point between the Local IC(s) at sea for spill response and the IMT (or delegate).			
Update the strategy and tactics for: **- the next operational period (with detail & zoning), to submit to IC for approval;** **- the next 3-5 days (outline) and next 5-10 days (for a large incident).**			
Coordinate the implementation of the aerial operations (aircraft at low altitude for surveillance) in liaison with the Air operations branch and the Aviation Authority.	**Critical risk**: simultaneous maritime & aerial operations.		
Coordinate the implementation of the maritime response operations (vessel based) in liaison with the Local IC(s), and with support of the Group supervisor (Recovery). **Adjust the tactical plan and zoning of operations if needed (compared to IAP designed previous day).**			
Coordinate the implementation of the surface and subsea monitoring actions (vessel-based) with the Surface and Subsea Monitoring Groups.			
Advise Operations chief on resources to: - **Be placed under direct command of the Local IC At Sea (e.g. Vessels).** - **Remain under direct command of the IMT (e.g. Helicopters).**			
Assess the effectiveness and operational limits/ constraints of previous operations.			
Request from the Local IC(s) regular updates on the incident, operations, results of operations, difficulties and needs.			

6.6.2 Job ticket: Operations/ Surface/ Surface Monitoring Group supervisor

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Assist the Planning/ Situation unit to prepare the Surface Monitoring Plan.			
Set-up an emergency communication network between the monitoring teams (vessel-based) and the IMT.			
Source competent personnel specialized equipment as needed for the monitoring teams (vessels to be sourced by the Logistics section). **Request, once approved, Logistics Section to mobilize them.**			
Prepare the launching of drifter buoys (accordingly to the approved monitoring plan) in relation with the teams on site and Operations/ Vessels.			
Prepare the initial aerial surveillance missions (accordingly to the approved monitoring plan).			
DAILY MANAGEMENT OF RESPONSE	**Tools**	**Priority**	**Status**
Assist the Planning/ Situation unit to review the Surface Monitoring Plan. **Discuss possible monitoring activities with Planning/ Environment unit.**			
Prepare the Aerial surveillance missions for the coming days with Operations section/ Air Operations missions. **Ensure there is no conflicts with other aerial activities.** **Ensure the Local IC(s) are informed of the exact timing of all aerial surface monitoring operations in their area of responsibility.**	**Critical risk:** low altitude flight vs. use of observation balloon and drones.		
Request, from Local IC at sea, the location and timing where aerial monitoring tools launched from vessels will be used (tethered observation balloons, drones).			
Prepare the vessel-based monitoring missions with the monitoring teams on site and the Local IC(s) for coming days: sampling, air quality, mechanical mixing assessment etc.			
Coordinate directly the daily implementation of aerial observation. **Coordinate with the Local IC(s) the daily implementation of monitoring from vessels:** sampling, air quality, mechanical mixing assessment etc.			
Ensure the vessel-based surface monitoring teams report to the Local IC upon arrival on site and at the beginning & end of each day (if a Local IC is appointed to that area of monitoring operations).			
Ensure the aerial observers report to the Local IC after landing to guide vessels (if a Local IC is appointed to that area of monitoring operations) **and IMT**.			
Request from the surface monitoring teams on site: - Results – to forward to the Planning Section; - Updates on the operations, difficulties and needs.			

6.6.3 Job ticket: Operations/ Surface/ Subsea Monitoring Group supervisor

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
N/ A. Subsea monitoring is mobilized in a later stage. *Note. The estimation of the flow-rate in case of a blow-out and effectiveness of SSDI operations are the responsibility of the Source Control teams at the well-head location, managed by the BOTF.* *Refer to the TEP Liban BOCP.*			
DAILY MANAGEMENT OF RESPONSE	**Tools**	**Priority**	**Status**
Assist the Planning/ Environment Offshore unit to prepare the subsea monitoring plan.			
Set-up an emergency communication network between the subsea monitoring teams (vessel-based) and the IMT.			
Source competent personnel for the subsea monitoring teams. **Request, once approved, Logistics Section to mobilize them.**			
Prepare the subsea monitoring (& sampling) missions with Local IC’s and subsea monitoring teams for the coming days: - carried out from vessels (deep sea fluorometer, subsea/deep sea water quality monitoring and sampling, sediment sampling, etc.); - launched from vessels & autonomous (AUV’s & gliders) etc.			
Coordinate <u>with the Local IC(s)</u> the daily implementation of subsea monitoring <u>from vessels</u>. **Ensure the tracking and data collection of subsea autonomous monitoring tools.**			
Inform the Local IC(s) of the subsea monitoring actions for the next operational period and prepare the monitoring missions with them.			
Ensure the vessel-based subsea monitoring teams report to the Local IC upon arrival on site and at the beginning & end of each day (if a Local IC is appointed to that area of monitoring operations).			
Request from the subsea monitoring teams on site: - Results – to forward to the Planning Section; - Updates on the operations, difficulties and needs.			

6.6.4 Job ticket: Operations/ Surface/ Recovery Offshore Response Group

Also applicable for Recovery Near shore Group supervisor.

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Assist the Operation section chief or Surface branch director to: **- prepare the initial Incident Action Plan.** **- facilitate the recovery of current day (if needed) and prepare the operations of the next day.**			
Request the mobilization of available vessels and competent team leader to deploy equipment.	▶ Vessels Branch		
Establish a line of communication with the designated vessel recovery coordinator on board/ team leaders.			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Assist the Surface branch director to review: **- the strategy, associated tactics, zoning & dimension needed resources for the Incident Action Plan of the next operational period.** **- the strategy & associated tactics for the next 3-5 days (or 5-10 days for a large incident).**			
Coordinate the integration of external vessels into the recovery teams.			
- Inform the Local IC At Sea of the mobilization of recovery/assistance/ Rec. Oil storage vessels to be placed under his coordination and others joining. - Request emergency clearance from Operation/ Vessels branch to authorize the entry in the area of operations of the mobilized vessels.			
- Agree on a transfer point/ time of mobilized vessels from management by Logistics section to operational management by Operations section.			
- Provide to Local IC’s contacts of mobilized vessels before their arrival. - Provide directly instructions to mobilized vessels about transfer point and contacts of IC, or via Logistics section.			
- Ensure direct contacts are established between mobilized vessels on site and the Local IC's.			
Prepare, facilitate & follow-up the deployment of booms & skimmer and oil recovery operations with designated recovery coordinator / team leaders.			
- Define daily zoning of areas for recovery.			
- Ensure suitability of equipment & monitoring effectiveness.			
- Plan storage of recovered oil on board the vessels (capacity?). - Have authorization for decantation and over-boarding of decanted water.			
- Use of floating storage tanks and shuttling/ offloading of the tanks? - Envisage mobilizing additional vessel/ coastal tanker to store rec. oil?			
- Ensure availability of transfer pump and hoses for transfer of recovered oil. - Plan procedure & JRA for ship-to-ship or to-tanker transfer of recovered oil. - Plan transport, offloading onshore and treatment of recovered oil.			
Send summary reports of recovery missions to the Surface Branch Director, including effectiveness, difficulties encountered and needs/ recommendations for next day(s).			

6.6.5 Job ticket: Operations/ Surface/ Mechanical Mixing Group supervisor

Responsibilities are similar to those of the Recovery Offshore Group supervisor, adapted to mechanical mixing.

6.6.6 Job ticket: Operations/ Air Operations Branch Director

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Supervise planning & preparation of <u>all</u> aerial response operations in incident sites. **Ensure:** **- safety of <u>all</u> aerial operations (surveillance, personnel transfer etc.).** **- aerial incident-related activities do not conflict with other aerial activities (transport of personnel).**	**Critical risk**		
Ensure: **- Local IC At Sea are informed of all planned aerial activities for the day (particularly low altitude flights) and kept updated in near real time of aerial activities in their area of operations.** **- Monitoring teams on site in charge of Drones/ Observation balloons are aware of the low altitude aerial traffic for the day.**			
Organize daily operational briefings with pilots mobilized and support company to agree on flight plans and support activities.	▶Air Op’s/ Air tactical group		
Liaise with pilots & Civil authorities to obtain flight plans. **Follow-up the delivery of flight plans and preparation of missions.**	▶Air Op’s/ Air tactical group		
Supervise <u>all</u> aerial operations (transport, surveillance).	**Critical risk**		
Ensure follow-up is provided to the IMT: **- Real-time status of all on-going aerial activity;** **- Knowledge of planned aerial activity for the current day.**	▶Air Op’s/ Air tactical group Aircraft tracking system		
Ensure all ground support is available for the aircrafts and crew at the airport.	▶Air Op’s/ Air support group		
Assist daily the Surface branch director to prepare aerial response tactical activities for the next operational period. **Ensure particularly that the daily zoning of aerial low-altitude flights is very accurately defined.**	▶Air Op’s/ Air tactical group		
Provide fixed-wind specification if such aircraft is needed for mid- to long-range aerial surveillance. **Advise for chartering process.**	▶Logistics section		

6.6.7 Job ticket: Operations/ Air Operations/ Air Tactical Group Supervisor

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Plan & coordinate <u>all</u> aerial operations on response sites offshore, nearshore and onshore. **Ensure:** **- safety of <u>all</u> aerial operations (surveillance, personnel transfer etc.).** **- aerial incident-related activities do not conflict with other aerial activities (transport of personnel).**	**Critical risk**		
Provide to Air Op’s Branch an accurate summary of planned aerial tactical operations for the current day with zoning, ETD’s/ ETA’s and type of flights & aircrafts– To be disseminated to IMT & Local IC’s.			
Prepare support material for briefing with pilots. **Animate daily briefings with pilots.** **Capture findings & comments of briefings.**			
Provide to Air Op’s branch director the aerial tactical response plan & zoning for the next operational period. **Ensure:** **- to have technical input from pilots on capability & limitations for surveillance flights.** **- that the daily zoning of low-altitude flights is accurate.** *Note. Aerial transport of crew/ personnel is not considered a tactical aerial activity; but is included in the general aerial activity planning.*			
Set-up the tools (flight tracking system) in IMT to maintain a real-time status of all on-going aerial activities. **Maintain up-to-date knowledge in the IMT of all planned aerial activities.**			
Coordinate with crews of aircrafts <u>all</u> aerial operations (transport, surveillance).	**Critical risk**		
Be informed of ETD’s & ETA’s of all flights, and real departure and arrival of all flights – to be provided to IMT & Local IC’s.			
Keep an updated an inventory of all aircrafts in use/ available (helicopters and fixed-wings if mobilized).			

6.6.8 Job ticket: Operations/ Air Operation/ Air Support Group Supervisor

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Carry out an inventory of available ground support for helicopter and fixed-wings aircrafts + assessment of capabilities of airports for large cargo planes.	In Lebanon and close countries as needed		
Organize additional ground support for helicopters / fixed-wings (used for aerial surveillance) if needed. **Contract a local airport support company if needed through the Logistics section** (airport ground support, crew management, etc.)**.**			
Organize ground support for the cargo aircraft(s) on identified airport(s), including: - aircraft parking area; - support personnel, offloading equipment & transport for cargo; - temporary cargo storage area in airport if needed; - support for crew (transport, in/out airport etc.).			
Facilitate Customs Clearance of equipment, and Immigration process of crew if needed (upon instructions of Logistics section).	▶Logistics Section.		
Ensure support for the pilots is provided at the airport: visas, reception, transport, rest-room etc.			
Consider the use of other airports for mid- to long- range aerial surveillance with helicopters and fixed-wings.	▶Logistics Section.		
Coordinate the set-up of heli-bases on the shore if needed, with support of Logistics/ Facilities.	▶Logistics Section.		
Maintain a real-time status of all aerial ground support activity.			
Keep Air Op’s Branch director informed of the status of all aircraft bases and support needs.			

6.6.9 Job ticket: Operations/ Shoreline Branch Director

The present job ticket is reviewed depending if and how Governorate and national authorities take over the management of shore operations.

RESPONSIBILITIES	PERSONNEL		
See "Full-blown IMT structure and responsibilities ", p.15			
IMMEDIATE ACTIONS – IF TEP LIBAN IS IN CHARGE OF CLEANUP	**Tools**	**Priority**	**Status**
Obtain information from Planning/ Situation unit to gain a full understanding of the situation onshore upon arrival in the IMT (own mobilization may occur few days after the IMT mobilization).			
Request/ Designate the personnel for the Shoreline branch (in the IMT) as needed; and coordinate their work: - supervisor of group Shoreline survey; - supervisor of group Protection; - supervisor of divisions for shoreline clean-up.			
Establish a line of communication with the designated Local IC on the shore (if already appointed & on site).			
/!\ Understand responsibilities regarding oiled shoreline intervention of: - local, Governorate and national authorities and agencies; - TEP LIBAN.			
Request the oiled shoreline survey/ SCAT program to implement.	▶Environment onshore.		
Develop the protection tactics for the coming days and precise actions for the next operational period: - Tactics, hazards, need of support/ boat, daily check etc. - Type and amount of equipment needed for all planned protection. - Transportation by road to site. Mobilization and deployment on site. - Define the resources (personnel, equipment & logistical support) to mobilize.	In liaison with protection teams. ▶Environment Onshore Unit. + Site Protection Plans if available.		
Define the framework for shoreline clean-up: - Delimitations of shoreline divisions "A", "B", "…" etc. - Local IC Post to set-up per Division and close staging areas as needed. - Local IC and Local IC post members for each Local IC post. - Links with local and Governorate authorities.			
Develop the shoreline clean-up tactics for the coming days per Division & working sites; **and precise actions for the next operational period:** - Shoreline treatment techniques & end-points. - Organization and supervision of working sites, personnel hiring, equipment and consumables, safety/ security site specific plans. - Need for external expertise: advisors, team leader etc. - Transportation by road to site. Mobilization and deployment on site. - Define the resources (personnel, equipment & logistical support) to mobilize.	▶Local IC(s) Ops Sup 7		
Ensure site specific Job Risk Assessments are completed before any operations. (option: Request JRA from contracted companies).	▶Local IC(s) + Security company (if contracted).		
Assist Logistics section to source competent personnel/ companies for: - IMT Groups and Divisions supervisors. - oiled shoreline survey. - Team leaders for protection and clean-up operations.	▶Planning section ▶Logistics section + Total H.Q.		
Assist Logistics section to source competent specialized shore response & clean-up companies.	▶Logistics section + Total H.Q.		
Develop the shoreline survey, protection and clean-up Action Plan for information of the authorities (after approval of IC).			

DAILY MANAGEMENT – IF TEP LIBAN IS IN CHARGE OF CLEANUP	Tools	Priority	Status
Act as the contact point between the Local IC(s) and the IMT.			
Liaise regularly with management of clean-up companies contracted to review operations and contract.			
Set-up an emergency communication network between sites onshore and the IMT.			
Provide timely support and assistance to the Local IC(s) as needed.			
Re-enforce the Operation section/ Shoreline branch/ supervisors as needed.			
Review the tactics for the coming days, and provide precise actions for the next operational period regarding: - oiled shoreline survey; - shoreline protection tactics; - shoreline clean-up tactics.			
Coordinate the oiled shoreline survey activities with specialized contractors and in liaison with local/ Governorate/ national authorities: - oiled shoreline survey (SCAT); - sunken oil detection (in shallow waters); - environmental impact assessment etc.			
Coordinate the oiled shoreline protection and clean-up activities, in liaison with: - Local/ Governorate authorities; - Local IC's and support of Group/ Divisions supervisors.			
Liaise & coordinate with the Waste and Oiled wildlife branches directors.			
Assess the effectiveness and operational limits/ constraints of operations.			
Request from the Local IC(s) regular updates on the incident, operations, results of operations, difficulties and needs.			

6.6.10 Job ticket: Operations/ Shoreline/ Onshore Survey/SCAT Group Supervisor

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Obtain information from Planning/ Situation unit to gain a full understanding of the situation upon arrival in the IMT.			
Assist the Environment onshore unit to prepare the oiled shoreline survey. **Agree on the use of the SCAT methodology and reporting format.**	▶ Environment onshore unit		
Assist Shoreline branch dir. & Logistics section to source competent personnel/ companies for oiled shoreline survey (SCAT). **Once approved, follow-up mobilization by Logistics Section and arrival on site.**			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Set-up an emergency communication network between surveying teams and IMT. **Ensure redundancy of communication means particularly for survey in remote areas (mobile phones on 2+ mobile network + satellite phones).**			
Coordinate the preparation of surveying missions, in liaison with the surveying teams, and with Local IC(s) if already mobilized on site + support of Logistics: - Aerial observation; - Ground survey & sampling.			
Provide equipment as needed for the survey teams: guidelines, forms, support material, camera, GPS, PPE, etc. for field teams. **(Or ensure surveyors have all equipment).**			
Liaise with the survey teams and Air Operations Branch to prepare the shoreline aerial surveillance missions.			
Liaise with the survey teams and the Local IC(s) to prepare the ground surveying missions: - transport to and within the area adapted to the environment (road, boat, quad etc.); - meeting with authorities prior to survey; - access to sites; - food, lodging, etc. **Ensure:** - the local authorities are aware of the missions. - representatives of the Governorate authorities participate – as needed – to the survey.			
Ensure the survey teams are under the command of the Local IC (s), if operating in the area of responsibility of a Local IC.			
Follow-up the survey missions in near real-time and feedback progress to the IMT.			
Request from the teams: - Results – to be forwarded to the Planning Section; - Updates on the missions, difficulties and needs.			

6.6.11 Job ticket: Operations/ Shoreline/ Environmental & Societal Impact Group Supervisor

Refer to:

“Job ticket: Operation/ Shoreline/ Onshore Survey/SCAT Group Supervisor”

And replace “oiled shoreline survey” by “environmental & societal impact assessment”.

6.6.12 Job ticket: Operations/ Shoreline/ Protection Group Supervisor

The present job ticket is reviewed depending if and how governorates and national authorities supervise or take over the management of shore operations.

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Obtain information from Planning/ Situation unit to gain a full understanding of the situation upon arrival in the IMT from oiled shoreline survey team (if deployed).			
Ascertain sites to be protected and anticipated protection tactics by the Planning/ Environment onshore unit.			
Prepare the protection tactics with the Planning/ Environment onshore unit.			
Request the contacts closest to the sites: - Local communities, Representative of municipality(ies), Representative of the Governorate(s).	▶Shoreline Branch Director		
Organize the survey mission(s) of the sites to protect, to check site access, morphology and conditions (compared to the anticipated protection plan etc.). - Protection of large number of sites: aerial survey first, then ground survey. - Protection of small number of sites: plan for ground survey directly (e.g. <5-10).	Include Protection Team Leader.		
Liaise with the governorate & local authorities during the survey mission.			
Update the protection tactics after the survey of sites . **Define the needed team, equipment & logistical support.**			
Source competent personnel for the field personnel. **Once approved, request Logistics Section to mobilize the personnel.**			
DAILY MANAGEMENT – <u>IF TEP LIBAN IS IN CHARGE OF THE OPERATIONS</u>	**Tools**	**Priority**	**Status**
Prepare on site protection missions.			
- Request security for the field teams if needed. - Request security to guard the deployed equipment.	▶Security company		
- Source the protection equipment (in country? Region? Makeshift? etc.). - Confirm the presence of boats for the deployment or mobilize support boats.	▶Logistics Section		
- Organize the transport of the protection equipment on the sites by land: 4x4, trailers, trucks, etc. or by sea or air if needed.	▶Logistics Section		
- Set-up the protection teams (leader & support personnel & security).			
Coordinate and support the site protection operations (in relation with the Local IC if already present on site).			
- Send in advance some personnel of the protection team to make contacts with the Local IC (if already present), with locals and to source support (boats etc.).			
- Confirm reception of the protection equipment on the sites.			
- Confirm when the protection operation is completed. - Request details on measures to ensure system remains efficient after a tidal cycle.			
Follow-up and demobilize.			
- Ensure daily visits to the site to ascertain the effectiveness of the protection tactics.			
- Inform IMT of (in)effectiveness or change of tactics/ equipment if needed.			
- Propose demobilization when no further risks; and demobilize after approval of IC.			

6.6.13 Job ticket: Operations/ Shoreline/ Division "A" Supervisor

The present job ticket is reviewed depending if and how governorates and national authorities supervise or take over the management of shore operations.

RESPONSIBILITIES	**PERSONNEL**		
See "Full-blown IMT structure and responsibilities ", p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Obtain information from Planning/ Situation unit to gain a full understanding of the situation upon arrival in the IMT.			
Obtain latest information from oiled shoreline survey team and identification of areas to be cleaned by the Division (from approved Incident Action Plan).			
Prepare the clean-up tactics with the Environment onshore unit.			
Request from the Shoreline Branch Director the contacts on-site: - Local communities, Representative of municipality, Representative of the province.			
Organize a survey mission to: - Check the whole area and locate sites to clean + location for the Local IC Post. - Evaluate coastal morphology and conditions (access, currents, hazards etc.). - Liaise with the local authorities. - Confirm sites to clean-up in priority & progress direction of clean-up per site.	With designated Local IC for the division.		
After the survey, evaluate needs for: - Set-up and run the Local IC Posts; - Store temporarily the waste on site; - clean-up operations for first 1 to 2 weeks: personnel, equipment + logistical support.			
Source competent personnel for the IMT and field personnel. **Once approved, request Logistics Section to mobilize competent personnel.**			
DAILY MANAGEMENT – <u>IF TEP LIBAN IS IN CHARGE OF THE OPERATIONS</u>	**Tools**	**Priority**	**Status**
Set-up an emergency communication network between Local IC and the IMT.			
Coordinate and support site protection operations (with the Local IC).			
- Request security for the field teams, as needed, and to guard equipment.	▶Security company.		
- Source the clean-up equipment (in country? Makeshift? etc.). - Source work force (team leader & local as workers).	▶Logistics Section		
- Organize the transport of the equipment on the sites by land: 4x4, trailers, trucks, etc. or by sea or air if needed.	▶Logistics Section		
- Follow-up the Local IC teams (Local IC, team leaders, personnel etc.).			
Coordinate and support the shoreline clean-up operations in relation with the Local IC(s).			
- Ensure safety is first concern on site.			
- Confirm the set-up of the Local IC teams and localization of working sites.			
- Ensure Local IC understands areas to clean, clean-up techniques and end-points.			
- Request daily report from the Local IC: status of the work, effectiveness, waste produced, engaged resources and needs, and forward to Planning/ Situation unit.			
Follow-up and demobilization.			
- Inform IMT of (in)effectiveness or change of tactics/ equipment if needed.			
- Confirm end of clean-up and need to organize a "Site Inspection visit".			

6.6.14 Job ticket: Operations/ Waste Branch Director

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Provide to the IMT an Oil Waste Management Action Plan.			
Implement and coordinate all operations for the collection, transport, intermediate storage, treatment and final disposal of recovered oil and oily waste.			

6.6.15 Job ticket: Operations/ Wildlife Branch Director

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Provide to the IMT an Oiled Wildlife Management Action Plan.			
Implement and coordinate all operations for the oiled wildlife management.			

6.7 Job tickets: IMT/ Logistics section

See list of job tickets and page numbers in:

“Job tickets: Incident Commander and IMT section chiefs”, p.77

6.7.1 Job ticket: Logistics/ Support branch Director

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
TASKS	**Tools**	**Priority**	**Status**
Provides Supply, Facilities and Ground support for the response operations.			
Coordinate the work of the Supply, Facilities and Ground support units. **Ensure deliverables are provided to the IMT.**			
Provide input about logistics support & mobilization to the IMT.			
Brief Branch staff as needed.			
Identify and anticipate support requirements.			
Request additional resources as needed.			
Oversee demobilization of branch and associated personnel.			

6.7.2 Job ticket: Logistics/ Support/ Supply Unit Leader

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE RESPONSE	**Tools**	**Priority**	**Status**
Compile the needs (personnel, equipment, consumables, & logistical support) approved for mobilization from external assistance & other providers.			
Identify the priority needs with Operations Section.			
Coordinate the work of the Supply unit to mobilize timely in country the needed resources. - National-International contracted Assistance Manager - Local Supply Manager - International Supply Manager			
Ensure items (goods &/ or services) are technically approved by the Operation or Planning section, and Terms & conditions of contract are approved by the Finance section.			
Oversee the arrival and reception of supplies in country. - Equipment Manager - Personnel Manager			
Store the received resources in reception/ staging areas before their dispatch. - Facilities unit leader			
Oversee, as agreed with Operations section: **- the transport of personnel to the IMT, operational sites, or other location, and transfer under operational responsibility of the Operations.** **- the transport of resources in staging areas close to intervention sites and transfer under the responsibility of Operations / close IC’s.**			
Maintain an updated knowledge of the status of the mobilization of resources, with an overall inventory management system.			
Inform Finance Section of all cost implication, cost evaluation (rental cost staged or in use, purchase etc.) and invoicing procedures.			

6.7.3 Job ticket: Logistics/ Support/ Supply Unit/ National-International contracted Assistance Manager

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
OSRL mobilization: request the immediate mobilization of 5 OSRL representatives for Tier 3 events (for Logistics, Operations, Planning).			
Compile the needs for external assistance based on the evaluation from Planning/ Resources unit.			
Source the providers of assistance with existing contracts/ agreements.			
- Ensure type, specification, amount, ancillaries and packaging are clearly specified for each resource.			
- Notify external assistance (after approval of GM) about incident & needs. - Confirm contacts (phone and mail).	Op. Sup. 12 (Contacts)		
- Confirm the effective availability of resources from external assistance (OSRL…) and mobilization time.	Op. Sup. 12 (Contacts)		
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
REQUEST FOR ASSISTANCE			
Validate and approve the offers.			
- Request detailed information from the provider on the proposed equipment: specifications, dimension, weight, packaging, handling/ lifting etc.	- Op. Sup. 4 (Mobilization of external assistance)		
- Ensure, with Operations/ Surface &/or Operations/ Shoreline that the proposed equipment can be safely deployed and operated. - Check the operating procedures and lifting certification and arrangement.	DNV 2.7-1 for containers, DNV 2.7-3 for offshore loose package etc.		
- Provide a list of resources to mobilize to the Incident commander, for approval by a Call Out Authority.			
MOBILIZATION OF ASSISTANCE			
Request the mobilization of the assistance.			
- Send signed mobilization forms to the providers.			
- Request confirmation and acceptance from the providers.			
- Request transport details from the providers: freighter, departure, arrival date and location.			
- Confirm Customs Clearance procedure and request papers from providers.	▶Logistics/ Support/ Equipment Manager		
Prepare the Customs Clearance of the assistance.			
- Prepare Customs Clearance.			
- Provide papers for Customs Clearance to transit service provider at the airport/ port.			
Provide all information and papers to the: - Supply/ Equipment Manager to prepare the in-country handling of equipment & dispatch to sites. - Supply/ Personnel Manager to prepare the in-country reception of personnel.			
Inform Logistics section chief about the: - planned people movements and requirements (hotel, driver, security etc.); - requirements for equipment (transport, flight, Customs, handling…).			
ARRIVAL OF ASSISTANCE			
Inform Equipment &/ or Personnel Manager to organize reception & dispatch.			

6.7.4 Job ticket: Logistics/ Support/ Supply Unit/ Local Supply Manager

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Based on needed resources, source providers in country.			
Request proposal from providers in country (cost, amount, delivery time, and packaging).			
Review proposal with Operations Section (technical approval) and IC (cost and overall approval). **Ensure contract is acceptable (Finance Section/ Procurement and Legal Units).**			
Issue contract or Purchase Order once approved. **Inform Supply Unit Leader of delivery time and location.**			
Follow-up the delivery of resources (equipment).			
- Update the daily inventory system for the resources purchased, rented, borrowed.			
- Acknowledge and document the reception from the provider.			
Provide all information and papers to the Supply/ Equipment Manager to prepare the in-country handling of equipment, and dispatch to the sites.			

6.7.5 Job ticket: Logistics/ Support/ Supply Unit/ International Supply Manager

➔Same roles and responsibilities as the National Supply manager (with the addition of international transport and Customs Clearance).

6.7.6 Job ticket: Logistics/ Support/ Supply Unit/ Equipment Manager

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
RECEPTION OF THE ASSISTANCE			
Receive assistance at the airport (adapt if port).			
- Plan facilities for the aircraft: GPU, fuel, etc., cargo handling company and for the crew.	▶Operations/Air Operations/ Air Support		
- Anticipate facilities, equipment and transport needed at airport/ port.			
- Follow-up/ facilitate the Customs Clearance process (request emergency clearance).			
- Organize the offloading of aircraft/ vessel to a close staging area or onto transport.			
Receive assistance & transfer at the staging area			
- Ensure a full inventory of the equipment is carried out. - Cross check with packing list and list of requested resources.			
- Assess the condition of the equipment (New/ Good/ Used/ Damaged/ Out Of Order…) and any missing items. - Document with photos.			
Dispatch the assistance.			
- For all resources, agree with Operations section on a point of transfer of responsibility: i.e. location where and date when the equipment is transferred under the responsibility of the Operations section or Local IC: operations area, logistics base, staging area etc.			
- For offshore resources transferred by boat: prepare all documents required for transport in the city and entrance into the logistics base. - Inform the staging area manager on site of the ETA of resources and name of vessel.			
- For shoreline resources: inform the staging area managers of the arrival of equipment.			
DEMOBILIZATION OF THE ASSISTANCE			
Organize the demobilization of the external assistance equipment.			
- Ensure all external assistance equipment is cleaned, repaired or replaced, and returned to the original status as soon as possible.			
- Document all equipment (photos, and particularly any damaged/ missing equipment.			
- Preparation for transport and departure of equipment.			
- Acknowledge and document the reception by the provider.			

6.7.7 Job ticket: Logistics/ Support/ Supply Unit/ Personnel Manager

RESPONSIBILITIES	PERSONNEL		
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Request the planning of the personnel (arrival, departure, rotations) to anticipate the needs.			
Before the arrival of personnel from external assistance:			
- inform on requirements to enter country: Visa, etc. (if applicable). - Provide items for visas (if applicable) and follow-up the delivery of visas.			
- Provide full contacts of drivers, person in charge, and TEP Liban emergency contacts.			
- Provide meeting point and information on Total representative who will be present.			
- Organize hotel and transport.			
Organize the reception at the airport of personnel from external assistance: - Immigration (Visa); - Taxi service, hotel and food; - Interpreter (if and when required).			
Inform relevant Section of arrival of personnel. **For all personnel, agree with IMT or Local IC on a point of transfer of responsibility**: i.e. location where and date when the personnel is transferred under a clearly established responsibility (in the IMT, response area, other).			
Follow-up the personnel in –country and organize departure.			

6.7.8 Job ticket: Logistics/ Support/ Facilities Unit Leader

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Ensure key rooms (IMT and CMC) are and remain fully functional. **Ensure food/ water and any other service are provided & maintained to all involved personnel at Head Office.**			
Prepare the expansion of IMT in the current TEP Liban offices at Beirut or transfer of the IMT in another larger facility.			
Provide Security guards (as needed) for: - all facilities (Local IC Posts, base camps, resources in staging areas, etc.) prior to their set-up. - working/ clean-up sites on shore.			
Set-up & provide services to run & maintain Local IC Posts for coordinating personnel on shoreline site. - housing, energy, food, water, sanitary, Air. Con./heating Etc. - Support personnel			
Provide equipment & services to set-up & maintain staging areas for equipment. - adequate storage for equipment - check in/out procedures for equipment and consumables.			
Provide equipment & services to set-up & maintain base camps and lodging services for response personnel on site. - Energy, sanitation, housing, clothing, food and water etc.			
Provide equipment & services to set-up & maintain intermediate waste storage sites. - land, ground protection, skips, lining, fencing, shovels, etc.			
Provide decontamination kit for personnel (on site) and for equipment.			
Ensure medical assistance is available on site.			

6.7.9 Job ticket: Logistics/ Support/ Ground Support Unit Leader

RESPONSIBILITIES			
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Define on a case-by-case basis, based on the specifics of incident & needs.			

6.7.10 Job tickets: Logistics / Service Branch

Note. Service Branch may not be required for offshore response; but is critical for onshore interventions.

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Provides Medical services, Food/catering and Communication equipment for all support and response operations.			
Coordinate the work of the Medical, Food and Communication units. Ensure deliverables are provided to the IMT.			
Supervise the needs and set-up of communication equipment and network (particularly onshore, in remote areas).			
Provide Medical input to the IAP (e.g. medical support on site, MedEvac capabilities on all sites etc.).			
Supervise the needs and provision of food/catering services on all incident-related sites.			
Brief Branch staff as needed.			
Identify/ anticipate needs for service and support requirements.			
Request additional resources as needed.			
Oversee demobilization of branch and associated personnel.			

6.7.11 Job tickets: Logistics / Service Branch / Communication & IT Unit Leader

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Define on a case-by-case basis, based on the specifics of incident & needs.			

6.7.12 Job tickets: Logistics / Service Branch / Medical Unit Leader

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Define on a case-by-case basis, based on the specifics of incident & needs.			

6.7.13 Job tickets: Logistics / Service Branch / Food Unit Leader

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Define on a case-by-case basis, based on the specifics of incident & needs.			

6.8 Job tickets: IMT/ Finance section

See list of job tickets and page numbers in:

“Job tickets: Incident Commander and IMT section chiefs”, p.77

6.8.1 Job ticket: Finance/ Cost Unit Leader

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Set-up & manage accounting team.			
Implement a cost tracking system for all: - Personnel involved in the response operations (Total, contractors & others); - Equipment & consumables mobilized; - Logistical support mobilized; - Facilities set-up; - Services (modelling, satellite, medical, food, security etc.).			
Implement a cost tracking system for insurance, penalties, claims, compensation etc.			
Maintain up-to-date status of all costs incurred. **Analyse cost data & recommend cost-saving measures (buy/ rent?).**			
Estimate cost of: - operations at +10, +20, +30 days etc. and – when possible – total cost; - insurance, penalties, claims, compensation etc.			
Collate records of all expenditures.			

6.8.2 Job ticket: Finance/ Time Unit Leader

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Implement a time tracking system of all: - Equipment used (mobilized, en route, staged, in use, damaged) property of TEP Liban, or leased, rented, provided by assistance etc.; - Logistical support (aircrafts, vessels, land transport etc.); - Personnel involved in the response operations (in days/ hours).			
Ensure working hours/days of personnel complies with national regulation. Consider exceptional derogations as needed.			
Collate time sheets or usage records of: - personnel; - equipment; - aircrafts, vessels, land vehicles, facilities etc.			

6.8.3 Job ticket: Finance/ Procurement Unit Leader

RESPONSIBILITIES			
See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Ensure sufficient cash flow to meet immediate response needs.			
Provide advance payment immediately when needed (Air transport). **Ensure timely payments of all invoices.**			
Manage all financial and administrative issues related to providers/ vendors (contracts, leases and purchase agreements etc.).			
Request a copy of all contracts envisaged. **Provide advice after review of terms & conditions.**			
Review and validate terms & conditions of all PO’s & contracts for all response operations, including (but not limited to): - monitoring & modelling; - mobilization of local/ regional assistance. (Note. OSRL contracts are already approved by Total H.Q.) - purchase/ rental of supplies; - procurement of services, transport, communication and other assistance; - etc.			
Request a copy of all contracts signed & executed.			

6.8.4 Job ticket: Finance/ Claims & Compensation Unit Leader

RESPONSIBILITIES	PERSONNEL		
🗎 See “Full-blown IMT structure and responsibilities ”, p.15			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Review all relevant insurance programs and advise on the need to notify insurers as needed.			
Review insurance programs for the personnel and equipment mobilized from External Assistance.			
In case of spill from a TEP Liban drilling unit/ offshore activities, **- National laws apply to manage claims filed against TEP Liban for socio-economic damages.**			
- Request procedure from CMC regarding the management of claims.			
- Envisage to set-up local offices in the affected areas to collect claims from local communities and authorities.			
- Request CMC to set-up a settlement mechanism for compensation.			
- Set-up a management system for all claims for compensation.			
In case of spill from a tanker (passing ship), conventions CLC 92 and Fund 92 are applicable for TEP Liban and any person suffering damage/ loss caused by the pollution.			
- Liaise with insurer of tanker (P&I club) and ITOPF (oil spill experts for the tanker owner) after approval of GM.			
- Document all expenditures related to the response and loss.			
- Request expertise to assist in claims management.			
- Follow-up the claims process with the P&I and ITOPF.			

6.9 Job tickets: Personnel At Sea

/!\ Job tickets are provided as guidelines of tasks for Tier 2 & 3 incidents, to adapt case-by-case.

See list of job tickets and page numbers in:

“Job tickets: Incident Commander and IMT section chiefs”, p.77

6.9.1 Job ticket: Local Incident Commander IC At Sea

RESPONSIBILITIES	PERSONNEL		
Manage offshore safe and effective tactical response operations. **Keep the IMT informed about the incident status and on-going operations.**			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Assume command for the area and/ or the missions defined by the IMT, as soon as designated by the IC.			
Mobilize Local IC Post personnel (allocated by the IMT). - Planning Officer; - Operation Recovery supervisors (located in the Local IC Post or on vessel); - Event logger; - Site Safety Officer; - Mechanical engineer (maintenance & repair of response equipment); - staging area manager (if needed).			
Review with the Safety Officer the risks associated to: - the spilled material and operations; - safety measures to enforce: exclusion area, air monitoring, PPE, etc.			
Establish a clearly defined tactical response organization: - set-up the Local IC Post and required personnel; - set-up staging areas; - designate coordinator on board/ team leaders etc.			
Establish a communication network and protocol with the field personnel.			
Have a full understanding of the situation, objectives and strategy.	Incident Action Plan		
Review the instructions from the Incident Action Plan (from IMT). **Decide on actions to implement depending on available resources & conditions on site.**			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Request the Planning Officer to: **- obtain the latest spill status & Incident Action Plan from the IMT;** **- review the daily site-specific Action Plan (approved day before) if needed with input of supervisors.**			
Request from IMT details of all aerial activities planned for the day (surveillance). **Ensure there is no conflict with planned maritime & monitoring operations.**	/!\ Critical		
Ensure an early morning daily Safety & Operations briefing (prepared by the Planning Officer) with all Local IC Post members and Supervisors (if in Local IC Post or provide in verbal/ written format). - Safety briefing: pollutant, simultaneous operations, specific equipment etc.; - Latest information on the incident and oil spill; - Operations planned for the day for each supervisor; - Zoning of the operations for the day; - Resources to engage and status of available resources; - Slicks targeted and specific tactical instructions; - Communication and reporting instructions.			

Receive & coordinate with the external assistance vessels. - Provide communication instructions and contacts of Total supervisors. - Provide operating instructions (or instruct supervisors to provide).			
Coordinate operations and maintain constant communications with supervisors / coordinator on board/ team leaders on vessels.			
- Request regular updates (every 1 to 2 hours) from the supervisors on the operations, oil encountered and results.			
- Decide on the need to re-allocate teams depending on their feedback and slick observations.			
- Organize the management of the recovered oil.			
- Update IMT regularly (twice/day or more as needed).			
- Request an operational report from each supervisor at the end of the day, to provide to Planning officer.			
Request additional aerial surveillance if needed to guide the response vessels.			
Approve the specific on-site Action Plan consolidated by the Planning officer with input of supervisors, based on the Incident Action Plan from the IMT, for the next day(s).			
- Ask Planning officer with input of Supervisors to review/update the Incident Action Plan for the next day(s) received from the IMT. - Accept; or amend as needed and feedback to the IMT.			
- Plan the allocation of tasks/area per vessel and needed resources per vessel.			
- Request the needed resources for the next day(s) from IMT if needed.			
Approve the daily report developed by the Planning officer. **Send to the IMT/ Operation section.**			
Supervise the refuelling/ replenishment and transfer/ offloading of recovered oil during the night.			
Agree on re-positioning of the vessels during the night proposed by the supervisors to be close to the estimated position of the slicks the next day.			

6.9.2 Job ticket: Offshore Safety Officer

RESPONSIBILITIES	**PERSONNEL**		
Ensure that all appropriate actions are taken to protect the health and ensure safety of on-site responders.			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Request from IMT: - Full details of spilled material and associated risks: explosivity, H2S, VOC…; - Details/ instructions on exclusion areas to enforce; - Details/ instructions on air monitoring program to enforce; - Personal safety measures for the responders (adapted to their task & location compared to the pollutant): PPE, respiratory equipment, etc.			
Review the details of the spilled material and associated risks. **Confirm to the Local Incident Commander the safety measures to enforce.**			
Liaise with Air quality monitoring team if deployed.			
Ensure risks are assessed through an expeditated Job Risk Assessment JRA process. Risks include: - Deployment & use of equipment; - Towing & skimming operations with one or two vessels; - Multi-vessels operations.	Ops Sup 5. JRA for offshore deployment of equipment & simultaneous response operations.		
Prepare safety instructions for all operations in area. **Circulate instructions to supervisors and coordinator on board/ Team leaders.** **Ensure Work Permits are signed with captain of vessels.** **Request specific safety instructions for high risk operations.**	Ops Sup 5 Offshore tactics		
Ensure all supervisors (and coordinator on board/ team leaders on vessels) are fully briefed on the risks related to the spilled material and operations.			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Ensure each recovery supervisor instructs coordinator on board/ team leaders to set-up Hot – Warm – Cold Zone on each recovery vessel. **Ensure personnel on deck has appropriate PPE and decontamination kit.**	Ops Sup 5 Offshore tactics		
Ensure Medevac procedures are in place and cover efficiently all personnel at sea involved in the response during all operations.			
Discuss of on-going operations with supervisors during the day, with the feedback of team leaders. **Identify any unsafe operation.** **Assist/ advise coordinator on board/ team leaders on vessels for any specific risky/ unusual operations – as requested by supervisors.**			
Assist supervisors and the Local IC to identify any potentially unsafe operation regarding the operations of the next day. **Prepare safety instructions for next day.** **Assist to prepare JRA as needed and to prepare Work Permits as needed.**			
Report daily to the Local IC and IMT about status of: - Personnel, medical/ health problems and need for shift/ replacement; - PPE stock and needs of PPE, decontamination kits etc.			

6.9.3 Job ticket: Offshore Planning Officer

RESPONSIBILITIES	PERSONNEL		
Provide to the Local Incident Commander: - Up-to-date status of the incident, pollution and on-going operations; - site specific Action Plan (derived from IMT Incident Action Plan with input of supervisors); - daily reports (to send to the IMT).			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Obtain the latest information about the spill, zoning of response and on-going operations.			
Obtain the latest information about on-site available and "en route" resources.			
Obtain the latest Incident Action Plan from the IMT. **Adapt the IMT general Incident Action Plan IAP into a "site-specific Action Plan" for the area after discussion with Operation Supervisors.** **Provide for approval to the Local IC.**			
Liaise with the IMT Planning section for advice as needed.			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Obtain the latest information about: - slicks location and targeted areas for spill response. - planned actions (monitoring, recovery…) from the IMT Incident Action Plan. - wind and current observed on site and forecasted for the next 24 hrs.			
Estimate the drifting speed and direction of the slicks. **Estimate the probable location of the slicks once vessels arrive on site.**			
Review if needed the site-specific Action Plan defined the day before.			
Assist the Local IC to prepare the early morning Safety & operations briefing: - Safety briefing about pollutant, simultaneous operations and specific equipment; - Latest information on the incident and oil spill; - Operations planned for the day for each Supervisors and their coordinator on board/ Team Leaders; - Zoning of the operations, reviewed with the latest observations; - Resources to engage and status of available resources; - Slicks targeted and specific tactical instructions; - Communication and reporting instructions.			
Re-evaluate the tactics during the day based on aerial surveillance reports and observations from vessels. **Propose relocation of vessels to Local IC if needed.**			
Prepare the site-specific Action Plan for the next day, based on the IAP received from the IMT, and with the input of the supervisors. **Provide, for validation, to the Local IC at the end of afternoon/ end of day.**			

Prepare the daily report for the IMT, for the approval of the Local IC, to include e.g. - Name of Local IC, date and time, operational period covered by the report; - Organization (Local IC Post and response teams); - Latest observation on pollution; - Summary of resources engaged; - Tasks carried out by teams (observation, and recovery); - Estimation of results ○ Area covered by recovery boats, oil recovered; - Problems encountered; - Status of resources and stocks (PPE); - Planned actions for coming days and needs.			
Ensure all documentation is archived (plans, instructions, decisions, exchanges with IMT, times of use and staging of equipment, working hours of vessels, equipment and personnel, etc.).			

6.9.4 Job ticket: Recovery Local Supervisors

RESPONSIBILITIES	PERSONNEL		
Command safely and efficiently the operations, as per the site-specific Action Plan approved by the Local Incident Commander IC, in liaison with the captains and coordinator on board/ Team leaders on board the vessels. **Ensure regular feedback on progress and difficulties of operations to the Local IC Post.**			
IMMEDIATE ACTIONS	**Tools**	**Priority**	**Status**
Mobilize to the Local IC Post or to a designated vessel - as agreed with the Local IC.			
Ensure, with coordinator on board/ Team Leaders, that: - all equipment is secured, complete and functional; - all ancillaries are ready (towing ropes, buoys etc.); - consumables are available (gasoil, electric power etc.).			
Obtain the latest Safety & Operations instructions from the Local IC.			
Review and sign all required Work Permits with captains of vessels (or delegate to coordinator on board/).			
Brief directly the captains of vessel and coordinator on board/ Team Leaders about the operations of the day.			
DAILY MANAGEMENT	**Tools**	**Priority**	**Status**
Ensure a competent coordinator on board/ Team leader is on board each vessel to recover oil (deploy boom and skimmer).			
Provide tactical guidance to the captains of vessels as per the agreed site-specific Action Plan: - Area of operation (with GPS waypoints); - Leading vessels per type of operation and operation area; - Vessels teams (recovery); - coordinator on board/ Team leaders on board the vessels.			
Provide instructions as per the agreed site-specific Action Plan to the coordinator on board/ Team Leaders for recovery: deployment of booms, use of skimmer, storage/ decantation/ transfer of recovered oil, etc.			
Ensure crews and teams are briefed by coordinator on board/ Team Leaders on board on: - safety measures (regarding the pollutant and the operations); - operations planned; - operating instructions of the equipment.			
Coordinate the vessels operations and movements during the day. **Reposition the vessels as needed** (to follow the slicks).			
Report regularly to the Local IC about the progress and difficulties of the on-going operations and probable needs for the next day.			
Provide operational input to the Planning Officer to prepare the site-specific Action Plan for the next day: vessels, type of operations, area of response, logistical support needed, recovered oil to manage etc.			
Request an operation report from each vessel at the end of the day.			

Send a report to the Local IC at the end of the day including: - Name of Supervisor, date and time, operational period covered by the report; - Latest observation on pollution; - Summary of vessels and resources engaged; - Tasks carried out by teams (observation, recovery); - Estimation of results: ○ Area covered by recovery boat, oil recovered; - Problems encountered; - Status of resources and stocks (PPE); - Needs.			
Plan and coordinate, with assistance of Logistics manager of the Local IC Post, the refuelling/ replenishment of the vessels during the night.			
Plan and coordinate the transfer/ offloading of recovered, oil during the night if possible (to have vessels carrying out containment & recovery during the day).			
Agree with Local IC on the re-positioning of the vessels during the night, after the refuelling/ replenishment, to be as close as possible to the estimated position of the slicks the next day. **Instruct captains of vessels.**			

6.10 Job tickets: Personnel Onshore

/!\ Job tickets are provided as guidelines of tasks for Tier 2 & 3 incidents, to adapt case-by-case.

See list of job tickets and page numbers in:

“Job tickets: Incident Commander and IMT section chiefs”, p.77

6.10.1 Job ticket: Onshore Division Local Incident Commander

RESPONSIBILITIES	PERSONNEL		
Organize and manage on site onshore safe and effective tactical response operations as per Incident Action Plan. **Keep the IMT informed about the incident status and on-going operations.**			
IMMEDIATE ACTIONS (PREPARATION BEFORE FIELD WORK)	**Tools**	**Priority**	**Status**
➔BEFORE ARRIVAL ON SITE.			
Assume command for the area (Division) defined by the IMT, as soon as designated by the IC.			
Have a full understanding of: - the situation in the division, objectives, strategy, and priority sites to clean-up. - Administrative boundaries and authorities (regional, municipalities) - any security/ safety issues.	Incident Action Plan		
Provide to IMT/Logistics section the needed personnel and resources to: - set-up the Local IC Post, base camp if needed; - initiate the clean-up operations (workers, equipment, consumables…).			
Mobilize the needed competent personnel (defined with and allocated by the IMT) to the Local IC Post, e.g.: - Site Safety Officer, Medic; - Community liaison officer; - Security manager; - Mechanical engineer (maintenance & repair of response equipment); - Logistics manager, Staging area manager (if needed), Facility/ base camp manager; - Planning Officer; - Clean-up Supervisor; - Wildlife Supervisor (if needed); - Team leaders etc. **Advise IMT on need for additional personnel or replacement/ shift**.			
Review with the Safety Officer the risks related to: - the spilled material; - the operating environment (temperature, tides, current, wildlife, hazards etc.); - the operations and equipment used. **Agree on safety measures to enforce (exclusion area, PPE, etc.).** **Request Job Risk Assessment for any risky operations (from the Safety Officer with involved supervisor).**			
Ensure 1st Aid competent personnel is available on site; closest medical facilities are identified; and MedEvac procedures are set-up.			
Ensure the local authorities are officially aware of the planned response activities; and have approved them. **Obtain contacts of the local authorities.**	With Community Liaison Officer		
➔UPON ARRIVAL ON SITE.			
Enforce the Site Safety plan and MedEvac procedure.			

Establish contact with representatives of local authorities.	With Community Liaison Officer		
Establish contact with shore survey teams (if in area) or via Planning officer. **Ensure they follow instructions.**			
Establish a clearly defined tactical response organization: - set-up the Local IC Post, members and support personnel; - set-up staging areas; - designate team leaders etc. **Be present on site to coordinate the set-up of facilities coordinated by IMT/ Logistics section** (Local IC Post, Base camp, staging area etc.). **Confirm to the IMT that the facilities are set-up & adequate.**			
Establish a communication network with supervisors and Team leaders. **Request communication equipment from IMT/Logistics section as needed.**			
Evaluate security threats and request appropriate security from IMT as needed.	If needed		
Review the instructions from the IMT general Incident Action Plan. **Request Planning Officer to translate into a detailed Division-specific Action Plan.** **Participate to the survey of the oiled sites to clean in priority (if possible).** **Delineate working sites. Agree on priority clean-up sites & actions per site.**	Planning Officer		
Allocate workers and resources to working sites			
DAILY MANAGEMENT ON THE FIELD	**Tools**	**Priority**	**Status**
Liaise with representatives of local/ Governorate authorities. **Provide information on progress, on-going operations and planned operations.** **Obtain approval.** **Forward questions, complaints, comments etc. to IMT.**	With Community Liaison Officer		
Request the Planning Officer to: - prepare the daily division-specific Action Plan, detailing operations site by site (derived from the general IMT Incident Action Plan). - obtain the latest status of oiled areas, priority areas to clean and instructions on clean-up techniques.	Planning officer		
Request from IMT details of all monitoring/survey activities planned for the coming days. **Ensure onshore survey teams report to the Local IC when in the area of the division.**			
Ensure a morning daily Safety & Operations briefing with all Local IC Post members and Supervisors prepared by the Planning Officer. - Safety briefing about pollutant, specific operations and equipment. - Latest information on the incident and oil on the shore. - Operations planned for the day by supervisor/ by site. - Zoning of the clean-up working sites. - Resources to engage and status of available resources. - Communication and reporting instructions. - Ensure all workers have understood and acknowledge the safety & operational instructions			
Receive external assistance. - Request stock status from the Staging area manager. - Ensure IMT Logistics section is informed of reception of resources.			
Coordinate operations and maintain constant communications with the Supervisors.			
- Ensure all working sites, waste storage sites, staging areas etc. are clearly marked out and public kept out.			

- Ensure name of every personnel in the Local IC Post, support sites and working sites, are recorded, as well as working hours every day.			
- Ensure type and amount of equipment, consumables, services etc. used daily is recorded.			
- Request regular updates (1 or 2 per day) from the Supervisors on the operations, oil encountered and results. - Visit the working sites if & when possible.			
- Provide updates to the IMT regularly for critical/risky operations and/ or operations in sensitive areas (1 or 2 per day).			
- Request an operations report from each Supervisor at the end of the day; and provide to Planning officer.			
Ensure health and safety of responders: water, food, PPE, decontamination kits, toilets, clean clothes if needed etc.	Safety Officer and Medic.		
Request additional onshore survey if new polluted sites are discovered during the clean-up.			
Organize site visits with local authorities when requested by IMT.			
Approve the Division-specific Action Plan (from the Planning officer) for the next day(s). - Review the Incident Action Plan for the next day(s) received from the IMT. - Feedback amendments to the IMT, as needed. - Plan the allocation of tasks/area per team and needed resources. - Request the needed resources for the next day(s) from IMT.			
Organize end-of-day debriefing with all Local IC Post members. **Request Planning Officer to record the minutes of meeting.** **Example of topics to discuss:** - Site Safety Officer – health & safety issues; - Medic – injuries, health problems, lack of resources; - Community liaison officer – status of relation with local communities, concerns, potential problems and conflicts; - Security manager – issues? - Logistics manager – status of all stocks (base camp, Local IC Post, operations); - Staging area manager – status of consumables and equipment and planned arrivals; - Facility/ base camp manager – status, concerns and needs. - Planning Officer & all Supervisors– on going operations, results, work remaining; - Mechanical engineer – problems with equipment, spare &/or repair needs; - Local IC – latest information from the IMT, planned work for the coming day(s) and resources planned.	Planning officer.		
Approve the end-of-day report summarized by Planning officer. **Send to the IMT, including the needed resources for the next day(s).**			
MANAGEMENT – END OF OPERATIONS	**Tools**	**Priority**	**Status**
Inform the IMT of the end of clean-up operations for each working site. **Request site inspection visit with authorities.**			
Supervise the demobilization of working sites and of the Local IC Post. **Ensure all sites (working, Local IC Post, staging, waste storage etc.) are left clean.**			

6.10.2 Job ticket: Onshore Safety Officer

RESPONSIBILITIES	PERSONNEL		
Ensure that all appropriate actions are taken to protect the health and safety of on-site responders.			
IMMEDIATE ACTIONS (PREPARATION BEFORE FIELD WORK)	**Tools**	**Priority**	**Status**
➔BEFORE ARRIVAL ON SITE.			
Request from IMT: - full details of spilled material & associated risks (skin contact, inhalation, VOC). - local risks related to the site (tides, currents, etc.), flora/ fauna, others... - Personal safety measures for the responders (adapted to their task & location compared to the pollutant): PPE, respiratory equipment, etc.			
Review the details of the spilled material and associated risks. **Confirm to the Local Incident Commander the safety measures to enforce.**			
Evaluate risks related to all operations.			
➔UPON ARRIVAL ON SITE.			
Ensure the Local IC Post is safely set-up, areas (staging, waste, etc.) and access roads are clearly marked out.			
Participate to the survey of the working sites with the Local IC.			
Carry out specific Job Risk Assessment for any risky operations with the involved supervisor(s). **Prepare general safety instructions for all operations.** **Circulate instructions to supervisors and Team leaders.** **Ensure Work Permits (or similar) are signed with Team leaders and supervisors.**	Ops Supt 8 Onshore tactics		
Develop sites-safety plan as needed.			
Display sites-safety plan, emergency contacts and MedEvac procedure at all sites (Local IC post, waste & staging areas, working sites…)**.**			
DAILY MANAGEMENT ON THE FIELD	**Tools**	**Priority**	**Status**
Participate to the morning Safety & Operation briefing at the Local IC Post. **Ensure supervisors cascade instructions to Team leaders and teams.**			
Assist the Supervisors to safely set-up their clean-up working sites. - Access to site (road, quad or 4x4, foot, small vessels, helicopters…); - Delimitation of Hot – Warm – Cold zones; - appropriate level of PPE for each operation: "No protection? No operation"; - Buddy system compulsory. Isolated worker is forbidden; - Decontamination areas ,kits and protocol; - Waste temporary storage sites and instructions etc.			
Assist Supervisors to identify and anticipate unsafe situation/operation.			
Visit working sites, discuss with Team leaders to identify unsafe situation/operation.			
Inform IMT, after approval of Local IC, of any unsafe/ unforeseen situation/operation & mitigation measures enforced.			
Participate to the end-of-day debriefing.			
Assist the Local IC to plan the operations of the next day. **Review sites-safety plan as needed for the next days.**			
Report daily to the Local IC and IMT about status of: - Personnel, medical/ health problems and need for shift/ replacement; - PPE stock and needs of PPE, decontamination kits etc.			

6.10.3 Job ticket: Onshore Planning Officer

RESPONSIBILITIES	PERSONNEL		
Provide to the Local Incident Commander: - Up-to-date status of the incident, pollution and on-going operations; - Site specific Action Plan (derived from IMT Incident Action Plan with input of supervisors); - Daily reports (to send to the IMT).			
IMMEDIATE ACTIONS (PREPARATION BEFORE FIELD WORK)	**Tools**	**Priority**	**Status**
➔BEFORE ARRIVAL ON SITE.			
Have a full understanding of the situation within the division, objectives and strategy, and priority sites to clean-up.	Incident Action Plan		
Assist the Local IC to define the needed resources to: - set-up the Local IC Post, base camp (if needed); - initiate the clean-up operations (workers, equipment, consumables…).			
Obtain the latest information about: - oiled shorelines, sites to clean, on-going survey &/or operations (if applicable), safety/security concerns (for survey &/or clean-up teams) etc.; - the latest information about available and "en-route" resources.			
Liaise with the IMT/ Planning section for advice & information.			
➔UPON ARRIVAL ON SITE.			
Establish contact with shore survey teams (if in area). **Request the results of the survey of oiled shoreline.**			
Review the instructions from the IMT Incident Action Plan. **Survey the oiled sites to clean in priority.** **Translate IMT Incident Action Plan into a detailed Division-specific Action Plan, with delineation of working sites, actions & resources site-by-site, based on feedback of survey and of supervisors.**			
DAILY MANAGEMENT ON THE FIELD	**Tools**	**Priority**	**Status**
Obtain the latest information from onshore survey teams about Shoreline Oiling Survey and Shoreline Treatment recommendations:			
Prepare the daily division-specific Action Plan for the Local IC.			
Assist the Local IC to prepare the early morning daily Safety & operations briefing to include: - Safety briefing about pollutant, specific operations and equipment; - Latest information on the incident and oil spill; - location, extent of & resources allocated to the working sites; - Operations planned for the day per site; - Status of engaged & available resources; - Communication and reporting instructions etc.			
Prepare safety instructions for all workers to ensure they understood and acknowledged the safety & operational instructions (e.g. basic questionnaire and form to sign/recognize).			
Visit the working sites during the day to evaluate the oiling, effectiveness of clean-up techniques, difficulties and waste generated.			
Inform the Local IC of any oiled area non-surveyed and need to organize survey with SCAT teams.			
Prepare the division-specific Action Plan for the next day, derived from the general IAP received from the IMT. **Submit to the Local IC at the end of the day.**			

Advise the Local IC on: - the level of clean-up reached for each working site compared to the end-points agreed in the Action Plan. - the possibility to stop clean-up operations for each working site and call for a Site Inspection Report visit with the local authorities.			
Prepare the end-of-day debriefing for the Local IC. **Capture minutes of debriefing.**			

Send the end-of-day report, approved by the Local IC, to the IMT.
- Name of Local IC, date and time, operational period covered by the report;
- Organization (Local IC Post and response teams);
- Latest observations of oiling;
- Summary of resources engaged:
  o Personnel engaged on each working site (name and hours worked),
  o Resources engaged on each working site,
- Tasks carried out per site;
- Estimation of results
  o Overall area with working site,
  o Location and extent of each working site (map),
  o Results achieved compared to agreed clean-up end-points,
  o Area covered/cleaned during the day on each working site,
  o Waste generated and sorting and storage;
- Problems encountered;
- Status of stocks of resources;
- Planned actions for coming days and needs.			

Ensure all documentation is archived (plans, instructions, decisions, exchanges with IMT, times of use and staging of equipment, working hours of personnel, equipment and logistical support etc.).			
MANAGEMENT – END OF OPERATIONS	**Tools**	**Priority**	**Status**
Prepare the Site Inspection Report visit with the authorities. **Document the Site Inspection Report visit and acceptance/ reject of the closing of the working site by authorities.**			

6.10.4 Job ticket: Operations Field Supervisors and SCAT/ NRDA Team Leaders

Note. Adapt as needed for oiled shoreline surveyors (SCAT specialists) that do not manage work-sites, but survey sites.

RESPONSIBILITIES	**PERSONNEL**		
Command safely and efficiently the operations, as per the site-specific Action Plan approved by the Local Incident Commander IC, in liaison with the Team leaders on the working sites. **Ensure regular feedback on progress and difficulties of operations to the Local IC Post.**			
IMMEDIATE ACTIONS (PREPARATION BEFORE FIELD WORK)	**Tools**	**Priority**	**Status**
➔BEFORE ARRIVAL ON SITE.			
Review planned operations and clean-up techniques. **Gain knowledge of the coastal environments, accesses and MetOcean conditions and forecast on site.** **Inform the Local IC of any foreseeable problem and possible workarounds.**			
➔UPON ARRIVAL ON SITE.			
Obtain from the Local IC: **- the latest Safety & Operations instructions;** **- the last site safety plan and MedEvac procedure – if in place.**			
Survey the sites to be cleaned, protected or surveyed. **Confirm the delineation of sites for clean-up, techniques and end-points.** **Confirm the equipment, support and personnel required.**			
Ensure equipment received is complete, adequate and functional.			
Ensure competent Team leaders are appointed on each site to clean. **Brief Team leaders on first actions and set-up of working sites.**			
DAILY MANAGEMENT ON THE FIELD	**Tools**	**Priority**	**Status**
Ensure the Site safety plan, emergency contacts and MedEvac procedure is displayed on site and known by Teams leaders and all workers.			
Participate to the morning daily Safety & Operations briefing with Local IC Post members and other supervisors.			
Provide to the Team leaders a summary of Safety & Operations briefing and detailed instructions per site (as per the approved Sites-specific Action Plan): - Safety measures; - Work planned and direction of work progress on each site; - Waste sorting and storage on site; - Provisions of resources and support to the sites; - Workers allocated to each site. **Ensure safety measures & working instructions are cascaded to workers**.			
Coordinate the operation on the working sites. **Re-allocate workers &/or resources between sites during the day if needed.**			
Report regularly to the Local IC about the progress and difficulties of the on-going operations and probable needs for the next day.			
Provide operational input to the Planning Officer to prepare the site-specific Action Plan for the next day: clean-up techniques, areas to be cleaned, equipment, workers and logistical support needed, waste to remove etc.			
Request an operation report from each Teal leader at the end of the day.			

Send a report to the Planning officer at the end of the day, including e.g.
- Name of person in charge, date, time, period covered by the report;
- Summary of resources engaged:
  ○ Personnel engaged on each site (name and hours);
  ○ Resources engaged on each site;
- Tasks carried out on each site;
- Estimation of results:
  ○ Location and extent of each working site (map);
  ○ Area covered/cleaned during the day;
  ○ Waste generated, type and volume/ weight;
- Problems encountered;
- Status of resources;
- Planned actions for coming days and needs.			

Participate to the end-of-day debriefing with Local IC Post members to review progress and discuss next-day actions.			
Agree with the Local IC on work plan per site for next day.			
Plan the delivery (next days) of workers and equipment, consumables, PPE, etc. needed for each site.			
Plan the removal of the oily waste temporarily stored on each working site.			

6.10.5 Job ticket: Waste Field Supervisor

Specific procedure to be developed by external specialized contractor on a case-by-case basis.

6.10.6 Job ticket: Wildlife Field Supervisor

Specific procedure to be developed by external specialized contractor on a case-by-case basis.

6.10.7 Job ticket: Logistics & Staging area Manager

RESPONSIBILITIES	PERSONNEL		
Collate needs for Local IC Post ,support sites and operations. **Follow-up arrival, staging and dispatch of resources on the sites.** **Source local resources if available.** **Establish and maintain staging areas for all equipment, consumables, fuel and support for the operations.** **Enforce daily inventory and check-in and check-out procedures.** **Inform the Local Incident Commander and IMT of stock status.**			
IMMEDIATE ACTIONS (PREPARATION BEFORE FIELD WORK)	**Tools**	**Priority**	**Status**
➔BEFORE ARRIVAL ON SITE.			
Locate the best suited locations for: - staging areas (close to main road and to Local IC Post &/or working sites); - waste storage areas.			
Identify needs for and Inform IMT Logistics/ Facilities Unit: - marking of access; - delimitation & marking of areas; - security of staging areas (guards night/ day).			
➔UPON ARRIVAL ON SITE.			
Confirm the location with the Local IC. **Set-up of staging area(s) & waste storage area(s).**			
Set-up the staging area(s): - marking of boundaries of staging area(s); - segregation of resources within the staging area(s); - signalize the access, entrance/exit of staging area(s); - check-in and check-out procedures; **Designate personnel in charge of each staging area(s).**			
Set-up the waste storage area(s).			
Identify resources & consumables available locally; and inform IC.			
Inform the Local IC and IMT of the set-up of staging area(s).			
DAILY MANAGEMENT ON THE FIELD	**Tools**	**Priority**	**Status**
Obtain latest information from IMT on planned daily deliveries of resources. **Arrange reception with personnel in charge of staging areas.**			
Purchase resources & consumables locally as per instructions of the Local IC.			
Confirm to the Local IC and IMT the daily deliveries to staging area(s).			
Request daily inventory of staging areas with resources arrived/ departed. **Maintain real-time inventory of staged resources for the Local IC.**			
Organize release of resources as requested by the Local IC. Organize dispatch a delivery to working sites.			
MANAGEMENT – END OF OPERATIONS	**Tools**	**Priority**	**Status**
Demobilize staging area(s). **Move remaining resources to other staging area(s) or back to main staging area.**			

6.10.8 Job ticket: Onshore Facility/ Base camp Manager

RESPONSIBILITIES	PERSONNEL		
Set-up of the Local IC Post and/ or base camp as per instructions of the Local Incident Commander IC. **Ensure the daily running of the Local IC Post and/ or Base camp.**			

6.10.9 Job ticket: Onshore Medic

RESPONSIBILITIES	PERSONNEL		
Provide first medical support on-site as needed. **Identify situation/operation that may threaten health of responders.** **Monitor any potential effect of the oil on local communities.**			
IMMEDIATE ACTIONS (PREPARATION BEFORE FIELD WORK)	**Tools**	**Priority**	**Status**
➔BEFORE ARRIVAL ON SITE.			
Advice the Local Incident Commander IC on medical equipment & kits resources to maintain at: - the Local IC Post; - base camp; - each working sites.			
Inform the Local IC of any foreseen risk for health on site (air temperature, environment, fauna/flora, food/water poisoning, working conditions etc.).			
Set-up & test the MedEvac procedures with IMT Logistics.			
➔UPON ARRIVAL ON SITE.			
Confirm the Local IC the MedEvac procedure is enforced and effective (or review with IMT).			
Ensure the set-up of Local IC Post, base camp, sites etc. does not pose any threat for the health of personnel.			
Identify close local medical facilities: doctor, clinic, ophthalmologist, emergencies etc. **Contact and visit facilities for a full assessment.**			
Participate – as much as practically possible - to the initial site survey.			
DAILY MANAGEMENT ON THE FIELD	**Tools**	**Priority**	**Status**
Ensure 1st Aid kits are available on all working & support sites (and suited to risk).			
Organize MedEvac, as needed, under the supervision of the Local IC.			
Request information on the planned daily operations.			
Participate to the morning daily briefing. **Issue health recommendations as needed.**			
Monitor health issues in the Local IC Post and base camp (food, water, health of responders etc.).			
Visit regularly the working sites. **Evaluate the working conditions of workers and any risk for health.** **Advice the Local IC on any required mitigation measures.**			
Identify any risk for the health of local communities. **Advise the Local IC on possible mitigating measures to be implemented in liaison with local authorities** (exposure to pollutant, impact on ground water, on fisheries etc.).			
Assist the NRDA teams to assess potential effects on the health.			
Participate to end-of-day debriefing with all Local IC Post members.			
Request needed resources for health and 1st Aid as needed.			

6.10.10 Job ticket: Community Liaison Officer

RESPONSIBILITIES	PERSONNEL		
Establish contacts with local communities (and authorities if requested). **Explain incident, risks and operations (and mitigations measures if applicable).** **Facilitate operations by limiting/ avoiding perturbation from local communities.** **"Listen" to the comments/ complaints/ requests & forward to the Local IC and IMT.**			
IMMEDIATE ACTIONS (PREPARATION BEFORE FIELD WORK)	**Tools**	**Priority**	**Status**
➔BEFORE ARRIVAL ON SITE.			
Obtain location and extent of area(s) with planned working sites. **Compare to administrative boundaries (region, municipalities & villages).**			
Obtain names and contacts of local authorities at all levels and group leaders (fishing, tourism).			
Request from the CMC Communication: - Feedback on perception of spill by local communities and authorities; - Support material to explain the spill, the effects and planned operations to local communities and authorities.			
Request IMT/ Finance/ Compensation to: - issue instructions about compensation mechanisms for local communities and authorities; - provide contacts of local office set-up by TEP LIBAN to collect the claims for compensation (if applicable).			
Identify any potential difficulties/ conflicts with local communities or specific communities (fishermen, aquaculture, etc.).			
Request support of local authorities to explain issues and planned work to local communities (possible joint meetings).			
➔UPON ARRIVAL ON SITE.			
Establish contact with local communities and authorities to explain situation, planned operations and compensation mechanisms.			
"Listen" to local communities to understand their perception of the spill. **Feedback to the IMT.**			
Facilitate the employment of local communities as clean-up workers if and when needed.			
DAILY MANAGEMENT ON THE FIELD	**Tools**	**Priority**	**Status**
Participate to the morning daily Safety & Operations briefing with Local IC Post members and Supervisors.			
Assist the Local IC to liaise with the representatives of local communities and authorities.			
Organize site visits with the representatives of local communities and authorities if required and after approval of the Local IC.			
Act as the Local IC spokesman for representatives of local communities and authorities, and media if required.			
Inform Local IC of any potential or confirmed concern or conflict.			
Participate to the end-of-day debriefing with all Local IC Post members.			
MANAGEMENT – END OF OPERATIONS	**Tools**	**Priority**	**Status**
Assist the Local IC to organize the site Inspection Report of the cleaned sites, to request the end of operations and closure of working sites.			

OIL SPILL CONTINGENCY PLAN
VOL 1.2 ACTION PLAN FOR DRILLING UNIT

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	10/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

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Markings:

/!\ Warning

🖹 Link to other documents of the TEP Liban OSCP

ⓘ Link to external document or information, not part TEP Liban OSCP

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1. PURPOSE & SCOPE

The present procedure "VOL 1.2 ACTION PLAN DRILLING UNIT" covers the response:

- **to offshore oil spills**: release of hydrocarbon products into the marine environment. Management of loss of containment (i.e. release of hydrocarbons limited to the drilling unit and not affecting the marine environment) is covered by the SOPEP of the drilling unit. Other spills (support vessels, logistics base) are not covered in this document.
- to hydrocarbon spills due to TEP Liban activities.
- to Tier 1 spill incidents, normally managed with available resources on site, and the initial response to Tier 2 & 3 spills.
- **within Block 4 and "close" to the drilling unit** (i.e. area reachable quickly by the support vessel, approximately less than 45 min to one-hour sailing time, defined on a case-by-case basis).

The Total RSES on the drilling unit holds the initial responsibility for oil spill management at sea.

The overall management of Tier 2 or 3 spill response is the responsibility of TEP Liban head office (in Beirut) and is managed by the TEP Liban Incident Management Team. It is described in "VOL 1.1 ACTION PLAN FOR TEP Liban TIER 2 & 3 SPILLS".

Other spills (unknown or third-party) are reported to TEP Liban Head Office and response decided on a case-by-case basis.

When an oil spill is associated with a wider emergency (e.g. fire, explosion, personal injury), the **Drilling Unit Emergency Plan** is activated, as well as the **Emergency Response Plan** of TEP Liban, together with specialized plans, such as the Blowout Contingency Plan, depending on the type of emergency.

The OIM/ Master of the Drilling Unit is responsible for the implementation of the applicable international maritime conventions (SOLAS, MARPOL, OPRC90 etc.), for all interventions on board the Drilling Unit and is **ultimately responsible for the safety of all personnel on board** until the evacuation of the Drilling Unit.

A bridging document describes the split of responsibilities between Total personnel on board the Drilling Unit and other personnel and contractors, for oil spills and other emergencies.

The HSE manager of TEP Liban maintains the present procedure & availability of response resources on site.

2. SPILL TIER LEVEL & RESPONSIBILITIES

TEP Liban uses the **Tier level concept** (international concept, used by Total, to classy spills into three levels of severity and mobilization, and used in the Lebanese NOSCP). Tier levels are defined based on the specific risks and settings of TEP Liban.

Tier level is assessed as soon as possible, based on best available information and on the table below.

- One criterion is enough to classify a spill in Tier 2 or 3.
- Level is assessed considering the volume, nature and persistency of the product spilled, associated risks and level of resources needed for the response.
- Volumes (of oil accidentally released into the environment) are indicative guidelines.
- Good practice is to "prudently over-estimate" the spill and risks.
- Tier 2 or 3 classification must be approved by the TEP Liban GM.

Table 1 : Offshore Tier levels for TEP Liban

OFFSHORE SPILLS - TIER LEVELS

Status 25/11/2019

		- TIER LEVELS +		
		☐ TIER 1	☐ TIER 2	☐ TIER 3
SPILL	**General characteristics**	☐ (Very) Minor spill. Minor to insignificant pollution offshore. ☐ Source stopped.	☐ Intermediate spill. Potential to significant pollution. ☐ Source stopped or minor release of few days.	☐ Major to catastrophic spill. Significant to catastrophic pollution. ☐ Spill that may escalate &/ or be continuous.
LOCATION	**OFFSHORE**			
	Non-persistent oil Extent	☐ **< 50 m3** ☐ Offshore spill. No risk of damage on the coast. Possible (minor) transboundary spill.	☐ **50 to 300-400m3** ☐ Offshore. No risk of significant damage on the coast. Possible transboundary spill.	☐ **> 400 m3** ☐ Offshore. Possible residual spill on the coast. Possible large transboundary spill.
	Note. Extended to +/-100m3 for drilling mud (sinks)			
RESPONSE	**Resources**	☐ Tier 1 resources (TEP Liban) + Contracted companies in country	☐ Tier 1 resources (TEP Liban) + Other O&G operators + Service companies in country/ close countries + National resources	☐ All Tier 1 + 2 resources + Mobilization of regional & international assistance
	Management	☐ **TEP Liban**: Site personnel + support of HO if needed Or **captain of vessel** if PSV incident	☐ **TEP Liban** : site, IMT & CMT + Total HQ & TEPCY : "spot" support + Drilling unit Company HQ **+ Authorities**: Follow-up & supervision (activation of NOSCP at the discretion of the Authorities) Or shipowner if PSV incident	☐ **TEP Liban**: site, IMT & CMT + Total HQ assistance (remote & in country) + TEPCY + Drilling unit Company HQ **+ Authorities**: Follow-up & supervision (activation of NOSCP at the discretion of the Authorities) Or shipowner if PSV incident
	Note. Persistents: crude, HFO & IFO, utility oils, etc.		*Non-persistent: Condensate, MGO, drilling mud NABM, etc.*	

See TEP Liban OSCVP Vol. 2, section "Oil products, spill scenarios & Tier levels"

3. MANAGEMENT ORGANIZATION ON SITE

This section covers the organization to implement on site for Tier 1 and initial Tier 2 / 3 spills close to the rig.

Figure below illustrates the organization on the drilling unit for the initial oil spill response.

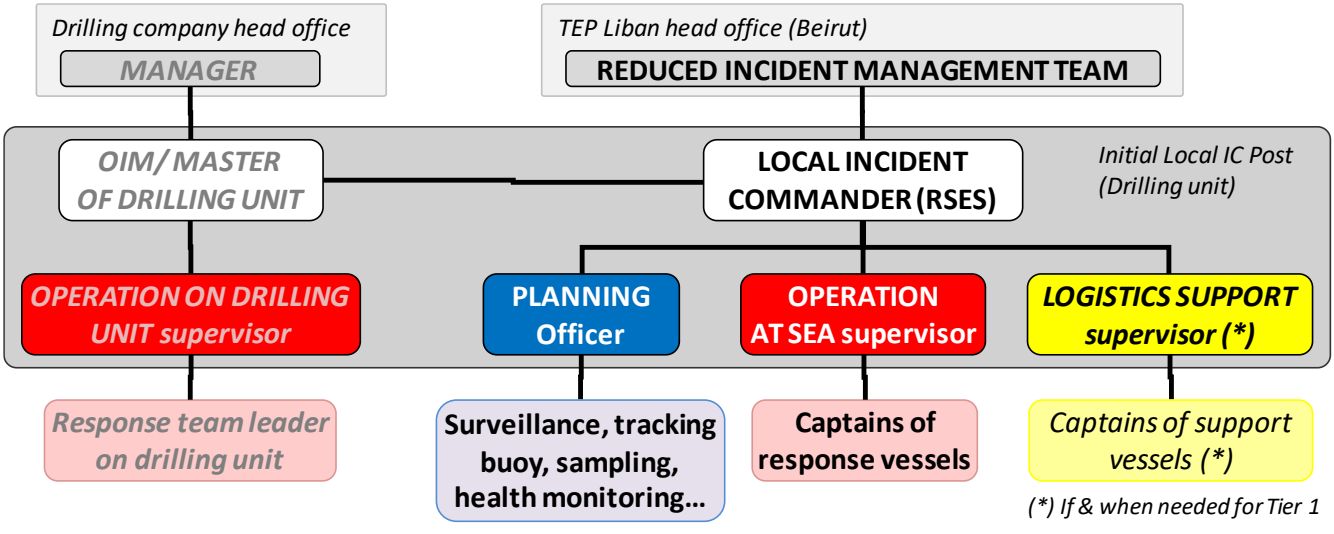

Figure 1: Initial Oil Spill Incident Management on the Drilling Unit

▶ The **initial Local Incident Commander IC (Local IC)** for oil spill at sea close to the drilling unit is the TEP Liban RSES on the drilling unit.

Note. Spills from PSV "en route" outside of the Marine Restricted Area are managed by the captain and ship owner (with assistance of TEP Liban as needed).

▶ The **Local IC** is responsible of the overall spill management (until he delegates to members of the Local IC Post) and:

- Alerts immediately the TEP Liban Duty Officer [1]and sends the notification form;
- Ensures a rapid spill assessment and activates the OSCP Vol 1.2 Drilling Unit Action Plan if needed;
- Assumes the position of initial Local Incident Commander IC;
- Approves the tactical response plan; mobilizes vessels and coordinates the response at sea.

▶ The **Local IC** acts in liaison with the OIM/ Master of the Drilling unit to:

- Ensure the general management of the emergency;
- Ensure adequate health & safety measures are enforced on the drilling unit and onboard the vessels;
- Ensure notification from the drilling unit to the maritime authorities is in line with the TEP Liban notification;
- Follow-up the source control measures and response operations on the drilling unit;
- Mobilize the Local IC Post and designate the personnel to assist him for oil spill response.

▶ The **Local IC** reports on a regular basis to:

- His hierarchy (e.g. Drilling Superintendent) and TEP Liban reduced IMT (if the TEP Liban ERP is not activated);
- The IMT/ Operations Section if the IMT is activated (Tier 2 or 3).

[1] The Duty Officer function is maned by the Drilling super intendent in TEP Liban H.O.

Table below presents the key functions and responsibilities of the Local IC Post members for oil spill.

PLANNING officer	- Advises about safeguarding of Health and Safety of personnel and responders. - Prepares the notification form and the daily situation report. - Organizes monitoring of Health & Safety and spill, and evaluation of response. - Collects information on spill status and associated risks. - Provides predictions about drift and behaviour of spilled product. - Consolidates the Action Plan for next day (based on tactics proposed by Operations at-sea supervisor). - Maintains the Incident Situation Board updated. - Acts as liaison with TEP Liban (Reduced) IMT.
OPERATIONS ON DRILLING UNIT supervisor	- Coordinates the response operations on the drilling unit (source control, loss of containment), under the supervision of the OIM/ Master – **Not in the scope of this present procedure**.
OPERATIONS AT SEA supervisor	- Proposes at sea spill response tactics to the Local IC, including resources needed, timing for mobilization and zoning for use. - Mobilizes the vessel(s), after approval of tactics by the Local IC. - Coordinates the spill maritime response operations with vessels. - Provides regular feedback on the response operations to the local IC Post. - Act as the contact point between the Local IC Post and the response vessels.
LOGISTICS SUPPORT supervisor	- Request resources to TEP Liban (Reduced) IMT if needed. - Manages the arrival and dispatch of resources: replacement PPE etc.

Support functions for incident management (e.g. Event logger) are described in the emergency response plan of the drilling unit.

▶ Personnel, designated by the OIM, carry out the response operations on the drilling unit.

▶ Vessels, mobilized by the designated Operations at sea supervisor, after approval of the RSES (and OIM/ master if and when needed, e.g. release from an operation on-going with the drilling unit), carry out response at sea.

▶ **The Local IC manages Tier 1 spills**; and initiates the response to Tier 2 & 3 spills, if possible.

▶ **The TEP Liban Reduced IMT**[2] liaises initially with the site, to facilitate the provision of:

- Helicopter and observer for aerial surveillance;
- Additional supply vessel(s) to relieve the stand-by vessel etc.

▶ **The RSES remains the Local IC for oil spill**, until the TEP Liban Operations Manager or Incident Commander designates a replacement, e.g. if:

- Situation on the drilling unit prevents him from coordinating at sea operations;
- Oil slicks move away of the drilling unit, requiring response vessels to possibly operate over 2-3 hours sailing distance from the drilling unit (adapted on a case-by-case basis);
- Incident escalates (or risks of escalating) to a Tier 2 or 3 and requires mobilization of external resources.

[2] Composed of relevant senior personnel, e.g. Operations Manager, Drilling Manager, HSE Manager, Logistics Manager, until the TEP Liban ERP is activated and the full IMT is mobilized (Tier 2 or 3 or other emergency).

4. INITIAL RESPONSE ACTIONS

Matrix below describes the initial actions of the three key positions of the Local IC Post (Local IC, Planning officer and Operation at-sea supervisor); and are detailed after.

Legend :
R : Responsible : The doer(s), the leader(s)
(R) : Support : support the leader(s)
A : Accountable : Monitors the progress, accoutable for the results
C : Consulted
I : Informed

INITIAL ACTIONS	Local IC	Planning Officer	Operation At-Sea Supervisor	OIM / Master of the Rig	PSV vessel captain
1 - Alert on site & immediate safety					
Broasdcast alert on drilling unit & close vessels	C	I	I	R/A	I
Set-up of exclusion area on drilling unit	C	I	I	R/A	I
Set-up of exclusion area around spill at sea	C	I	I	R/A	I
Air quality monitoring on drilling unit	I	R	I	A	I
Air quality monitoring around the slick at sea	I	C	R	A	R
2 - Assessment of spill & activation of OSCP					
Risk assessment and implementation safety measures at sea / Provision of PPE, gas monitors, etc.	A	R	C	C	R/A
Confirmation of product spilled, estimation of volume and drift prediction	A	R	I	C	I
Confirmation of Tier Level: activation of OSCP and mobilisation of Local IC Post	R/A	C	I	C	I
3 - Dissemination of alert & notification of TEP Liban head office					
Initial alert (phone) to TEP Liban Duty Officer (DO) & Drilling Superintendant	R/A	C	C	I	I
Sending of notification form to TEP Liban DO	R/A	I	I	I	I
Sending of notification form to JMOC (If oil spilled at sea)	C	C	I	R/A	I
Consolidation of maritime exclusion area	C	C	R	A	I
4 - Engagement of monitoring and response actions					
Mobilisation of Local IC Post on the drilling unit	R/A	I	I	C	I
Development of initial air and spill monitoring tactics at sea	A	R	I	C	I
Development of oil sampling tactics at-sea	A	R	I	C	I
Development of response tactics at-sea	A	C	R	C	I
Mobilisation of response resources at sea (vessels)	A	C	R	C	R
Coordination of monitoring and response operations at sea	A	C	R	C	C
From vessel: Implementation of response operations at sea and reporting to Local IC Post	A	I	C	I	R
Preparation of response plan for day + 1	A	R	R	C	I

Figure 2: Initial actions on the Drilling unit in case of spill

4.1 Alert on site & safety

▶ Any personnel on site witnessing a spill (or a loss of containment) immediately alerts the control room or closest team leader/ supervisor.

▶ The OIM/ Master of the Drilling unit ensures:

- The immediate alert and safety of the personnel on the Drilling unit;
- The immediate alert of close vessels.

Hot works are stopped if and when needed.

Immediate actions to control the source are carried out by personnel on location if safety is ensured.

Close vessels are released (if needed) and an initial exclusion maritime area around the spill is enforced.

In case of smell of hydrocarbon, air quality measurement is carried out as soon as possible on the Drilling Unit by a monitoring team with appropriate PPE, supervised by the Planning officer.

Note. VOC are immediately and continuously monitored in case of blow-out. Significant risk is limited to the first 24 hrs for an instantaneous spill. In case of a blow-out with a continuous release of hydrocarbons, air quality monitoring should continue until capping the capping is completed and the release is stopped. Blow-out monitoring tactics are defined by the IMT.

Air quality monitoring devices are available on the drilling unit and support vessels.

Example of handheld VOC/ Benzene monitoring device (ULTRA RAE 3000 with Benzene tubes)	Example of VOC monitoring device: TIGER (www.ionscience.com)
	

All Health & Safety Rules remain applicable when responding to an oil spill.

4.2 Assessment of spill & activation of OSCP

▶ The RSES collects (or requests the Planning officer to collect) the best available information:

- Source of incident?
- Risk of escalation?
- Nature of product spilled? Associated risks?
- Source controlled: range of volume spilled?
- Continuous spillage: estimated flow rate and range of volume spilled at given time?
- Safety measures in place?
- Exclusion zone in place on Drilling unit &/or at sea?
- First response actions?
- Observed drift direction of the spill?
- Risks for vessels in the vicinity?

Note. Spilled volume is evaluated later.

▶ The Planning officer:

- Alerts immediately the OIM/ Master and RSES about the risks associated with the spill and first safety measures (exclusion, PPE, air quality monitoring etc.) as per Drilling unit procedure;
- Reviews the extent of the exclusion area as needed.

▶ The Planning officer:

- Confirms the nature of spilled product and volume (based on instruments &/ or observations using the Bonn Colour Code);
- Evaluates the current drift speed & direction (based on observed drift, wind & current);

▶ The RSES, based on the initial information available:

- Defines the Tier level of the incident;
- Decides to activate the present Oil Spill Contingency Plan procedure;
- Becomes Local Incident Commander – IC; and mobilizes the Local IC Post (in liaison with the OIM/ Master).

4.3 Dissemination of alert & Notification of TEP Liban head office

▶ The RSES:

- Alerts by phone the TEP Liban Duty Officer; and requests immediate assistance for Tier 2 or 3 spills;
- Ensures the Master reports the oil spill at sea to the JMOC, normally using POLREP notification form.
- Checks that information in the Total notification form is consistent with the form of the Master (and reporting of OIM to the drilling company).

🗎 See *National authorities POLREP notification form is available in OIL SPILL CONTINGENCY PLAN OPERATIONAL SUPPORT N°13: FORMS & TEMPLATES*

▶ The Planning officer (or RSES) sends as soon as possible to the TEP Liban Duty Officer:

- The Total notification internal form approved by the RSES.
- A copy of the Master notification form sent to the JMOC (POLREP or other format).

▶ The Operations at-sea supervisor:

- Reviews the extension of the maritime exclusion area around the spill;
- Ensures close and incoming vessels are informed of the spill and maritime exclusion area;
- Checks the availability of vessels and time to mobilize vessels.

4.4 Engagement of response and monitoring actions

Tactics focuses on MGO and condensate spill (classified as “non-persistent hydrocarbon products”).

▶ The Planning Officer confirms the safety measures and PPE for the monitoring and response teams on the vessel;

▶ The Planning Officer provides instructions for:

- air quality monitoring: at sea VOC and H2S measurements by a vessel, approaching the slick upwind or sidewind, for any Tier 2 or 3 and Tier 1 spills of few m3’s.;
- spill monitoring and sampling:

- survey of oil slicks with vessel available and/ or from rig (and possible use of drones),
- launching of ARGOS buoy (compulsory for Tier 2 & 3, recommended for spills of few m3's),
- hydrocarbon sampling for condensate spill and any unknown spill.
- *Note. Blow-out monitoring tactics are defined by the IMT.*

▶ The Planning Officer consolidates the evaluation of spilled volume and of initial behaviour and drift of slicks (current and coming with forecasted winds).

See Operational support n°3 "FATE & BEHAVIOUR OF OIL AT SEA".

Use OSRA application modules: Quantification + Trajectory.

▶ The Planning Officer estimates natural dispersion and evaporation and evaluates the need for active response operations (mechanical mixing and/or containment and recovery) as follows:

MARINE GAS OIL – MGO	**CONDENSATE (in case of a blow-out)**
The fate and behaviour of MGO at sea is governed by sea-state (wind). Indicative response guidance: • <5 kts wind: (very) limited natural dispersion ➔ Mechanical mixing essential to replace natural dispersion. • 5-10 kts wind: limited natural dispersion ➔ Mechanical mixing needed to increase natural dispersion. • >10-15 kts wind: efficient natural dispersion ➔ Mechanical mixing optional.	Initial dispersion in the water-column (during the rise to the surface) is considered in the range of 30% (conservative figure). Surfacing of condensates (based on modelling study): • approximately 2 to 3 hours minimum after the start of the release . • with an offset of 500 to 600 m or more compared to the well head location, located at the NE considering the prevailing winds and currents. If significant quantity of condensate is observed at surface, response may be needed: • Mechanical mixing improves natural dispersion. • Containment and recovery is an option to recover weathered condensate residues.

In all case cases, oil spill tracking & air monitoring with appropriate gas monitoring is carried out to evaluate the oil behaviour at the sea surface and evaporation.

▶ The Planning Officer:

- sets up the initial Incident Situation Board with the latest best available information ;

See "Example of Incident Status Board", p.29.

- recalculates the oil drift regularly; provides an estimated position for the next hours (checks the ARGOS buoy position) and coming day.
- requests assistance of TEP Liban HSE Manager for unknown or persistent hydrocarbons (HFO/ IFO or other).

▶ The Operations at-sea supervisor updates the exclusion areas at sea and proposes response tactics.

- Tactics for MGO are based – if needed – on mechanical mixing if needed (low-medium winds, <10-15 kts).
- Tactics for condensates are defined case-by-case, based on their observed weathering.
- Tactics anticipate the drifting of the slick vs. time to mobilize vessels, to anticipate the slick location and guide the vessels to the slick location after drifting time (corresponding to the vessel mobilization time).
- Tactics focus on larger slicks (located if possible with GPS waypoints).

- Note. Blow-out response tactics are defined by the IMT. Containment and recovery, option for Tier 2 or 3 only, is managed by the IMT with a dedicated Local IC.

See "Table 2: Indicative offshore response techniques & resources for instantaneous MGO/ Condensate spill (Source TEP Liban OSCP Operational Support n°4)", p.15

See "Tactics for offshore spills of refined hydrocarbon products", p.30.

See Operational Support n°4 "OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION"

▶ The Operations at-sea supervisor:

- implements and coordinates the vessel monitoring and response actions, once approved by the Local IC.
- mobilizes vessels and provides tactics to the captain of vessels.
- prepares the approved operations & vessels for next day during the night.

▶ The Local IC, based on the spill and effectiveness of response, evaluates the need to continue response operations the next day, and if necessary, requests the development of monitoring and response tactics for the next day.

A summary of indicative response tactics for offshore spills of MGO and condensate is proposed below; to adapt.

Table 2: Indicative offshore response techniques & resources for instantaneous MGO/ Condensate spill (Source TEP Liban OSCP Operational Support n°4)

OFFSHORE INSTANTANEOUS SPILLS OF MGO & CONDENSATES : TECHNIQUES & RESOURCES						
	TECHNIQUES				**RESOURCES (indicative)**	
VOLUME	**Monitored Natural Attenuation MNA**	**Mechanical mixing (*)** – MGO (optional for condensates)	**Dispersant spraying**	**Option. Recovery (**) –** Weathered heavy condensates	**TEP Liban**	**External**
< 1 bbl	✓					N/ A
< 1 to 2 m3	✓	*Option*			If needed (low winds): - 1 “mixing” vessel	N/ A
5 to 10 m3	✓	✓ if low winds				
10 to 50 m3	✓	✓ if low winds		*Option*		
50 to 300-400 m3	✓	✓ if low winds		*Highly unlikely scenario*	If needed (low winds): - 1 to 2 “mixing” vessels (if 50 to 100 m3) - 2 “mixing” vessels (if >100 m3)	- 1 to 2 additional “mixing” vessels (>200 m3) - 1 offshore recovery team (if needed) - Offloading & treatment of recovered oil
>400 m3	✓	✓ if low winds		*Not considered a realistic scenario*	- 2 “mixing” vessels if possible	- 2+ additional “mixing” vessels (>300-400 m3) - 1 offshore recovery team (if needed) - Offloading & treatment of recovered oil
>1,000 m3	✓	✓ if low winds		*Not considered a realistic scenario*	- 2 “mixing” vessels if possible	- 3+ additional “mixing” vessels (>100 m3) - 1 offshore recovery team (if needed) - Offloading & treatment of recovered oil

(*) Mechanical mixing is carried out immediately in low winds for MGO spills, not required for winds over 10-15 knots. Mixing may be implemented for condensate spills after initial evaporation.

(**) Recovery is an option for condensate, if heavier condensates are encountered and if hydrocarbons remain at sea surface after evaporation.

Note. A recovery team includes a main vessel with boom and skimmer, and an assistance vessel to tow the boom. Specific boom can be deployed with only one vessel.

5. DAILY MANAGEMENT OF RESPONSE ON SITE

Matrix below describes the daily oil spill management steps by the three key positions in the Local IC Post (Local IC, Planning officer and Operation at-sea supervisor). Specific actions are detailed after.

Early morning:

- In case of Tier 2 or 3, full IMT is mobilized in Beirut and assists.
- Slick positions for the next day are estimated, based on overnight drift prediction and the position of ARGOS buoys. Vessels may provide some observations (however, partial and limited).
- Vessels are ready to respond for the next day; and located close to the estimated position of the slicks.
- Aerial surveillance, to be carried out early morning, is the only option to locate the target thick slicks.

Legend :
R : Responsible : The doer(s), the leader(s)
(R) : Support : support the leader(s)
A : Accountable : Monitors the progress, accoutable for the results
C : Consulted
I : Informed

DAILY MANAGEMENT OF RESPONSE ON SITE	Local IC	Planning Officer	Operation At-Sea Supervisor	OIM / Master of the Rig	PSV vessel captain
Relocation of vessels on expected spill location (during the night)	I	I	A	I	R
Early morning general update of the situation	I	R/A	I	I	I
Update of loacal IC Post members and display of information in the Local IC Post	I	R/A	I	I	I
Confirmation of air quality and and spill monitoring tactics	A	R	I	I	I
Coordination of monitiring and response actions	A	I	R	I	I
Monitoring and tracking actions (on vessels)	I	I	A	I	R
Response actions (mechanical mixing)	I	I	A	I	R
Anticipation of slick position for day +1	A	R	I	I	I
Development of air quality and spill monitoring tactics for day +1	A	R	I	I	I
Development of response tactics for day +1	A	C	R	I	I

Figure 3: Daily management steps in case of spill at sea on the Drilling unit

5.1 Spill monitoring & operation follow-up

Early morning, as soon as possible, and with results of aerial observation if available:

▶ The Planning Officer provides:

- The latest positions of the ARGOS buoys;
- Updated information about the extent & location of slicks (from aerial observations), and estimated mass balance (remaining volume of oil at sea surface);
- Observed wind & current, and weather forecast (wind);
- Updated oil drift prediction for the current day;
- Update on behaviour and expected mechanical dispersibility of oil.

▶ The Planning officer updates the monitoring tactics for the current day: air quality monitoring, sampling etc.

▶ The Operation at-sea supervisor confirms the target areas for the vessels (i.e. location of larger slicks).

▶ The Local IC approves updates/ modifications of tactics.

5.2 Incident Status Board

▶ The Planning Officer:

- Regularly updates the Incident Status Board with the latest information.
- Provides regularly to the Local IC a short summary of the situation and on-going operations.

See "Example of Incident Status Board", p.29.

5.3 Daily coordination of operations

▶ The Operation at-sea supervisor:

- Confirms the tactics for the current day to the vessels, MetOcean conditions and position of slicks.
- Guides the vessels to the larger slicks (based on their latest positions, drift and transit time of vessels).
- Ensure the vessel(s) follow the drift of the slick to remain on the target slicks.

▶ The Operation at-sea supervisor requests from the vessels:

- regular feedbacks (initially every 1-2 hours) about the effectiveness of operations;
- daily reports:
  - area covered, hours of operations, nature of oil encountered, speed of ship,
  - efficiency of mixing operations, photos.

5.4 Preparation for next day

▶ The Planning officer:

- provides an estimated position of the slicks for the next day.
- updates the monitoring tactics for the next day.

▶ The Operation at-sea supervisor updates the response tactics for the next day and needed vessels.

▶ The Local IC approves the tactics and resources to mobilize for the next day.

▶ The Operation at-sea supervisor organize the vessel(s) mobilization for the next day accordingly.

▶ The Local IC appoints a Logistics support to assist for the reception of vessels and other if & when needed.

5.5 Communication & Reporting

REGULAR COMMUNICATION WITH TEP Liban

For Tier 1 incidents

▶ The Local IC reports to the reduced IMT and receives technical support from the HSE Manager as needed.

For Tier 2/3 incidents (IMT mobilized in Beirut),

▶ The Local IC reports to the IMT Operation section.

▶ The Planning Officer receives the general Action Plan from the IMT/ Planning section and provides regularly information.

▶ The Operation at sea supervisor interfaces with the IMT/ Operations Section (if mobilized).

DAILY REPORTING

▶ The Planning officer sends a daily report, validated by the Local IC, to the TEP Liban reduced IMT (Tier 1) or to the full IMT (Tier 2 or 3), including:

- Status of the spill;
- Response operations carried out, planned for next day and requirements for following day.

EXTERNAL COMMUNICATIONS

▶ The Local IC and OIM/ Master ensure they send similar and consistent information to their hierarchy.

▶ The Local IC and OIM/ Master ensure regular information is provided to the personnel of the drilling unit to avoid or limit disclosure of false/ biased information by the personnel.

5.6 Final actions

▶ The Local IC notifies the teams of the end of operations, after approval of head office.

▶ The Planning officer sends the final spill report, validated by the RSES, to TEP Liban head office including:

- Actions taken during the response (including all logs and documentations);
- Causes of the spill and mitigation measures implemented on board;
- Lessons learnt and recommendations (e.g. procedures, training, equipment...).

▶ The Operation at-sea supervisor ensures that:

- All wastes generated by the clean-up operations has been disposed of.
- Response equipment is cleaned, repaired, replaced and stored and spares ordered.

6. AFFILIATE'S OIL SPILL RESPONSE ORGANIZATION

6.1 TEP Liban overall response organization & interfaces with national authorities

Figure below shows the overall organization of TEP Liban to manage spills up to Tier 3 after a spill in Block 4[3], and links with the national incident organization for Tier 2 & 3.

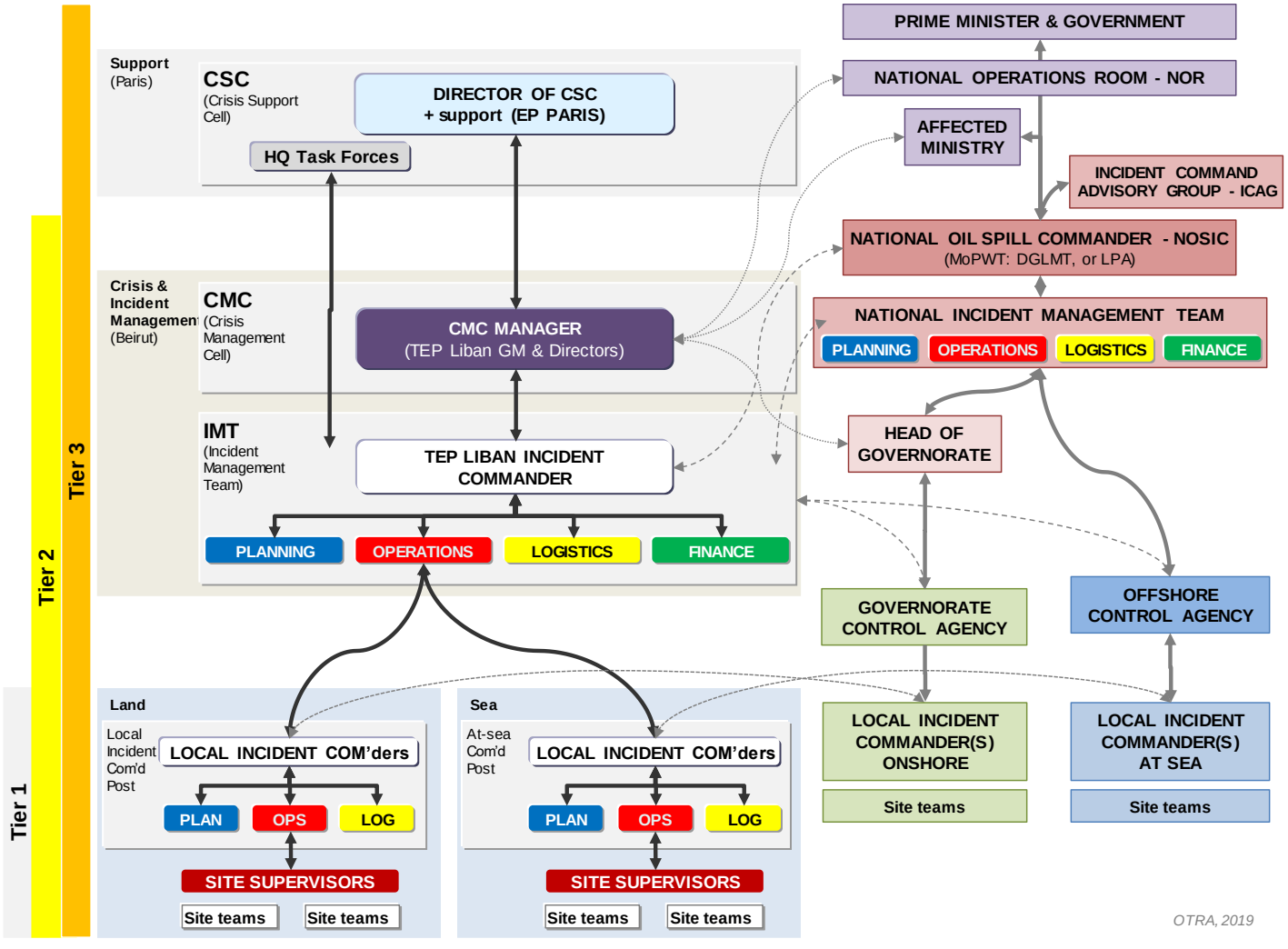

Figure 4: Overall Organization of TEP Liban & Total Group for Oil Spill Response

Local Incident Commanders IC's coordinate specific response operations in a given area (at-sea and onshore), with a Local Incident Command Post team, site supervisors and response teams on site.

TEP Liban Incident Commander IC coordinates the overall incident response with the assistance of the IMT, the TEP Liban Local Incident Commanders, external assistance and in liaison with the relevant authorities.

A "**Reduced IMT**" (e.g. Operations manager, HSE Manager, Drilling Manger &/ or Logistics Manager) may be mobilized at TEP Liban offices to support the site before the official activation of the TEP Liban ERP and mobilization of the IMT.

General Manager approves response strategies, manages crisis issues and communication, and high-level interfaces in Lebanon, with the CMC.

/!\ TEP Liban sends a representative in the national incident management team (to facilitate interfaces) or to the sectoral centres (i.e. at LPA, if and when mobilized).

[3] Spills originating from PSV or at the Logistics are managed by the responsible party: captain or logistics base manager.

TEP Liban maintains constant communication with Drilling unit company and other contractors as needed.

Total Crisis Support Cell CSC provides support to TEP Liban, coordinates transboundary incident, manages the overall crisis-level issues and ensures crisis communication (from Total H.Q., Paris).

6.2 IMT overall structure and responsibilities of sections

Figure below presents the five core functions in the IMT; command, planning, operations, logistics, finance.

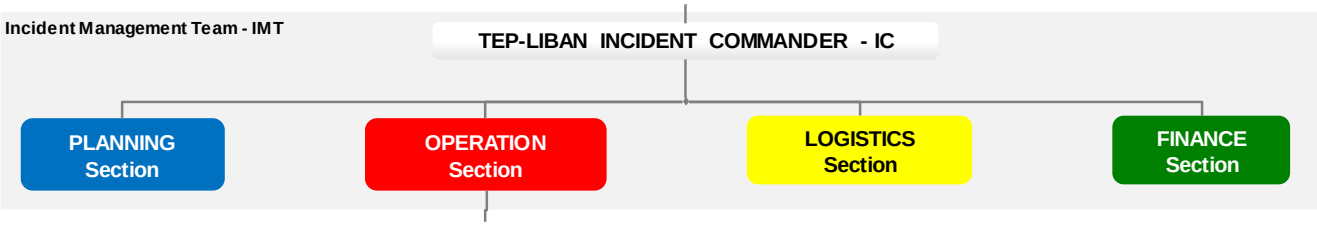

Figure 5 : The five core functions of TEP Liban IMT: command, planning, operations, logistics, finance

Table below lists the key responsibilities of each IMT core function[4].

IMT FUNCTION	KEY RESPONSIBILITIES
INCIDENT COMMANDER	- Overall management of incident response. - Establishing incident objectives and approving strategies and tactics. - Ensuring that activities accomplish objectives.
PLANNING SECTION	- Collecting, checking, and disseminating continuously information on the incident situation to the IMT (Incident Status Board) and site personnel. - Evaluating incident level and risks and identifying impacts. - Providing monitoring action plan. - Providing predictions (slick drift, oil behaviour, potential impacts, etc.). - Preparing status reports and notification (authorities and internal). - Maintaining the status of assigned resources and identify needs for external resources to mobilize. - Facilitating the Incident Action Plan IAP process; and preparing the IAP documents based on input from other sections and Command. - Propose incident objectives. Advise for OSR techniques and strategies. Provide scientific advice. - Planning for the demobilization of incident resources. - Collecting, recording, and safe-guarding all incident documents.
OPERATIONS SECTION	- Acting as the main point of contact with personnel on site and disseminate site feedback to the IMT. - Providing immediate support to the site. - Developing strategies and tactics to achieve incident objectives. - Directing the implementation of the approved Incident Action Plan for maritime, subsea, aerial, shore tactical activities in liaison with the Local Incident Commander(s) and optimize the use of resources - Organizing the Operations Section (& designation of personnel on site) to meet the incident's needs. - Designate personnel on site.

[4] Main reference: National Incident Management System, Third Edition, October 2017, FEMA + adaptation from U.S. COAST GUARD, INCIDENT MANAGEMENT HANDBOOK May 2014

	- Supporting the IAP development for each operational period.
LOGISTICS SECTION	- Acting as the main point of contact with external assistance/ resources providers. - Sourcing and providing external goods & services, and support for the incident management: • competent personnel, • facilities, security (of the IC facilities and personnel), • transportation, • supplies, equipment maintenance and fuel, • food services, • communications and IT support, • medical services for incident personnel etc. - Identify external providers. Formalize request, evaluate offer, set-up contracts. - Organize the mobilization/ reception/ check & transfer of resources to the Operations.
FINANCE SECTION	- Tracking costs, analysing cost data, making estimates, and recommending cost savings measures. - Recording time for incident personnel, equipment and logistical support. - Ensuring payments and reviewing contracts. - Analysing, reporting, and recording financial concerns (damage, insurance, responder injuries etc.). - Administering claims for compensation.

6.3 Tier 2 & 3 spill offshore response – First days organization

While Tier 1 events are managed by the Local IC and their site organization, Tier 2 and 3 maritime spills from/ close to the rig require the mobilization of TEP Liban incident management organization to provide assistance and manage overall the incident.

TEP Liban ERP as well as the OSCP Vol. 1.1 Action Plan (the present document) are activated.

Similar organization is mobilized to assist for spills from PSV or logistics base.

6.3.1 Organization overview

Figure below is the initial IMT organization for Tier 2 & 3 offshore spills, including blow-out situation.

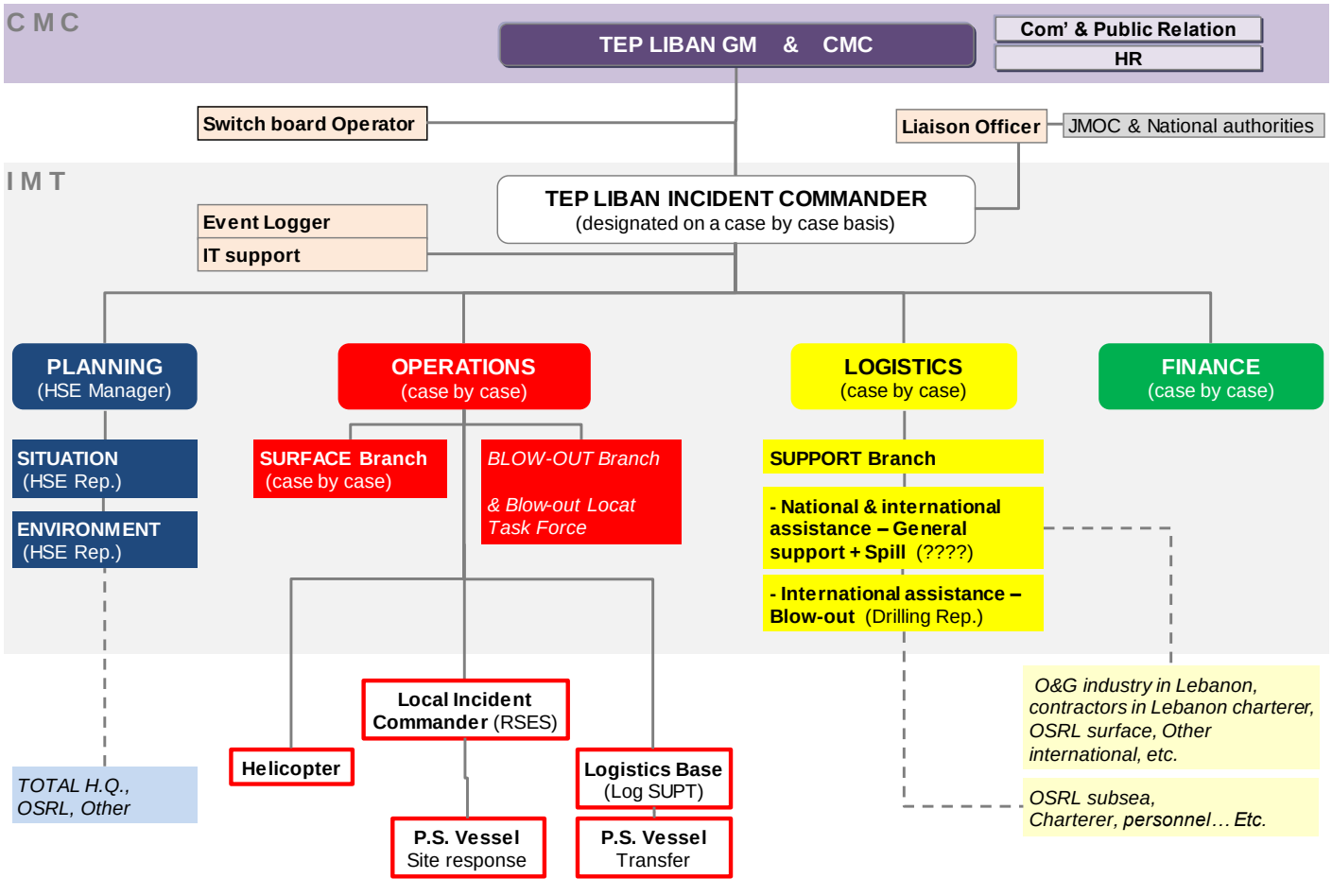

Figure 6 : Initial TEP Liban IMT organization for Tier 2 or 3 offshore spill

6.3.2 Local Incident Command Post (on site)

Spill on the location of the drilling unit. The Local IC (RSES) manages the operations on site. As soon as possible (i.e. next day), he is replaced by a designated Local IC At-Sea to coordinate the surface spill response (with Local IC Post members preferably on a response vessel).

Spill from a PSV in transit between the drilling unit and the port. The initial IC is the captain of the vessel. Spill is managed by the ship-owner. A dedicated IC and MT may be appointed by TEP Liban to provide assistance.

Approach is similar for a spill at the logistics base, to assist the base operator.

6.3.3 Incident Management Team IMT (head office)

For Tier 2 and 3 spills, the overall responsibility for the incident management is transferred to the **TEP Liban Incident Commander IC**, assisted by the IMT.

The IMT is staffed with TEP Liban personnel, designated depending on their availability, type of incident and competencies required.

INCIDENT COMMANDER

▶ INCIDENT COMMANDER designates immediately:

- Chiefs of SECTIONS PLANNING, OPERATION and LOGISTICS (and FINANCE as soon as required);
- A deputy IC, Event Logger and Liaison Officer (for the communication to the authorities).

PLANNING SECTION

▶ PLANNING SECTION CHIEF designates (or assumes directly the functions):

- SITUATION UNIT (for Tier 2 & 3) with minimum:
  - 1 person for the collection of facts, information display, status report writing etc.,
  - 1 person for fate & behaviour predictions, drift modelling etc.;
- ENVIRONMENT OFFSHORE UNIT (for Tier 3);
- Aerial Observer.

Note. In case of multi-emergencies (fire, MedEvac, etc.), additional expertise is mobilized within the section.

OPERATIONS SECTION

▶ OPERATION SECTION CHIEF is designated depending on the incident, e.g.:

- Drilling manager for spill on the location of the drilling unit;
- Head of logistics for other cases: spill from a PSV in transit or close to the port, logistics base.

▶ OPERATION SECTION CHIEF designates (or assumes directly the functions):

- A SURFACE RESPONSE BRANCH director assuming responsibilities of (until supervisors are designated):
  - SURFACE MONITORING GROUP to coordinate aerial observations and other monitoring operations (drifting buoys, gas/explosivity, etc.);
  - MECHANICAL MIXING GROUP to mechanical mixing operations to increase the natural dispersion of oil into the water.
  - RECOVERY OFFSHORE GROUP to coordinate oil containment and recovery operations at sea, as well as mixing operations.
  - Note. SURFACE RESPONSE BRANCH director also initially assumes the responsibilities of:
    - Vessels Branch to coordinate all vessels allocations and movements;
    - Air Operations Branch to coordinate all aerial activities, in liaison with the National Civil Aviation.
- A BLOW-OUT BRANCH director who manages the Blow-out Local Task Force.
  - The Blow-out Local Task Force is activated as per the BOCP provisions.
- A specific Local Incident Commander(s) on site and ensures the Local IC Post(s) is(are) staffed correctly.

LOGISTICS SECTION

▶ The LOGISTICS SECTION CHIEF assumes the responsibilities of (until personnel is designated):

- The SUPPORT BRANCH responsible for mobilizing the external assistance.
  - Tier 2: national assistance (O&G and other industry in Lebanon and specialized companies).
  - Tier 3: OSRL personnel (for PLANNING, OPERATION SECTIONS, and LOGISTICS SECTION to facilitate OSRL mobilization & interface with OSRL Duty Manager).
  - Blow-out: subsea equipment is mobilized by Drilling representatives, in the LOGISTICS SECTION.
- The SERVICE BRANCH which is activated latter if needed e.g. for shoreline operations in remote areas.

FINANCE SECTION

▶ The FINANCE SECTION CHIEF assumes the responsibilities of (until personnel is designated):

- COST UNIT;
- TIME UNIT;
- PROCUREMENT UNIT.

6.3.4 Crisis Management Cell CMC (head office)

The General Manager is informed immediately and manages the mobilization and staffing of the **Crisis Management Cell CMC** to manage crisis and high-level issues; and liaise with "*the appropriate affiliate departments, contractor companies, agencies, governmental authorities, and community representatives, as required*".

Total Liban M&S, Total country chair, is in charge of security, media communications and public relations for any incident in country (from Total Liban M&S and TEP Liban).

Accordingly, CMC will integrate personnel of TEP Liban and of Total Liban M&S.

CMC room may be located at the TEP Liban head office or, alternatively, at the Total Liban M&S head office, both in Beirut.

ⓘ *Refer to the TEP Liban ERP, 2019*.

7. OIL SPILL PREPAREDNESS FOR DRILLING UNIT

The TEP Liban HSE Manager in liaison with the RSES ensure the availability on site of competent personnel, and adequate and sufficient spill monitoring and response resources.

7.1 Competent personnel

▶ The RSES ensures the presence on the Drilling unit of personnel to staff key positions for oil spill response:

- Planning officer (1 person and a deputy);
- Operation at sea supervisor (1 person and a deputy);
- Spill observer for observations from drilling unit and possibly vessel or helicopter.

▶ The RSES ensures that the above personnel are designated, familiar with the provisions of the present procedure and trained to use the tools for initial offshore spill response.

▶ The TEP Liban HSE Manager ensures the crew of the vessels are aware of procedure for air quality monitoring, sampling and mechanical mixing.

7.2 Monitoring tools

▶ The RSES or designated Planning officer ensures the availability on site (on PSV's &/ or drilling unit) of:

- 4 tracking buoys (2 other buoys are in TEP Liban head office).
- 4 sampling kits (3 Back-up kits are in TEP Liban head office).
- VOC/ BTEX airborne concentration measurement device (in addition to gas/ H2S detector) on the drilling unit and on the PSV's.

7.3 Response equipment

▶ No dispersant spraying on MGO and condensate slicks.

▶ Containment and recovery equipment is managed by TEP Liban head office.

7.4 Local IC Post

▶ The RSES or designated Planning officer ensures the availability on site of:

Local IC Post room	• Table and chairs for 6 – 8 persons, • Video-projector and/or TV screen (minimum 50 in) • White boards (for Planning officer and Operations supervisor), • Communication equipment for drilling unit, marine & air (close)
Documents	• TEP Liban OSCP Volume Introduction • TEP Liban OSCP Volume 1.2 Action Plan for Drilling Unit (present document) • TEP Liban OSCP Operational Supports n°1, 2, 3, 4, 5 & 6 • Marine charts of the area
Tools	• Internet access • Access to TEP Liban share drive (W:\) • OSRA Application + Google Earth

8. APPENDICES

8.1 Internal notification form

See next page.

TEP Liban INTERNAL HYDROCARBON RELEASE NOTIFICATION FORM

TO	FROM	NOTIFICATION
TEP Liban DUTY OFFICER	**Name (& company):** …	**Notification ref:** …
Tel:	**Tel:** …	**Date:** …
Email:	**Mail:** …	**Time:** …

SEVERITY LEVEL (CRUDE OIL)		
☐ **TIER 1**	☐ **TIER 2**	☐ **TIER 3**

INCIDENT DESCRIPTION	
Origin of spill	
Cause of spill	
Volume spilled (m3)	
Hydrocarbon spilled	Crude oil | Condensate | Marine Gas Oil | Drilling mud Other (specify) :

SPILL DESCRIPTION							
Observation by	Rig | Vessel | Helicopter | Quayside | Land observer Other (specify) :						
Time of spill start	Date :			Time :			
Localization (WGS 84)	Latitude :			Longitude :			
Slick dimension (m)	Width :			Length:			
Appearance at sea (BONN code)	Silver sheen %	Rainbow %	Metallic %	True colour discontinuous %	True colour continuous %	Other, specify mm %	
Appearance on land							

WEATHER CONDITIONS ON SITE		
Sea conditions		
Wind	Direction *blowing from*:	Speed (Knot):
Current	Direction *flowing to*:	Speed (Knot):

MEASURES TAKEN		
☐ Source control	☐ Aerial surveillance	☐ Mechanical dispersion
☐ Contain't & Recovery	☐ Other:	

RESOURCES USED	
Monitoring	Vessel | Helicopter | Drifting buoy | Sampling | Others:
Mechanical mixing	Vessel:
Containment & recovery	Vessel: Equipment deployed:
Port operations	Equipment deployed:
Others	

8.2 Example of Incident Status Board

Figure below is an example, to adapt, of Incident Status Board.

INCIDENTS FACTS	SITUATION MAP	ORGANIZATION CHART
• Date & time of incident • Location & description of incident • Nature & volume of spilled product • Risks ? Health & Safety measures? • Weather forecast	• Location & extent of the slick + observed drift • Exclusion areas • Response operations • Wind & current, predicted drift	Including the contacts of personnel involved.
OBJECTIVES	**ASSIGNED TASKS**	**RESOURCES TRACKING**
• Objectives? • Tactics? Zoning?	• Personnel mobilized in the Local IC Post CP • Vessel(s) mobilized	• Resources deployed • Assistance requested and ETA

Figure 7: Example of layout of Incident Situation Board in the Local IC Post

8.3 Tactics for offshore spills of refined hydrocarbon products

See next page.

A summary of applicable tactics for spills of other hydrocarbon products is provided below. Methanol is added for information.

These tactics are adapted depending on the MetOcean conditions, type and weathering rate of hydrocarbons.

Table 3: Initial offshore response tactics for refined hydrocarbon products

PRODUCT	SPEC. GRAVITY (15°C/ 4°C)	FLASH POINT (°C)	BEHAVIOUR	RESPONSE TACTIC
Base oil EDC 170 SE	0.815 API 42	> 75°C	Lighter than as Marine Gas Oil. Density: 815 kg/m3 at 15°C. Viscosity: < 20.5 mm²/s at 40°C	Similar as Marine Gas Oil
Drilling mud	>1		Sinks (specific gravity of sea water is 1.025 at 25°C).	▶ **Monitor.**
Lubricating Oil (typical)	0.85 to 0,95 17.5<°API<35	> 60°C	Minimal loss through evaporation and natural dispersion. *Note. Some subsea hydraulic oil have a specific gravity>1 and sink e.g. HW525 (McDermid)*.	▶ **Monitor.** ▶ **Mechanical dispersion** to be considered for larger volumes (few bbl's or more).
Hydraulic Oil (typical)	0.88			
Intermediate Fuel Oil – IFO	0.85 to 0.95	> 50°C	Limited natural dispersion & evaporation. Significant emulsification with waves.	▶ Consider dispersant spraying in favourable conditions. ▶ **Mechanical recovery (boom & skimmer).**
Heavy Fuel Oil – HFO	>0.95	>60° to 90°C	Very limited natural dispersion & evaporation. Limited emulsification with waves.	▶ **Mechanical recovery (boom & skimmer).**
Methanol	0.7918	11°C	**Highly flammable.** If methanol does not ignite, major part dissolves in water, while the remaining evaporates. Example with air and water temperature of 20°C: • 1kt wind: 77% dissolves, 23% evaporates in 2hrs. • 30kts wind: 97% dissolves, 3% evaporates in 6min.	▶ Unit: **Rinse and dilute** (FiFi system). ▶ At sea: **monitor**.

8.4 Operational guidelines and instructions for monitoring & response

Guidelines and instructions for monitoring & response equipment are available in the following operational supports.

MONITORING	**Operational support**
Monitoring techniques	*N°4 "OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION"*
Fate & behaviour of condensate oil spilled at sea	*N°3 « FATE AND BEHAVIOUR OF OIL AT SEA ».*
Fate & behaviour of Marine Gas Oil and other refined hydrocarbons products spilled at sea	
Instructions for aerial observer	*N° 6 "USE OF OFFSHORE MONITORING & RESPONSE TOOLS & EQUIPMENT"*
Instructions: Garmin GPS and digital camera	
Instructions: ARGOS Drifter buoy	
Instructions: Sampling	
PREDICTION TOOLS	**Operational support**
ADIOS 2.0 Oil weathering model (5 days)	*N° 6 "USE OF OFFSHORE MONITORING & RESPONSE TOOLS & EQUIPMENT"*
ALOHA VOC/BTEX Atmospheric dispersion	
Oil Spill Response Application OSRA: • Unit converter • Oil Slick Trajectory • Oil Slick Quantification (Bonn Code)	
SAFETY	**Operational support**
Safety procedures for oil spill response operations	*N°5 "OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION"*
RESPONSE	**Operational support**
Proposals of tactics for instantaneous spills	*N°4 "OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION"*
Offshore mechanical mixing	*N°5 "OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION""*

OIL SPILL CONTINGENCY PLAN

VOL 1.3 GUIDANCE PLAN FOR LOGISTICS BASE

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

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Markings:

/!\ Warning

🗎 Link to other documents of the TEP Liban OSCP

ⓘ Link to external document or information, not part TEP Liban OSCP

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1. PURPOSE & SCOPE

The present procedure "VOL 1.3 GUIDANCE PLAN FOR LOGISTICS BASE" provides guidance for the TEP Liban personnel in the Logistics base (at Beirut port), to respond to spills of hydrocarbon products resulting from TEP Liban activities:

- on land at FAST BOLLORE Logistics base;
- in Beirut port waters (from a PSV loading/ offloading and bunkering).

Risk of oil spill, due to logistics support activities for TEP Liban, is limited by the implementation of adequate operational and safety measures. Spill scenarios identified in relations to logistics activities are as follows:

Table 1 : Examples of spill scenarios at the Logistics and Port of Beirut (all not applicable depending on operations)

INCIDENT WITH SPILL IN WATER	Product	Volume	Tier level
Minor leak on hose during bunkering	MGO	up to 1 bbl	1
Minor leak on hose during loading	Drilling mud	up to 1 bbl	1
Run-off to sea of breached drum (after mis-handling with pallet mover,	Engine/ lube/ hydr. oil	up to 1 bbl	1
Vehicle/ truck/ forklift collision leading to damage of drums/IBC's with run-off at sea	Engine/ lube/ hydr. oil	up to few bbl	1
Hose severe leak/ rupture during PSV bunkering + difficulties &/ or delay to control	MGO	up to few m3	2
Hose severe leak/ rupture during loading of drilling mud on PSV + difficulties &/ or delay to control	Drilling mud	up to few m3	2
Loss of drums/ IBC's at sea during transfer to ship	Engine/ lube/ hydr. oil	up to few m3	2
Loss of truck at sea loaded with IBC's &/or drums (fall from quayside)	Engine/ lube/ hydr. oil	up to 22 m3	2
Loss of truck tank at sea loaded with diesel/ MGO	MGO	up to 35 m3	2
Loss of PSV	MGO	up to few 100's m3	3

INCIDENT ON LAND. NO OIL AT SEA	Product	Volume	Tier level
Vehicle collision	Gasoline	up to few 10's ltrs	1 minor
Vehicle collision	MGO	up to few 10's ltrs	1
Minor leak in mud plant or hoses or quay	Drilling mud	up to 1 bbl	1
Problem with a drum (outside or in warehouse)	Engine/ lube/ hydr. oil	up to 1 bbl	1
Loss of Diesel tank of power generator	MGO	Up to 4-6 m3	1
Loss of base oil iso tank	Base oil (EDC 170 SE)	Up to 20 m3	2
Leak in mud plant or hoses or quay	Drilling mud	up to 1 bbl	1
Vehicle/crane/loader collision affecting multiple drums	Engine/ lube/ hydr. oil	up to few m3	1
Major rupture in mud plant or hoses	Drilling mud	up to few 10's m3	2
Major fire/ explosion at Logistics base/ Mud plant	Mixed products	over 100's m3	3

Note: Emergency response provisions of Port Authorities (GEPB), FAST BOLLORE and sub-contractors are not confirmed at the time of writing (04/11/2019).

FAST BOLLORE Base Manager has overall responsibility for emergency management in the perimeter of the logistics base. He holds the initial responsibility for oil spill management on land (in his area of responsibility); manages entirely Tier 1 spills on land and manages Tier 1 spills at sea close to his quayside.

Bunkering of PSV (MGO) is carried out ship-to-ship, at the quayside, or in the port or at sea.

"Gestion et Exploitation du Port de Beyrouth" (GEPB), authority regulating port operations, has overall responsibility for the management of Tier 2 & 3 spill response in the port.

When an oil spill is associated with a wider emergency (e.g. fire, explosion, personal injury), the FAST BOLLORE Emergency Procedures are activated, as well as those from GEPB if and when needed.

The FAST BOLLORE Base Manager is responsible for maintaining adequate personnel and resources on site to manage Tier 1 spills on land, to respond to minor spills at sea and initiate Tier 2 & 3 response.

TEP Liban ensures that adequate response capabilities are available on site (for land and port waters spills), with escalation mechanisms. TEP Liban HSE manager maintains the present Guidance up to date.

2. SPILL TIER LEVEL & RESPONSIBILITIES

TEP Liban uses the **Tier level concept** (internationally concept used by Total to classify spills into three levels of severity and mobilization, and used in the Lebanese NOSCP). Tier levels are defined based on the specific risks and settings of the logistics activity for TEP Liban.

Tier level is assessed as soon as possible, based on best available information and on the table below.

- One criterion is enough to classify a spill in Tier 2 or 3.
- Level is assessed considering the volume, nature and persistency of the product spilled, associated risks and level of resources needed for the response.
- Volumes (of oil accidentally released into the environment) are indicative guidelines.
- Good practice is to “prudently over-estimate” the spill and risks.
- Tier 2 or 3 classification is approved by the GM.

Table 2 : Tier levels for TEP Liban (indicative)

COASTAL, PORT, LOGISTICS BASE & INLAND SPILLS - TIER LEVELS

Status 25/11/2019

		- TIER LEVELS		+
LOCATION	**LOGISTICS BASE WATERS, PORT & CLOSE WATERS**			
	Non-persistent oil Extent	☐ **< 1-2 m3** ☐ Very close installations & quaysides, river banks, beaches.	☐ **2 m3 to 35-40m3** ☐ Installations, quaysides, river banks, beaches, etc. in the area.	☐ **> 40 m3** ☐ Installations, quaysides, river banks, beaches, coastal villages, islands etc. in extended area.
	LOGISTICS BASE INLAND			
	Non-persistent oil Extent	☐ **< 10-15 m3** ☐ Logistics base, storage area	☐ **15 m3 to 150m3** ☐ Logistics base, storage area & immediate surroundings	☐ **> 150 m3** ☐ Logistics base, storage area & surroundings + soil infiltration
RESPONSE	**Resources**	☐ Tier 1 resources (of Logistics Base) + Contracted companies on site.	☐ Tier 1 resources + Other O&G operators + Port Authorities + Service companies in country/ close countries + National resources	☐ All Tier 1 + 2 resources + Mobilization of regional & international assistance
	Management	☐ **Manager of Logistics base** Port Authorities 1/ Or captain of vessel if PSV incident	☐ **Port Authorities** + TEP Liban assistance + Total HQ : "spot" support + Authorities: Follow-up & supervision (activation of NOSCP at the discretion of the Authorities) Or shipowner if PSV incident	☐ **Port Authorities** + TEP Liban assistance: IMT & CMT + Total HQ assistance (remote & in country) **+ Authorities**: Follow-up & supervision (activation of NOSCP at the discretion of the Authorities) Or shipowner if PSV incident

Note. Persistents: crude, HFO & IFO, utility oils, etc. *Non-persistent: Condensate, MGO, drilling mud NABM, etc.*

See TEP Liban OSCP Vol. 2, section “Oil products, spill scenarios & Tier levels”

3. MANAGEMENT ORGANIZATION ON SITE

This section covers the organization to implement for Tier 1 & initial Tier 2 / 3 spills at the Logistics Base.

The figure below illustrates the possible organization for the initial oil spill response, based on the best understanding of FAST BOLLORE spill response arrangements.

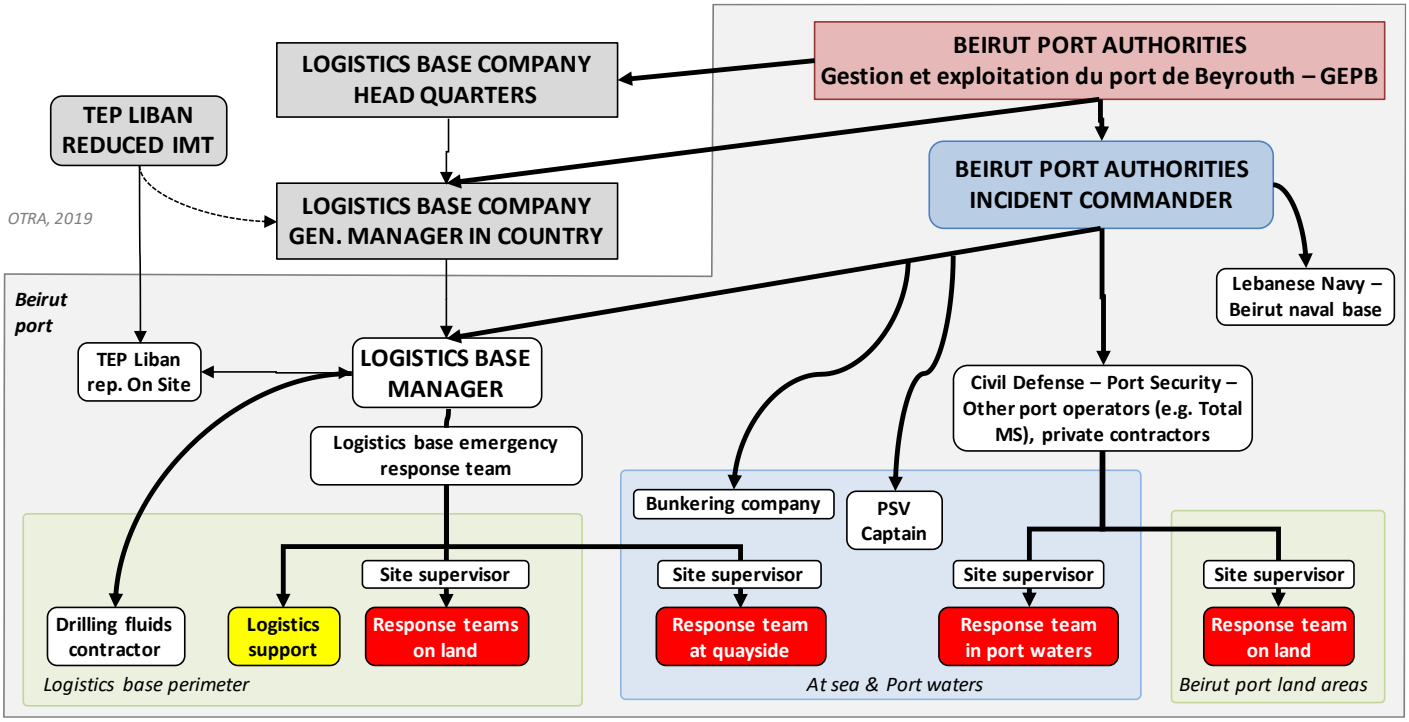


Figure 1 Oil spill response organization at FAST BOLLORE Logistics Base & Port of Beirut

▶ **FAST BOLLORE Base Manager** is responsible for:

- Tier 1 and initial Tier 2 & 3 land spill management in the perimeter of the logistics base.
- Tier 1 and initial Tier 2 & 3 spill management in port waters along the quayside of the logistics base (whether oil is spilled from a vessel at quayside or from uncontained logistics facilities on land).

▶ **FAST BOLLORE Base Manager**:

- Alerts GEPB for any spill (land or port waters) and also the JMOC (spill in port waters) using the POLREP notification form;
- Ensures a rapid spill assessment and activates the emergency procedures as needed;
- Approves the tactical plans, mobilizes the resources and commands the first response.
- Reports regularly to GEPB.

Note. For spills from PSV "en route", spill is managed by the captain and ship owner, with assistance of logistics base manager as needed.

Note. For spills of drilling fluids at the logistics base, contractor in charge of drilling fluids and running the mixing plant at the logistics base provides assistance as needed.

Note. For spills of MGO during ship-to-ship bunkering (carried out with PSV at the quayside, in the port or at-sea), bunkering company is in charge of first response with vessel, depending on the exact location of the incident. Assistance may be provided as needed.

▶ **GEPB** is responsible for the overall management of Tier 2 & 3 spills (land and port waters) in the port perimeter, supervising FAST BOLLORE and coordinating the response with other entities such as Lebanese

Navy (Beirut naval base), Civil Defence, Port security (access), industry partners (i.e. Total M&S) and private contractors.

▶ The **TEP Liban representative on site**, in liaison with the **FAST BOLLORE Base Manager**:

- Ensures emergency is adequately managed;
- Ensures adequate health & safety measures (monitoring, PPE etc.) are enforced;
- Ensures notification is sent to GEPB and JMOC as needed;
- Facilitates the provision of external assistance if required in liaison with the (Reduced) IMT in Beirut.

See Operational Support 13 FORMS & TEMPLATE for national authority POLREP notification form

▶ The **TEP Liban representative on site** reports on a regular basis to:

- His hierarchy (e.g. head of Logistics) and TEP Liban HSE Manager (or reduced IMT) if the TEP Liban ERP is not activated;
- The IMT/ Operations Section if the IMT is activated (Tier 2 or 3).

Table below presents the key functions and responsibilities of the FAST BOLLORE personnel for oil spill response.

PLANNING officer	- Advises about safeguarding of Health and Safety of personnel and responders. - Organizes monitoring of Health & Safety and spill, and evaluation of response. - Provides information on spill status and associated risks. - Provides predictions about behaviour of spilled product. - Consolidates the Action Plan for next day (for land response & at sea response along quayside). - Maintains the Incident Situation Board updated. - Prepares the notification form and the daily situation report. - Acts as liaison with TEP Liban Reduced IMT.
OPERATIONS ON LAND supervisor	- Coordinates the response operations on land.
OPERATIONS AT QUAYSIDE supervisor	- Coordinates the response operations from the quayside/ along the quayside.
LOGISTICS SUPPORT supervisor	- Request resources as needed (TEP Liban and others as needed). - Manages the arrival and dispatch of resources: replacement PPE etc.

▶ **The TEP Liban reduced IMT**[1] liaises initially with FAST BOLLORE, via the TEP Liban representative on site, to facilitate the provision of assistance if needed.

▶ **The TEP Liban IMT** may liaise with GEPB to provide further assistance if needed (for Tier 2 & 3 spills).

[1] Composed of relevant senior personnel, e.g. Operations Manager, Drilling Manager, HSE Manager, Logistics Manager, until the TEP Liban ERP is activated and the full IMT is mobilized (Tier 2 or 3 or other emergency).

4. INITIAL RESPONSE ACTIONS

Matrix below describes – for information – the expected initial actions of TEP Liban representative, FAST BOLLORE personnel and GEPB.

Legend :
R : Responsible : The doer(s), the leader(s)
(R) : Support : support the leader(s)
A : Accountable : Monitors the progress, accoutable for the results
C : Consulted
I : Informed

INITIAL ACTIONS	TEP Liban Rep.	FAST BOLLORE Base Manager	Gestion et Exploitation du Port de Beyrout (GEBP
1 - Alert on site & immediate safety			
Broasdcast alert to Personnel at the base + PSV	I	R/A	I
Set-up of exclusion area on land	C	R/A	I
Air quality monitoring on land	C	R/A	I
Air quality monitoring around the slick at sea	C	R	A
Initial exclusion area around spill at sea	C	R	R/A
2 - Assessment of spill & activation of contingency plan			
Risk assessment and safety measures / PPE in place on land	I	R/A	I
Product confirmed, volume spilled & drift estimated	C	R/A	I
Tier level confirmed . FAST BOLLORE contingency plan activated	C	R/A	I
3 - Dissemination of alert & notification of TEP Liban head office			
Initial alert (phone) to TEP Liban Duty Officer	R/A	I	*N/A*
Sending of notification form to TEP Liban DO	R/A	I	*N/A*
Sending of notification form to GEBP (any spill)	I	R/A	I
Sending of notification form to JMOC (If oil spilled at sea)	I	R/A	I
Consolidation of maritime exclusion area	I	I	R/A
Air quality monitoring	I	R	A
Alert of competent authorities	I	I	R/A
4 - Engagement of monitoring and response actions			
Set-up of FAST BOLLORE On-Scene Command	C	R/A	I
Development of monitoring and response tactics - on land	C	R/A	I
Implementation of initial monitoring and response tactics - on land	I	R/A	I
Development of monitoring and response tactics - at sea	C	R/A	I
Implementation of initial monitoring and response tactics - at sea	I	R/A	I

Figure 2: Initial actions at Logistics Base in case of spill on land or at sea

4.1 Alert on site & immediate safety

▶ Any personnel on site witnessing a loss of containment or a spill at sea immediately alerts the FAST BOLLORE base manager or HSE manager or closest team leader/ supervisor.

▶ The FAST BOLLORE base manager ensures:

- Safe actions are undertaken immediately to control the source/ stop the release or spill.
- Hot works are stopped if and when needed.
- Air quality measurement is carried out as soon as possible by a monitoring team with appropriate PPE in case of risk of suspicious &/or strong smell of hydrocarbon.
- Immediate actions to control the source are carried out by personnel on location if safety is ensured.

▶ The FAST BOLLORE base manager ensures:

- The immediate alert and safety of all personnel on & close to site (FAST BOLLORE & sub-contractor);
- Notification of the TEP Liban representative on site.

Health & Safety Rules remain applicable when responding to an oil spill.

Exposure limits are reminded below.

Table 3 : Exposure limits for workers (Source : Valeurs limites d'exposition professionnelles aux agents chimiques en France ; Aide-mémoire technique n° ED 984 ; 2007)

Product	VME or TLV-TWA = average exposure 8hrs	VLE or TLV-STEL = exposure limit for 15 min
Benzene	**1 ppm // 3,25 mg/m³**	**N/ A**
VOC, C6-C12	**284 ppm // 1 000 mg/m³**	**426 ppm // 1 500 mg/m³**

See: Operational Support n°4, section "SAFETY PROCEDURES FOR OFFSHORE RESPONSE"

4.2 Assessment of spill and activation of contingency plan

▶ FAST BOLLORE Base manager consolidates the assessment of the situation (on land and at sea)**:**

- to confirm first findings (product? Volume? Air quality?);
- samples the spilled/ released product;
- evaluates incidents and impacts;
- and decides of initial tactics.

Table 4 : Key information to collect during the initial assessment

FOR ANY TYPE OF INCIDENT

ORIGIN & TYPE OF INCIDENT
• Location and source of incident ? (IBC, tank, vessel, vehicle, mixing plant etc.)
• Cause of incident ?
• Type of spill/ release: instantaneous/ continuous?
• Risk of escalation? Risk of spill on land going at sea &/ or going in drainage/ buried systems ?
• Source :
  ○ Controlled/ stopped : estimated spilled volume?
  ○ Continuous: estimated flow rate and volume spilled at a given time?

TYPE OF PRODUCT & <u>ASSOCIATED RISKS</u> • Nature and appearance of spilled/ released product ? • Persistent hydrocarbons: utility oils (engine, lube, hydraulic) ? • Non-persistent hydrocarbons: MGO, gasoline, base oil ? • Non-floating: drilling mud? • Hazardous and Noxious Substances ? Other? Unknown product? • Risk of flammability/ explosivity? • Risks for health of personnel and close installations/ activities?

IMMEDIATES MEASURES

- Safety: exclusion area? evacuation?
- First response to control the source?
- Air quality monitoring
- Sampling of spilled product

INCIDENT AT SEA	INCIDENT ON LAND
CONDITIONS & BEHAVIOUR • Direction and speed of wind (& current when applicable)? • Observed drift of the slick? 🗎 *Operational Support n°3 section: « SPREADING & DRIFT OF HYDROCARBONS SPILLED AT SEA »*	**CONDITIONS & BEHAVIOUR** • Direction and speed of wind? • Observed run-off &/or infiltration in soil or drainage/buried system?
LOCATION & SPILLED VOLUME • Location & evaluation of size of slick (observation from quaysides and vessels) • Evaluation of spilled volume. **/!** Slicks drift and spread in the port but also concentrate against port infrastructures and vessels. Consequently, slick thickness may increase, and Bonn Colour Code may not be usable directly. 🗎 *Operational Support n°6 sections:* *- « AERIAL OBSERVER GUIDELINES »* *- « INSTRUCTIONS FOR SURFACE MONITORING »*	**LOCATION & RELEASED VOLUME** **Impermeable surface** (concrete, asphalt). • Location. • Evaluation of visible volume: length x width x thickness. **Permeable surface** (soil, sand). • Location. • Evaluation of visible volume: length x width x thickness. • Evaluation of infiltrated volume of hydrocarbon and volume of oiled soil. • Dig trenches to evaluate extent of area and depth of infiltration. 🗎 *Operational Support n°9, section « SHORELINE CLEANUP AND ASSESSMENT TECHNIQUE »*
• Aerial surveillance (e.g. using drone or helicopter) is required for any spills over few barrels, and/ or when slicks drift out of the port.	• Check presence of hydrocarbons in drainage/buried systems.
FORECAST • Drift direction and speed of slicks? • Risks for close areas/ activities?	**FORECAST** • Risk of run-off on other area? Of infiltration in the soil/ drainage systems? etc.

4.3 Dissemination of alert & Notification of TEP Liban head office

▶ The FAST BOLLORE base manager ensures:

- The notification of Beirut port operator “GEPB”;
- The notification of JMOC for any spills in port waters or risk of spill in port waters.

▶ PSV captain alerts GEPB (port operator), JMOC and FAST BOLLORE in case of a spill from the vessel.

▶ JMOC notifies authorities about any spill at sea in port waters (and GEPB to confirm).

▶ The TEP Liban representative forwards the notification to the TEP Liban Duty Officer.

▶ TEP Liban forwards the notification to Total Liban M&S.

Note. TEP Liban ensures, as much as practically possible, that authorities are timely and correctly notified and updated of the situation.

4.4 Level of activation & response management

▶ FAST BOLLORE HSE Manager:

- Confirms the safety measures and PPE for the monitoring and response teams;
- provides air quality and spill monitoring instructions.
- organizes sampling;
- manages spill on land (in logistics base perimeter) and along quayside.

▶ GEPB mobilizes vessels and personnel to manage Tier 1 spills in port waters, away from quaysides.

▶ GEPB activates their emergency system to coordinate Tier 2 & 3 spill response on land &/ or at sea.

Note. GEPB does not have a dedicated response organization and capabilities. It is possible that, in case of an incident, GEPB may relinquish the coordination of response operations to the Lebanese Civil Defence.

▶ TEP Liban may provide support to FAST BOLLORE and / or GEPB. In such case, the IMT is activated at TEP Liban head office (possible activation – partial – of ERP and OSCP).

▶ Total Liban M&S may provide assistance (e.g. mobilise their equipment).

See Appendices for road access transport of equipment from Total Liban M&S to the logistics base

4.5 Response techniques

The next table provides guidance on response technique depending on the type of product spilled.

Table 5: Logistics base/ port oil spill response Phase 1 technics for refined hydrocarbon products

PRODUCT	SPECIFIC GRAVITY 15°C/ 4°C	FLASH POINT (°C)	BEHAVIOUR	RESPONSE TECHNIC
Gasoline	+/- 0.7	**- 40°C**	Very fast evaporation on land / at sea. Additional dispersion at sea if medium/ strong winds. + Very rapid infiltration on soil	**/!\ High inflammation risk.** ▶ **Monitor** when spilled at sea. ▶ **Rinse & dilute** on land/ installations &/ or **cover with foam** (to limit explosive vapours).
Marine Gas Oil MGO	0.84 – 0.86	> 60°C	Fast evaporation on land / at sea. Natural dispersion at sea if medium/ strong winds. + Rapid infiltration on soil	▶ **Recover on land** (sorbents & pumping). ▶ **Contain & recover at sea** (boom, skimmer & sorbents).
Base oil *	0.815	> 77°C		
Drilling mud	> 1	>> 77°C	Sinks + Very limited infiltration on the soil	▶ **Recover on land** (manual scraping/ mechanical recovery and pumping). ▶ **Possible underwater pumping at sea.**
Lubricating Oil & Hydraulic Oil (typical)	0.85 to 0,95	> 60°C	Minimal loss through evaporation and natural dispersion. + Limited infiltration on soil *Note. Some subsea hydraulic oil have a specific gravity >1 and sink e.g. HW525*.	Treat as MGO (or drilling mud if S.G. > 1)

* EDC 170 SE base oil

4.6 Response steps and tactics

Based on the assessment, MetOcean conditions and anticipating the hydrocarbons fate and movements, the FAST BOLLORE base manager defines:

- Adequate PPE type/ level for the intervention team.
  - *Appendices "Personal Protective Equipment – Logistics base/ Port"*
  - *Operational Support n°8, section "ONSHORE SAFETY FOR RESPONSE"*
- The initial response tactics on land and in port waters along quayside.

The response strategies in port areas usually includes the following steps (on land and at sea):

- 0 – SAFETY
- 1 – PRIORITY : CONTAINMENT as soon as possible and once safety is ensured.
- 2 – PROTECTION if and when needed.
- 3 – SET-UP OF RECOVERY/ CLEAN-UP WORKING SITE once containment is achieved.
- 4 - RECOVERY after working site is set-up.
- 5 – CLEAN-UP after recovery is completed.
- 6 – WASTE MANAGEMENT during/ after recovery & clean-up.

/! Intervention is authorized by the FAST BOLLORE base manager when intervention conditions are safe.

/! Logistics base manager will particularly ensure that, for on land releases in confined/ badly ventilated areas, atmosphere is non-explosive and non-toxic (or adequate protection is in place).

The next tables provide tactical guidance for tactics maritime and on land response, **focused on MGO**.

Table 6 : Indicative tactics for maritime response – Logistics base/ Port response

STRATEGY	TACTICS AT SEA IN PORT WATERS
1 – PRIORITY : CONTAINMENT As soon as safely and practically possible.	▶ Limit the spreading and drift of hydrocarbons on the sea surface: - Deployment of booms around the slicks, - Deployment of booms down-stream of the drifting direction of the slicks. ▶ Concentrate hydrocarbons close to quayside, in an area of easy access for recovery work considering: - the natural action of the wind, - use of low-pressure fire hose to create a surface current.
2 PROTECTION if and when needed.	▶ Identify and protect the sensitive areas/ activities by anticipating the drift of the slicks. ▶ Deploy protection boom by anticipating the drift of the slicks at the surface of the sea (action of the wind, currents possible but probably non-significative). ▶ Limit the drift – as much as possible – in the rip-raps.
3 SET-UP OF WORKING SITE Once containment is achieved.	▶ Delineate the area of operations on the quayside. ▶ Restrict the accesses. ▶ Distribute PPE's. ▶ Set-up the waste storage area on site and protect the ground.
4 RECOVERY After working site is set-up.	▶ Pump, from the quayside, the hydrocarbons at the sea surface and polled against the port infrastructures &/ or vessels, with the assistance of a workboat. - Tier 1 : 1 peristaltic pump and weir skimmer (light or heavy hydrocarbons), disk skimmer (medium hydrocarbons, lube/ engine/ hydraulic oil), brush skimmer HC (heavy hydrocarbons). Option : vacuum truck (thick layer of medium/ heavy hydrocarbons). - Tier 2 - 3 : same equipment, re-enforced depending on volume spilled. + operations from vessels or barges to collect slicks out of reach from the quayside. ▶ Recover, with a workboat/ barge/ small vessel, oiled solid waste (plastics and others) + small drifting patches of oil: - light hydrocarbons with sorbent booms and rolls, towed. - medium/ heavy hydrocarbons: pom-poms on line, towed.

5 CLEAN-UP After recovery is completed.	▶ Contain cleaning effluents against the quayside, with floating booms and sorbent booms. ▶ Prepare the recovery of effluents in the contained area by anticipating the drift of the effluents and locating an oily waste storage area. ▶ Clean the oiled quaysides : - manual scraping, - rinsing, high pressure clean-up of residual oil. ▶ Flush, concentrate and recover the clean-up effluents in the recovery area.
6 WASTE MANAGEMENT During/ after operations	▶ Collect, sort and store on site recovered hydrocarbons and operational oily waste (PPE, sorbent). ▶ Store recovered oil in barrels/ drums, IBC (1m3), flexible tanks (5-10 m 3) or skips/ lorries. ▶ Carry out a first decantation on site if needed. Discharge decanted water in contained area, after filtration with sorbent material. ▶ Store oiled PPE & sorbents in heavy duty dustbin bags, water tight big-bags etc. ▶ Evacuate and treat the oily waste.

Table 7 : Indicative tactics for terrestrial response – Logistics base/ Port response

STRATEGY	TACTICS: IMPERMEABLE AREA AND QUAYSIDE AND SOIL/ PERMEABLE GROUND
1 – PRIORITY : CONTAINMENT As soon as safely and practically possible.	▶ Limit the spreading and run-off of hydrocarbons on the ground surface: - sorbent booms, water filled booms, solid booms, sand bags, etc. - trenches, embankments, planches on/ into the ground, wall/ berm etc. **Drainage system** ▶ Limit/ avoid the infiltration of hydrocarbons in the drainage system: deflection &/ or obturation plates, sand bags, plastic liners etc. ▶ Limit the run-off of hydrocarbons already in the drainage system by blocking the system down-stream: planks, sand bags, inflatable device etc.

STRATEGY	TACTICS: IMPERMEABLE AREA AND QUAYSIDE	TACTICS: SOIL/ PERMEABLE GROUND
1 PRIORITY : CONTAINMENT	▶ Concentrate hydrocarbons on the lowest area, and preferably towards the recovery area.	▶ Limit/ avoid the infiltration of hydrocarbons into the soil: plastic liners, water-saturation of the soil etc. ▶ Concentrate the hydrocarbons on the lowest areas and protect them with plastic liners. ▶ Deflect hydrocarbons towards impermeable areas.
2 PROTECTION if and when needed.	▶ Identify and protect entrances of drainage system. ▶ Identify and protect close activities and goods.	*Same as "Impermeable areas and quaysides"*
3 SET-UP OF WORKING SITE Once containment is achieved.	▶ Delineate the area of operations and the accesses. ▶ Distribute PPE's. ▶ Set-up the waste storage area on site and protect the ground.	*Same as "Impermeable areas and quaysides"*
4 RECOVERY After working site is set-up.	▶ Pump the thick layers of hydrocarbons (spills > few barrels or more): - Tier 1 : 1 direct suction with peristaltic pump &/ or vacuum truck. - Tier 2 - 3 : >= 2 peristaltic pumps &/ or 2 vacuum trucks.	*Same as "Impermeable areas and quaysides" and* ▶ Consider the possibility of digging holes &/ or trenches to pump the hydrocarbons in oil saturated grounds.

	▶ Recover the thin layers of hydrocarbons (range of <0.5cm) : - fluid hydrocarbons: use sorbent pads and sheets - viscous/ weathered hydrocarbons: manual scraping and collection ▶ Recover thick & elongated patches of hydrocarbons with sorbent booms (e.g. alongside pavements or in gutters).	*Note. Use a lobe pump for very viscous hydrocarbons &/ or loaded with sediments.*
5 CLEAN-UP After recovery is completed.	▶ Contain the area to clean with sorbents, inflatable booms, solid booms/ berms or other. ▶ Prepare an area dedicated to the recovery/ filtration of effluents. ▶ Clean the oiled surfaces with high pressure cleaners (and hot water if needed for heavy/ viscous hydrocarbons). ▶ Rinse, concentrate and recover the clean-up effluents in an area dedicated. Filtrate and discharge clear water (to limit amount of liquid waste). ▶ Consider using clean-up products for heavy/ viscous hydrocarbons.	**Soils saturated with hydrocarbons** ▶ Remove the surface layer of oiled saturated soil/ sediment: - manual surface scraping for small accumulations (10's – 100's kg) - mechanical scraping for large accumulations - Remove as less "clean" soil as possible. **Soils containing some oil** ▶ Consider treating in-situ oiled soil/ sediments with light hydrocarbons: - Surface : water rinsing, low pressure flushing, large flow rate flushing etc. - Buried : flushing, - Recovery of effluents in trenches with sorbents ▶ Evacuate soil/ sediment oiled with heavy/ viscous hydrocarbons. **Any type of operation** ▶ Concentrate and recover the clean-up effluents.
6 WASTE MANAGEMENT During/ after operations	▶ Collect, sort and store on site recovered hydrocarbons and operation waste (PPE, sorbent). ▶ Store recovered oil in barrels/ drums, IBC (1m3), flexible tanks (5-10 m 3) or skips/ lorries. ▶ Store oiled PPE & sorbents in heavy duty dustbin bags, water tight big-bags etc. ▶ Evacuate and treat the oily waste.	*Same as "Impermeable areas and quaysides" and* ▶ Store oiled soil/ sediments in water tight big-bags, skips, pits, etc. before evacuation.

4.7 Response information and guidelines

Operational guidelines and information are available as follow:

PREPARATION	
Personal Protective Equipment	🗎 *Appendices: "Personal Protective Equipment – Logistics base/ Port"*
Preparation, set-up and organization of working sites (recovery and clean-up)	🗎 *Operational Support n°8: Section "IMPLEMENTING CLEAN-UP OPERATIONS .*
OPERATIONS	
Example of worksite layout for the logistics base: Phase 1 operations: Gross recovery of oil in port waters	🗎 *Appendices: "Logistics base – Phase 1 "Gross recovery" worksite layout"*
Example of worksite layout for rip-raps in Beirut Phase 1 operations "Gross recovery" Phase 2 operations "Clean-up"	🗎 *Appendices: "Beirut port rip-raps – Phases 1 - Gross recovery & Phase 2 - Clean-up"*
Guidelines for the use of sorbent material	🗎 *Appendices: "Guidelines on use of sorbent"*
Indicative list of equipment for port/ logistics base Phase 1 operations "Gross recovery" Phase 2 operations "Clean-up"	🗎 *Appendices: "Indicative personnel & equipment list for Phases 1 & 2 at Logistics base & port/ rocky areas"*
INFORMATION	
Guidelines for boom deployment depending on the type of site and speed of current	🗎 *Operational Support n°8: "Boom launching guidelines"*
Instructions and technical information for boom anchoring, ropes and shackles	🗎 *Operational Support n°8: "Technical sheets for boom deployment & anchoring"*

5. DAILY MANAGEMENT OF RESPONSE

Matrix below describes the daily oil spill management steps, if operations extend over one day.

Legend :
R : Responsible : The doer(s), the leader(s)
(R) : Support : support the leader(s)
A : Accountable : Monitors the progress, accoutable for the results
C : Consulted
I : Informed

DAILY MANAGEMENT OF RESPONSE ON SITE	TEP Liban Rep.	FAST BOLLORE Base Manager	Gestion et Explotation du Port de Beyrout (GEBP
1 - Alert on site & immediate safety			
Update & confirmation daily tactics in logistics base perimeter (land, quayside water)	**C**	**R**	**A**
Coordination of monitoring and response in logistics base perimeter (land, quayside water)	**C**	**R**	**A**
Update & confirmation tactics on current day - outside of logistics base & in port waters	**I**	**C**	**R/A**
Coordination of monitoring and response operations - outside of logistics base & in port waters	**I**	**C**	**R/A**
Interface with local and national authorities	**I**	**I**	**R/A**

Figure 3: Daily spill management steps after day one at Beirut port

Note. TEP Liban IMT may also be mobilized to provide some assistance in the Port of Beirut or in its vicinity.

5.1 Spill monitoring & coordination of operations

▶ FAST BOLLORE Base Manager provides the latest status information regarding on land spill, oil slicks to the logistics base quayside; and coordinates the operations in their perimeter.

▶ GEPB should

- Provide the latest positions and extensions of slicks in the port waters and affected port infrastructures.
- Coordinate the overall maritime response in port waters (Tier 1, 2 & 3).
- Consolidate the daily assessment for Tier 2 or 3 spills.
- Coordinate the overall response for Tier 2 or 3 spills.

5.2 Communication

REGULAR COMMUNICATION

For Tier 1 incidents

▶ TEP Liban representative provides regular feedback and daily report to TEP Liban head office (or reduced IMT).

▶ TEP Liban head office communicates with FAST BOLLORE head office.

For Tier 2/3 incidents (IMT potentially mobilized in Beirut to provide support)

▶ TEP Liban representative (or TEP Liban team set-up in Beirut port) provides regular feedback and daily report to the IMT/ Operation section.

▶ TEP Liban head office communicates with FAST BOLLORE head office and possibly with GEPB depending on assistance requested.

EXTERNAL COMMUNICATIONS

▶ FAST BOLLORE informs GEPB regularly about all on-going on land/ quayside operations.

▶ FAST BOLLORE ensures basic information is provided to all personnel on the logistics base to avoid or limit disclosure of false/ biased information to next of kin.

▶ GEPB notifies and informs regularly the relevant Lebanese authorities.

▶ TEP Liban ensures authorities receive comprehensive information about the incident and response.

5.3 Final actions

▶ FAST BOLLORE advises on the end of Tier 1 on land/ quayside response operations.

▶ GEPB confirms the end of Tier 1 operations and decides on the end of Tier 2 & 3 response operations.

▶ FAST BOLLORE Base Manager sends to TEP Liban a comprehensive spill report:

- Causes of the spill and mitigation measures implemented;
- Product spill on-land and in the water and any other relevant information;
- Actions taken during the response (including all logs and documentations);
- Lessons learnt and recommendations for the future (e.g. procedures, training, equipment...) etc.

▶ FAST BOLLORE Base Manager ensures that:

- All wastes generated by the clean-up operations has been disposed of;
- Response equipment is cleaned, repaired, replaced and stored, and spares ordered for procurement;
- Adequate response capabilities are re-instated as soon as possible after the incident.

6. OIL SPILL PREPAREDNESS FOR LOGISTICS BASE

▶ TEP Liban HSE Manager verifies the availability on site of competent personnel and sufficient spill monitoring and response equipment, with logistics support for the deployment (e.g. 4x4, trailer, small work boat etc.). .

▶ FAST BOLLORE Base Manager ensures:

- the presence on site of adequate resources and competent personnel to manage Tier 1 spill and initiate Tier 2 & 3 response.
- that the above personnel are designated, familiar with the provisions of the emergency and oil spill response procedures in force and trained to use the equipment.
- some designated personnel are designated and aware of procedure and tools for air quality monitoring and actions in case of unknown product.

▶ An indicative list of personnel, Personal Protective Equipment (PPE) and response resources for port oil spill response is provided in Appendices.

🗎 *Appendices "7.1 Personal Protective Equipment"*

🗎 *Appendices "7.4 Indicative personnel & equipment list for Phases 1 & 2 at Logistics base & port/ rocky areas"*

7. APPENDICES

7.1 Personal Protective Equipment – Logistics base/ Port

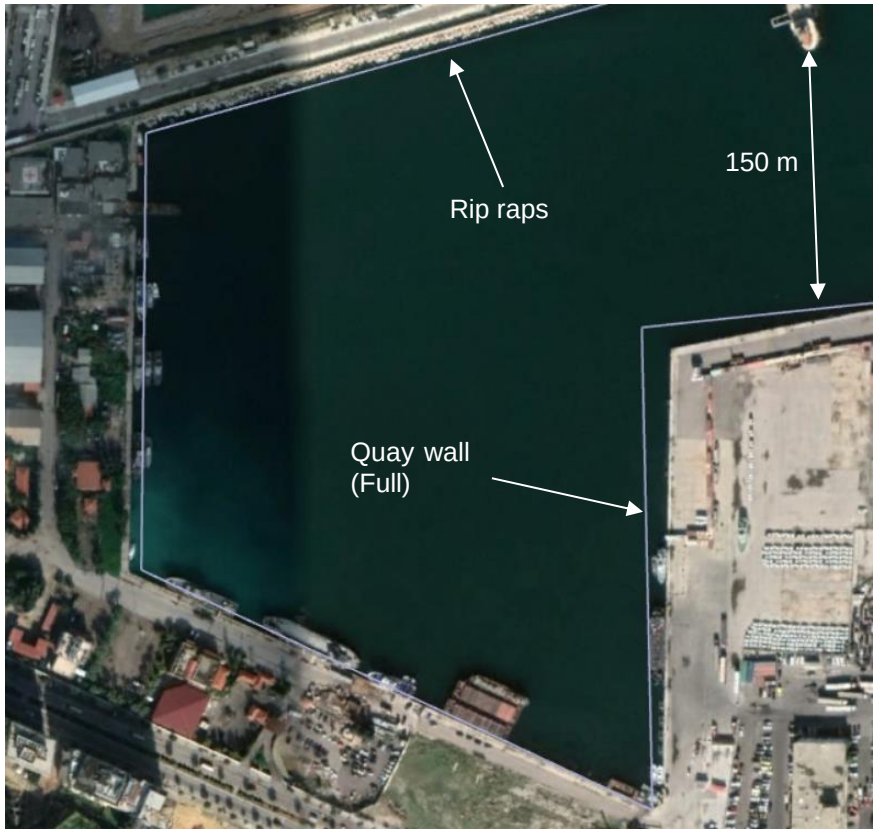
Table 8 : Personal Protective Equipment – Logistics base/ Port response

ALL LOCATIONS	
▶ **Stop all hot works** in the area of the spill/ release. ▶ **Ensure regular hydration of the responders and rotation of personnel for the difficult/ physically demanding tasks** (rotate personnel every 1-2 hours if needed). ▶ **Enforce the "buddy-system". Prohibit isolated workers.**	
▶ **Define the minimum level of PPE** for the assessment and intervention: **Compulsory**: • Safety plastic boots, oil resistant; • Disposable overall suits, Category CE: III Type 5/6; • Oil resistant gloves (e.g. nitrile); **Option**: • Safety goggles; • Life jacket (self-inflatable or foam filled) for responders on water and quayside/ shore close to the water (less than 1-2 m); • Mask ABEK (if Volatile Organic Compound - VOC or risk of VOC).	
OPEN SPACE	**CLOSED/ CONFINED/ UNDER-VENTILATED SPACE**
▶ Possible additional measures on a case by case basis. ▶ **Check and confirm the air quality** for the assessment and intervention.	▶ Ventilate. ▶ Define type of mask/ breathing apparatus required. ▶ **Monitor <u>continuously</u> and confirm the air quality** allows a safe intervention. • Explosivity of atmosphere? • Lack of oxygen? • For any odour of hydrocarbon, continuous measurement of VOC and Benzene (or BTEX).

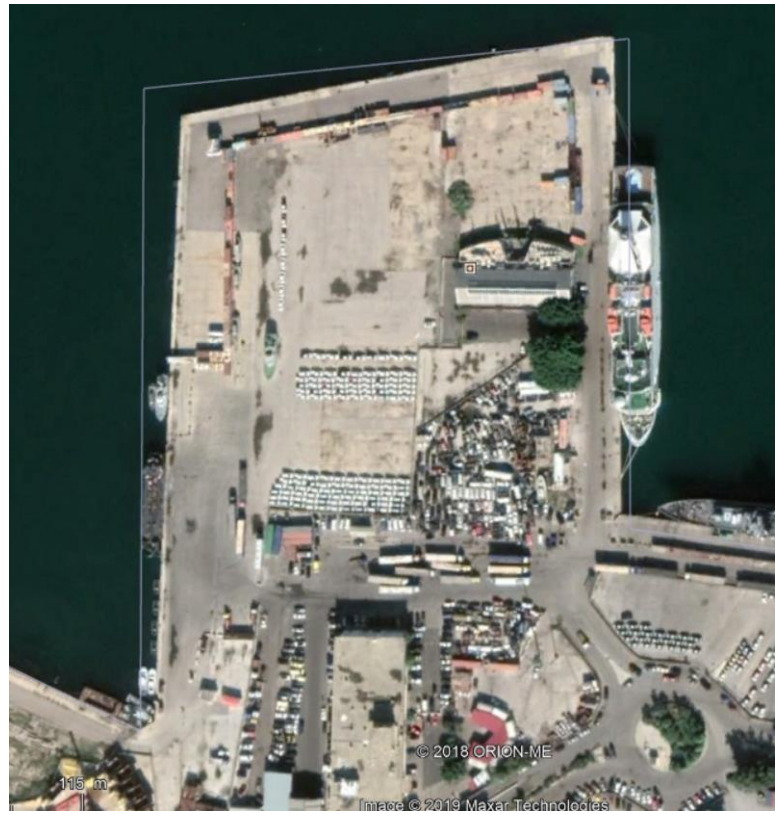
7.2 Logistics base – Phase 1 "Gross recovery" worksite layout

All screenshots: www.bing.com/maps or www.maps.google.com (Google Earth).

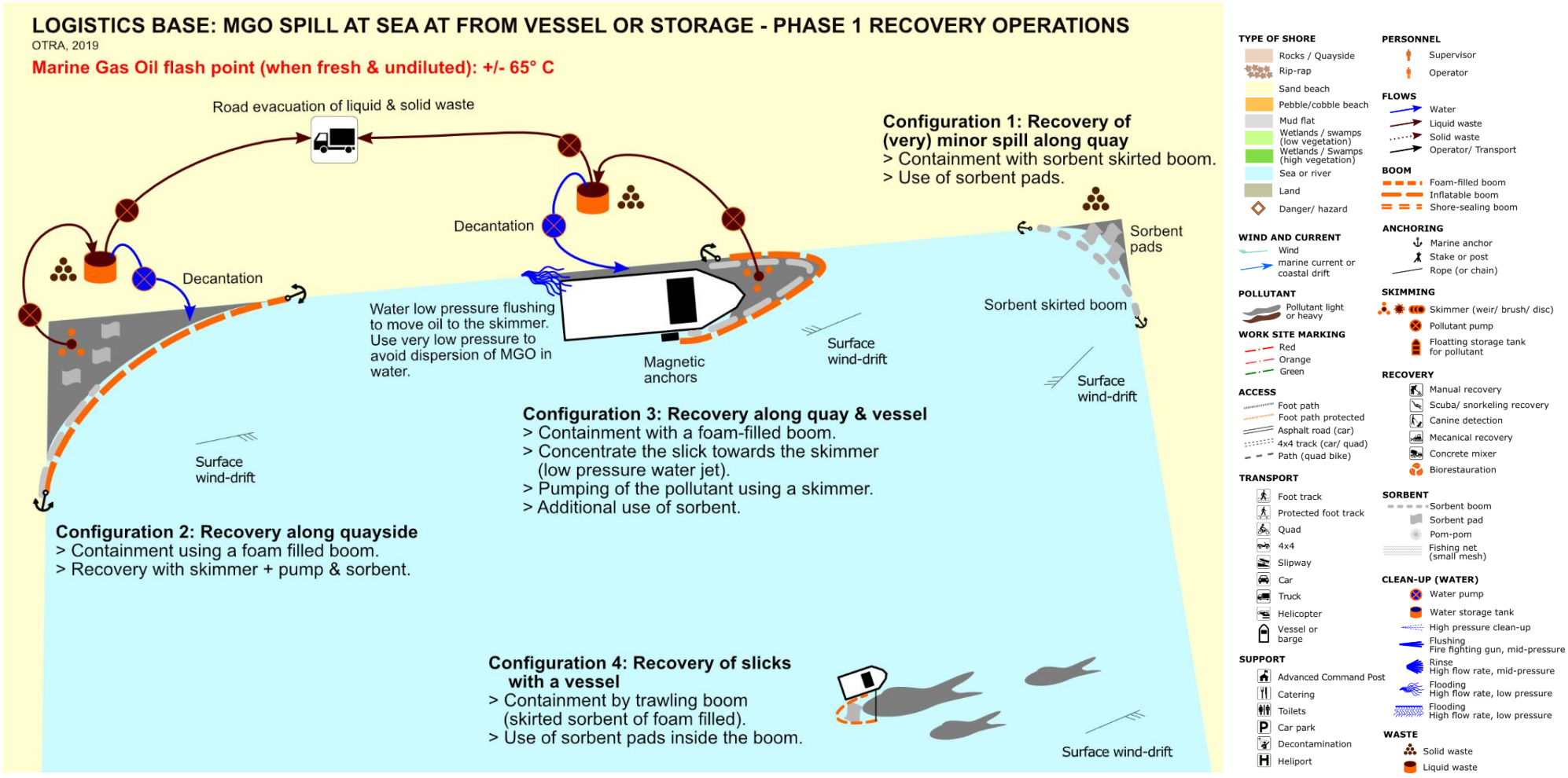
Logistics base, Beirut



Logistics base, Beirut



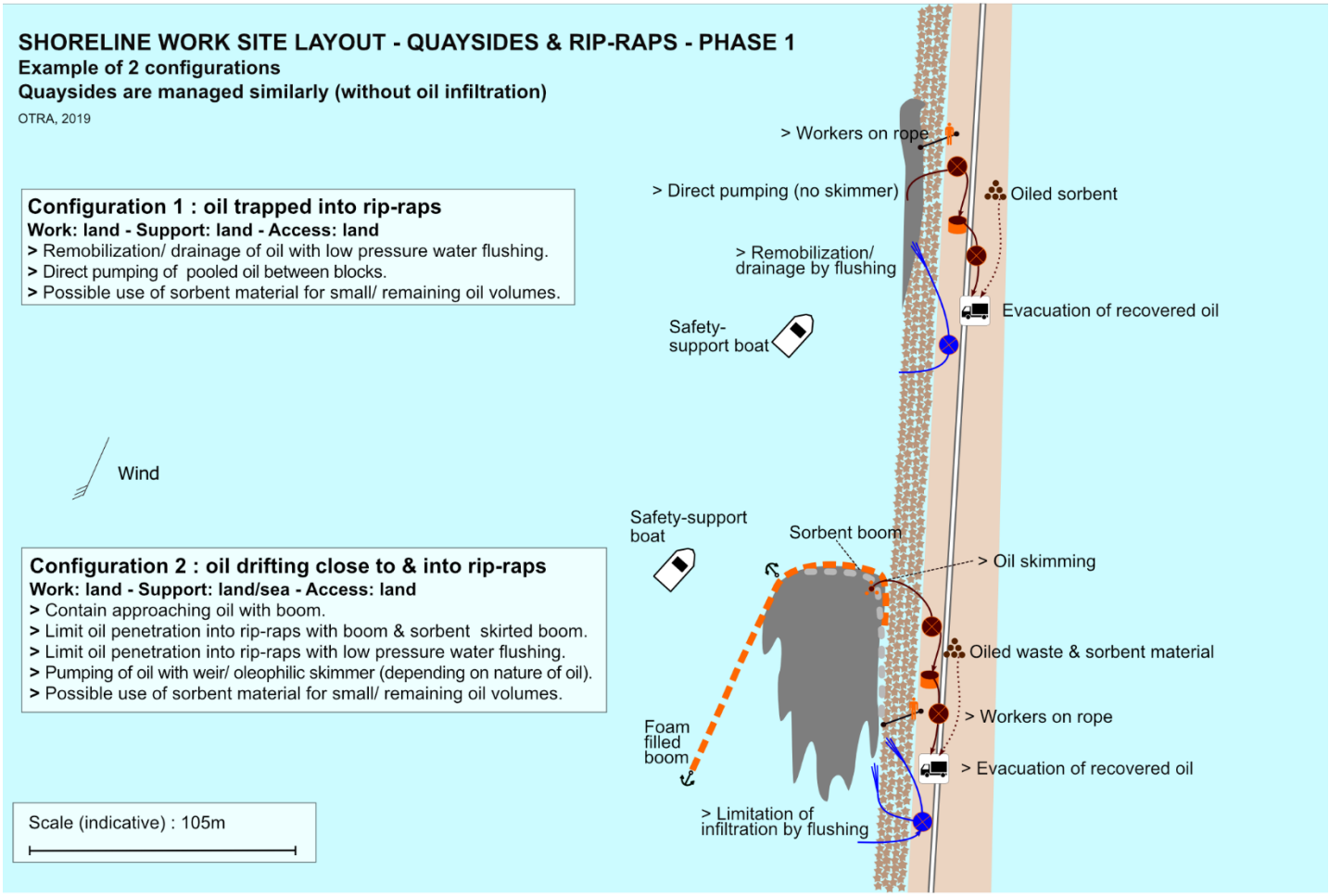
LOGISTICS BASE	PHASE 1



Link to Shore clean-up – Synoptic guidelines (Cedre): Rocks and Infrastructures, Phase 1 (1&2 / 3)	**Link to Technical datasheet:** See “Quayside & rip-raps worksite layout”	Indicative list of equipment for Phase 1 “Gross recovery” and Phase 2 “Clean-up”: “Indicative personnel & equipment list for Phases 1 & 2 at Logistics base & port/ rocky areas”, p.29

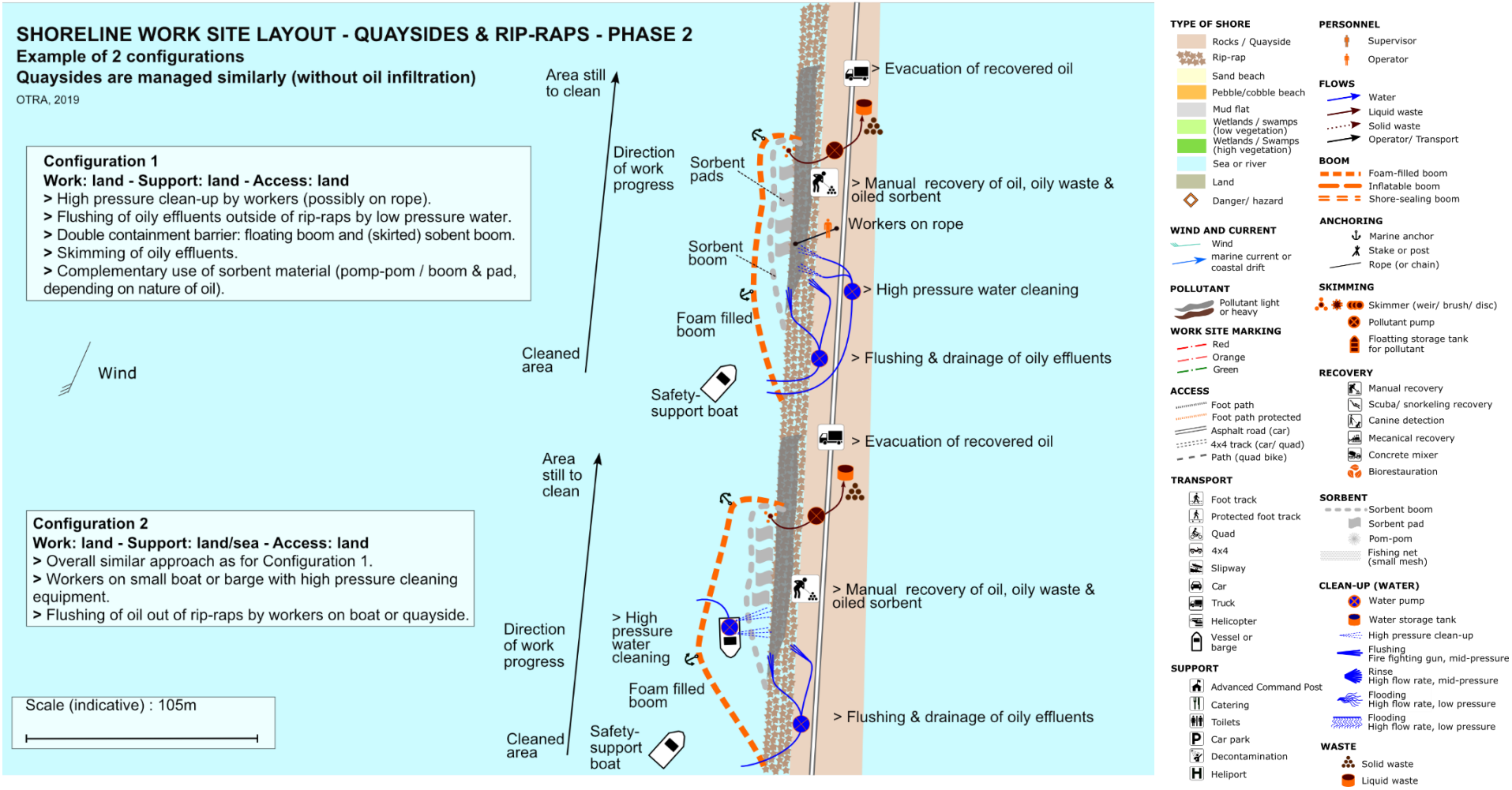
7.3 Beirut port rip-raps: Phases 1 - Gross recovery & Phase 2 - Clean-up

RIPRAPS	PHASE 1



Link to Shore clean-up – Synoptic guidelines (Cedre):	Link to Technical datasheet:	
Rocks and Infrastructures, Phase 1 (1/3 & 2/3)	N 02 SKIMMING/PUMPING AT THE WATER'S EDGE N 09 MANUAL COLLECTION N 12 FLUSHING	N 14 CONTAINMENT & RECOVERY OF EFFLUENTS ON WATER SURFACE N 15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE

RIPRAPS	PHASE 2



Link to Shore clean-up – Synoptic guidelines (Cedre):	Link to Technical datasheet:	
Rocks and Infrastructures, Phase 1 (3/3)	Before: MANUAL SCRAPING Before: PROTECTION AGAINST PROJECTIONS N 12 FLUSHING	N 14 CONTAINMENT & RECOVERY OF EFFLUENTS ON WATER SURFACE N 15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE N 19 HIGH PRESSURE WASHING USING HOT WATER (with/out products)

7.4 Guidelines on use of sorbent

Type of oil	**Light/ fresh/ low viscosity oil** e.g. MGO, base oil	**Viscous/ heavy/ sticky/ weathered oil**
Driver to select sorbent	Oil will be absorbed by sorbent material	Oil will stick to sorbent material
Preferred type of sorbent	Sorbent booms, sorbent pads, sorbent rolls, bulk sorbent	Pom-poms, thin-mesh fishing nets, some geotextile, plastic material, bulk sorbent
Examples	 Sorbent boom  sorbent rolls	 Sorbent pads  Bulk sorbent	 Pom-pom  Thin-mesh fishing net  Geotextile

7.5 Indicative personnel & equipment list for Phases 1 & 2 at Logistics base & port/ rocky areas

Personnel (indicative):

- 1 supervisor
- 2 team leaders
- 1 health & safety leader
- 10-15 operators (in one or two teams: quayside and boat)

Table below proposes an example of equipment list for Phase 1: oil recovery and to initiate (e.g. first 5 days) Phase 2: clean-up operations at logistics base & port areas (and inland), for a team of 10-15 persons, for a spill of Marine Gas Oil.

Similar equipment can be used for rocky areas and rip raps and with some adaptations for heavier/ more viscous oils (e.g. prefer pom-pom to sorbent pads).

All equipment, except the sorbent, can be stored in 2 road trailers (internal length 4m minimum), except the workboat.

COMMON ITEMS FOR PHASE 1 & 2 OPERATIONS

TRANSPORT & DEPLOYMENT	**Quantity**
Option. Storage on road Trailer (4m internal length minimum)	2
Shallow draft boat/ Workboat (5-6m, 20 HP mini.)	1
SAFETY	**Quantity**
Gas detector/ Explosimeter	2
Air quality meter (VOC and benzene)	1
Half-face cartridge mask (organic & inorganic vapours, acid gases and ammonia vapours)	20
1st Aid kit	2
Fire extinguisher	2
Portable marine VHF with charger and extra battery, and waterproof protective cover	4
Lifejackets	10
HEALTH	**Quantity**
Disposable TYVEK (2/ pers/ day)	100 mini.
Nitrile gloves (1/ pers/ day)	50 mini.
Safety rubber boots	15 pairs
Gas / dust mask (water flushing & high-pressure cleaning)	10+
Goggles (water flushing & high-pressure cleaning)	10+
Decontamination kit for personnel - indicative • 5 x litres of vegetable oil • 2 litres of soap microbeads • 2 litres of soap • 2 kg of cloth • 4 x rolls of small sorbent	1 kit

SITE SET-UP	Quantity
Roll of 2m x 200m of polypropylene geotextile, filaments, 125 g / m2, filter opening 83 µm (Light ground protection. Protection of clean areas when cleaning. Water filtration.)	2 roll
Worksite Signalization Kit: • 10 x Traffic cones • Red & White ribbon 2 x 100m roll • 20m x red & white plastic chain • 10 x steel bars Diam. 1cm, Length 1.5m • 20 x wood stakes	1
Small equipment: • very thin rope (100m x Diam 2mm) • very thin rope (100m x Diam 4mm) • rope (100m x Diam 8-10mm) • rope (100m x Diam 16mm) • Set of shackles • Grey duct tape 4 x 100m roll	10
WASTE STORAGE	**Quantity**
Roll of 2m x 200m of tarpaulin, polyethylene, thickness of 180 µm minimum	1
IBC 1 m3 (storage of recovered oil)	5
Big bags 1 m3 waterproof, 1,000 litres, with closing and lifting straps (storage of oiled PPE & sorbent)	10
Heavy duty waste bags (50-100 litres)	500
Buckets (industrial/ builder)	10
Dustbins (plastic, heavy duty, 100 – 150 litres)	4
FastTank – flexible storage 10 m3 + Saddle (to secure hose) + top cover (protection if heavy rain)	1

PHASE 1 - "BOOM & RECOVERY"

All suction & discharge hoses with Camlock fittings, usual diameter : 2''.

CONTAINMENT OF OIL AT SEA AGAINST QUAYSIDE	Quantity
Foam Filled Boom +/-0.75 m. in total height, 15m section, ASTM fitting	90 m
Towing triangle for Foam Filled Boom + tow line - 15m + return line 15m	4
"Sliding" anchoring at quayside: anchors (Danforth, 15 kg) or deadweight + 25m non-floating line	4
Anchor (Danforth, 15 kg) + 30m non-floating line + 3m chain + buoy	4
Skirted sorbent booms (Polypropylene, total height: 0.45m, section of 12.50m), with connection	75m
Option. Magnetic anchors kit, e.g.: • 2 x 200 kg resistance • 4 x 450 kg resistance	1
Option. Emergency magnetic obturation kit (e.g. Miko Plaster), e.g. • Magnetic plaster (0.5m x 0.45m, 0.83 x 0.45 , 1.25m x 0.90m) • 10 magnets • 1 magnetic anchor 200-300 kg resistance • Ropes, shackles & storage bag	1
Option. Pipe clamping kit: • clamps for the most common diameters of pipelines • clamping tools (flange, screws, tools, etc.)	1
RECOVERY OF OIL AT SEA AGAINST QUAYSIDE	**Quantity**
Peristaltic pump 25m3/ hr, diesel engine, spark arrestor and Chalwyn valve, for skimmers + 25 suction corrugated hose for skimmer to pump (5m section) + 35m discharge lay flat hose for pump (5m section) + 5 buoys to attach on suction hose	2
Small self-adjusting weir skimmer with buoys (draft < 50-60cm, weight < 40-50kg) – working with peristaltic pump	1

Very small weir skimmer (draft < 10cm, weight <10kg) – working with peristaltic pump	1
Note. Oleophilic are not suitable to recover MGO.	
CONTAINMENT & RECOVERYOF OIL AT SEA	**Quantity**
4-5m pole to deploy foam filled or skirted sorbent boom from small vessels in the port area	2
CONTAINMENT & RECOVERY ON LAND	**Quantity**
Drain seals kit, polyurethane (e.g. 0.5m x 0.5m, 0.7m x 0.7m, 1m x 1m)	1
Land spill flexible berm, polyurethane, 3m x 10cm x 7cm	4
Land manual tool kit: • 4 x spades • 2 x rakes	1
Suction nozzles kit for peristaltic pump (flat, round, with strainer etc.)	1
SORBENT AT SEA & ON LAND	**Quantity**
Sorbent boom (Polypropylene, Diam. 0.2m x Length 5 m, absorption capacity for 10m = 300 litres)	50 m
Sorbent boom (Polypropylene, Diam 0.13m x Length 3m, absorption capacity for 12m = 180 litres)	60 m
Sorbent sheets (Polypropylene, 100-sheet bag, 40 cm x 50 cm, total capacity = 136 litres)	8 bags
Sorbent roll (polypropylene, 44m x 96cm, absorption capacity = 250 litres minimum)	2 rolls
Bulk sorbent (peat or similar) in 10 kg bag	10 bags

PHASE 2 - "CLEAN-UP" (IN ADDITION TO PHASE 1 EQUIPMENT)

All suction & discharge hoses with Camlock fittings, usual diameter : 2''.

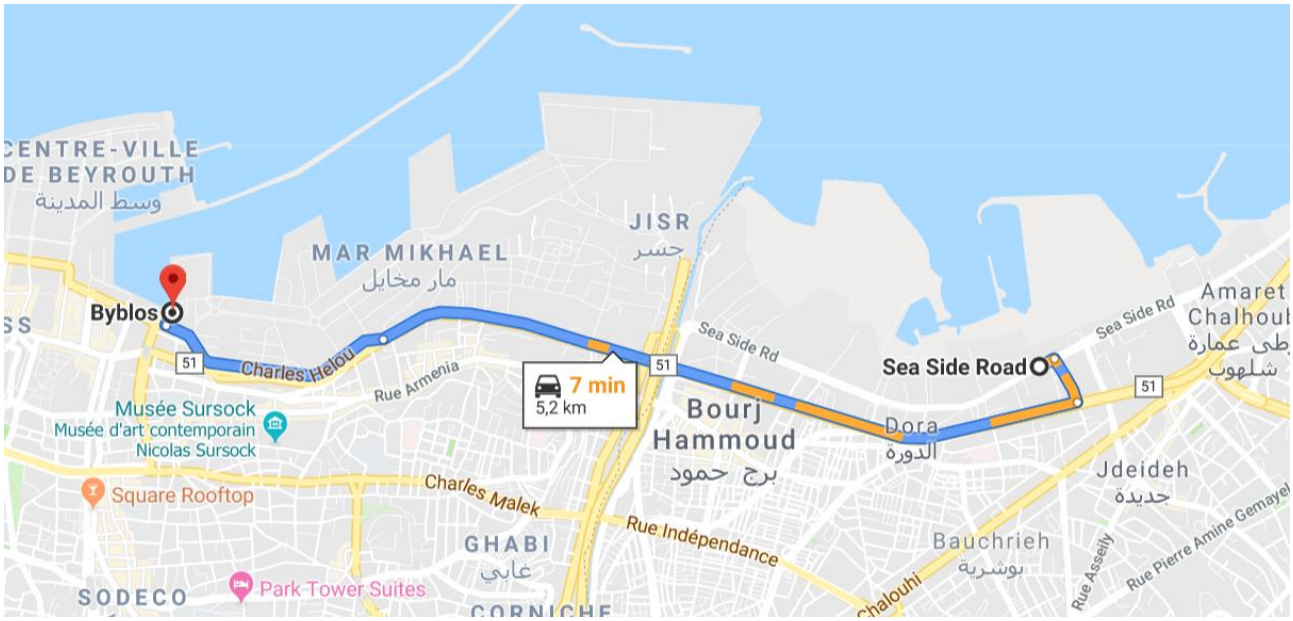
CLEAN-UP	Quantity
Centrifugal water pump, 20-30m3 / hr, diesel engine, with 2'' camlock connection + 4 x 5m 2 "suction hose, with camlock connection with strainer + 6 x 5m lay flat discharge hose 2 ", with camlock fitting	2
Flushing gun (Venturi system)	2
FiFi guns kit (150-200 l/min): • 2 round FiFi guns • 2 flat FiFi guns	2

OPTIONS – PERMANENT BOOM FOR VESSEL BUNKERING OPERATION

PERMANENT QUAYSIDE CONTAINMENT SETUP	Quantity
OPTION 1. Permanent boom (total height: +/- 60cm, section of 15m, skirt made of resistant PVC fabric, solid plastic floaters moulded and bolted on skirt) + mooring with tidal compensation system To be deployed in 2 sections (ship aft and stern) or in one section surrounding the ship.	90 m
OPTION 2. Flexible floating boom to be positioned between the ship and the quayside during transfer operations. 2 Units in use 1 Unit spare.	3 units

7.6 Itinerary by road from Total Liban M&S equipment stockpile to FAST BOLLORE logistics base

(travel duration generated by maps.google.com not including security clearance)



OIL SPILL CONTINGENCY PLAN
OPERATIONAL SUPPORT N°1:
OILS & PRODUCTS

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		
[redacted]		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

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Markings:

/!\ Warning

🗎 *Link to other documents of the TEP Liban OSCP*

ⓘ *Link to external document or information, not part of the TEP Liban OSCP*

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Table

1. SUMMARY OF PRODUCTS CONSIDERED FOR THE OSCP

Some hydrocarbons could be released into the environment, after an incident resulting from activities related to offshore exploration drilling of TEP Liban.

These hydrocarbons have been considered to develop response tactics for the OSCP, summarized below and detailed in the present OSCP volume.

The reservoir is expected to be **mainly gas bearing** (94-99% methane), density at standard conditions: 0.235 – 0.245 g/cc, specific gravity: 0.65 (Air = 1).

Condensates are also expected (42° - 46° API, 3.5-5.0 stb/ MMscf). API° 42 – 46 Condensate is comparable to a very light, non-persistent Group 2 oil or a Group 1 oil (API° limit between Groups 1 and 2 is 45 – see section 2.3).

HI 330/349 CONDENSATE, PHILLIPS (44.9° APÏ with documented distillation) is chosen as a representative condensate from the ADIOS 2.0 oil library to carry out some weathering modelling in the present document.

Note. Choosing a lighter condensate for modelling and planning (°API>45) would result in higher evaporation and natural dispersion rates, and a (much) shorter persistence time of the hydrocarbons at the surface of the sea, which would be a less conservative approach.

/!\ It is acknowledged that the exact characteristics of gas and possible condensates are not known for this exploration well.

Marine Gas Oil MGO is used for vessel propulsion and other engines on supply vessels and the drilling unit.

Drilling fluid EDC-170 SE (Base Oil) is used to prepare the drilling mud.

Table 1. Main Hydrocarbons considered for TEP Liban OSCP & key characteristics

	Type	Specific gravity (15°C)	API°	Group	Viscosity	Pour point
HI 330/349 CONDENSATE, PHILLIPS (Adios)	Condensate	0.802	44.9	2	1.85 cSt at 38°C	-65°C
MARINE GAS OIL (MGO)	Fuel	0.840 to 0.860	37	2	2 – 6 cSt at 40°C	- 6 to 0°C
DRILLING FLUID EDC 170 SE	Drilling fluid	0.815	42	2	< 20.5 mm²/s at 40°C	-50°C

Note. Other hydrocarbons may be spilled (engine/ lube/ hydraulic oil) but in very limited amount.

Note. The term "oil" or "hydrocarbons" is used here for crude oil, condensates and refined products.

2. EXPECTED WELL HYDROCARBONS CHARACTERISTICS

The reservoir is expected to be mainly gas bearing (94-99% methane), density at standard conditions: 0.235 – 0.245 g/cc, specific gravity: 0.65 (Air = 1) – Communication TEP Liban July 2019.

Condensates are also expected (42° - 46° API, 3.5-5.0 stb/MMscf) – Communication TEP Liban July 2019.

HI 330/349 CONDENSATE, PHILLIPS (44.9° APÏ with documented distillation) is chosen as a representative condensate from the ADIOS 2.0 library (Office of Response & Restoration, NOAA).

- API° 49
- Pour point: -65°C
- Viscosity: 1.85 cSt at 38°C
- Flash point: 13°C

/!\ Expected hydrocarbons characteristics are indicative only. Hydrocarbons encountered during the drilling may have different characteristics and therefore behave differently.

3. CHARACTERISTICS OF OTHER HYDROCARBONS FOR TEP LIBAN

3.1 List and characteristics of products

Following table presents key characteristics of hydrocarbon products other than from the reservoir that may be used by TEP Liban or encountered offshore in case of third-party spill: IFO & HFO.

Table 2: List of products maybe used during the drilling campaign or encountered offshore

Product	Spec. gravity (15°C/ 4°C)	Flash Point °C	Viscosity cSt	Pour Point °C
JET A1	0.8 or less 45<°API	39-45°C	2 at 15°C	< -40°C
Gas Oil (& MGO)	0.86 or less 35<°API	> 60°C	+/-5 at 15°C <5 at 30°C	- 5 to - 30°C
Marine diesel (& MDO)	0,84 or more °API +/-35	> 65°C	>10 at 30° to 40°C	5 to <0°C
Lubricating Oil (typical)	0.85 to 0,95 17,5<°API<35	> 60°C	High variability	-15°C
Hydraulic Oil (typical)	0.88	> 60°C	100 at 30°C	< 0°C
Intermediate Fuel Oil – IFO	0,85 to 0,95	> 60°C	1,500 - 3,000 at 15°C 275 at 30°C	10 to 30°C
Heavy Fuel Oil – HFO	>0,95	>60° to 90°C	5 000 - 30 000 at 15°C	>30°C

Lubricating and hydraulic oils are relatively viscous and not easily assimilated by the environment. Limited spreading is expected and loss through evaporation and natural dispersion is also likely to be limited. The action of mixing energy (from waves and/ or mechanical dispersion) is likely to produce an emulsion.

3.2 Types of fuel oils and marine fuel oils

Fuel oils are termed differently depending on the classification used: « Bunker », ASTM or IFO.

Examples	Bunker	ASTM	IFO
Light fuels, gasoil, domestic fuel, fuel completely distilled for vessels (Marine Gas Oil, MGO)	A	2	
Diesel, light fuel for vessels (Marine Diesel Oil, MDO)	B	4	60
Diesel heavy, intermediate fuel oil	B	5	180
Heavy fuel oil (vessels et industrial burners)	C	6	380

Following classification is often used for marine fuel oils:

- **MGO** (Marine gas oil) : MARINE FUEL OIL type DMA, commercial denomination-MGO (Marine gas oil) produced by mixing of light and medium fractions obtained by atmospheric and vacuum distillation of crude oil ;
- **MDO** (Marine diesel oil) : MARINE FUEL OIL type DMB produced by mixing of heavy oil fractions obtained by atmospheric distillation with fractions from secondary crude oil processing ;
- **IFO 180** (Intermediate fuel oil, 180 mm²/s viscosity at 50°C) : MARINE FUEL OIL type RME 180, commercial denomination-IFO 180 (Intermediate Fuel Oil 180) produced from heavy and medium oil fractions mixture, obtained from primary and secondary crude oil processing. ;
- **IFO 380** (Intermediate fuel oil, 380 mm²/s viscosity at 50°C) : MARINE FUEL OIL type RMG 380, commercial denomination-IFO 380 (Intermediate Fuel Oil 380) produced from heavy and medium oil fractions mixture, obtained from primary and secondary crude oil processing.

3.3 Characteristics of Marine Gas Oil (MGO) & Marine Diesel Oil (MDO)

Characteristics of Marine Gas Oil, used on platform supply vessels and drilling units, and of MDO are :

Parameters	Marine Gas Oil (MGO)	Marine Diesel Oil (MDO)
Group ITOPF	2	3
Appearance	Clear	Amber, clear to dark
Density 15°C	< 890 kg/ m3	< 900 kg/ m3
Kinematic viscosity at 40°C	< 6 cSt	< 11 cSt
Flash point	>+ 60°C	>= 60°C
Pour point	-6 to 0°C	0 to 6°C
Auto-ignition	> 250°C	> 250°C
Explosive limits (volume % in the air) Limits Lower / Upper	0,7 / 5	0,6 / 7,5

Tableau 1 : Characteristics of Marine Gas Oil and Marine Diesel Oil (Source : MSDS Marine Gas Oil, Revision Date: 18 Sep 2013, EXXONMOBIL et http://www.rezqina.com)

Examples of MGO MSDS are in:

ⓘ Safety Datasheet – Marine Gas Oil (CALTEX, 25/08/2014, V 1.0)

File "Marine Gas Oil - MSDS.pdf" in" in …\Vol Ops Support\Op Sup 1 Doc \MSDS HYDROCARBON PROD

ⓘ Safety Datasheet – DISTILLATE MARINE GAS OIL (DMA) (CHEVRON, 07/12/2010, Rev. 4)

File "DISTILLATE-MARINE-GAS-OIL-(DMA)-Europe-2013.pdf" in …\Vol Ops Support\Op Sup 1 Doc\MSDS HYDROCARBON PROD

3.4 Ecological and toxicological impact of Marine Gas Oil (MGO)

Table 3 and Table 4 summarize the relevant information regarding the toxicity of Marine Gas Oil.

Table 3: Toxicological information for Marine Gas Oil

TOXICOLOGICAL INFORMATION	Marine Gas Oil	Method / Source
Acute dermal toxicity	2000 mg/kg (rabbit), non hazardous - Low Toxicity	estimate based on ingredients (2) & (3)
Acute oral toxicity	2000 mg/kg, Category 4 hazard - Low Toxicity	estimate based on ingredients (2) & (3)
Acute inhalation toxicity	4 hour(s) LC50: >5mg/kg (4h, rat)- Low Toxicity	1 & 3
Acute inhalation toxicity	20 mg/L, non hazardous	estimate based on ingredients (2)
Skin irritation	Category 2 Hazard (moderate to severe skin irritation)	2 & 3
Eye irritation	Irritating to eyes (mild irritation)	2 & 3
Mutagenicity	In-vitro mutagenicity studies show that mutagenic activity is related to 4-6 ring polycyclic aromatic content.	3
Carcinogecity	No component of this product which is present at levels greater than or equal to 0.1 % is identified as a carcinogen or potential carcinogen.	OSHA (U.S.)

Table 4: Ecotoxicological information regarding Marine Gas Oil

ECOLOGICAL INFORMATION	Marine Gas Oil	Method / Source
Acute aquatic hazard	>100 mg/L, non-hazardous	estimate based on ingredients (2)
Long-term aquatic hazard	1 - 10 mg/L, Category Chronic 2 Hazard	estimate based on ingredients (2)
Crustacean	1,6 mg/l	TLm 48h (5)
Daphnia magna, small planktonic crustacean (adult length 1.5–5 mm) that belongs to the subclass Phyllopoda. Inhabits a variety of freshwater environments	20 - 210 mg/L	48 hour(s) Water Accomodated Fraction (1)
Fish	31 mg/l	LL50 96h (5)
Salmo gairdner (rainbow trout)	21 - 210 mg/L	96 hour(s) Water Accomodated Fraction (1)
Raphidocellus subcapitata (freshwater green algae)	2.6 - 25 mg/L	72 hour(s) Water Accomodated Fraction (1)
Biodegradability	Expected to be inherently biodegradable	4
Atmospheric Oxidation	More volatile component -- Expected to degrade rapidly in air	4

Source

1	CHEVRON Global Marine Product, MSDS DISTILLATTE
2	MSDS Marine Gas Oil, CALTEX, V. 1.0, 25/08/2015
3	SHEL MSDS Marine Gas Oil, V. 1.1, 19/04/2010
4	EXXONMOBILE MSDS MARINE GAS OIL, 09/01/2014
5	http://www.bomin.com/products/material-safety-data-sheet-dma/

Note. Range of mg/L is comparable to PPM.

4. DRILLING FLUID

Drilling muds used by TEP Liban will have a specific gravity above 1.24 and therefore sink.

Drilling fluid used to prepare the drilling mud is the EDC-170 SE (density of 818 kg/m3)

ⓘ MSDS EDC-170 SE in file: *Sup Op 1 Doc\ MSDS DRILLING FLUID\ "SDS-EDC-170-SE-2016.pdf".*

4.1 Key characteristics of drilling fluid EDC-170 SE

	Value	Unit	Method
Density (15°C)	815	Kg/ m3	EN ISO 12185
Specific gravity (15°C)	0.815	sg	Estimated
API	42	°API	Estimated
Appearance	+30	SAYBOLT	ASTM D156
Flash point	> 75	°C	ISO 2719
Auto-ignition	> 220	°C	ASTM E659-78
Pour point	< -50	°C	ISO 3016
Viscosity @ 40°C	20.5	mm2/s	ASTM D 445
Aromatics content	< 2	%	MSDS

Tableau 2 : Characteristics of EDC170-SE (Source : Total)

4.2 Ecotoxicity of drilling fluid EDC-170 SE

	Value	Unit	Method
Skin irritation	Non irritating	-	OECD 404
Eye irritation	Burning feeling and temporary redness	-	OECD 405
Biodegradability	>60% (28 days)	%	OECD 306
Toxicity to fish - Oncorhynchus mykiss LL50 (96h)	> 1000	Mg/ l	OECD 203
Toxicity to daphnia and other aquatic invertebrates - Daphnia magna - EL50 (48h)	> 1000	mg/l	OECD 202
Toxicity to algae - Pseudokirchneriella Subcapitata - ErL50 (72h)	> 1000	mg/l	OECD 201

Tableau 3 : Ecotoxicity of EDC-170 SE (Source : Total)

Compared to MGO, EDC-170 E is less toxic by, approximately, a factor 10.

5. DISPERSANTS

Oil & Gas Industry has set-up a worldwide stockpile of dispersant: Global dispersant Stockpile (total of 5,000 m3) including three products:

Following table provides, for each product, the links to the MSDS and Technical Information Sheet (by OSRL).

/!\ Data is provided as information. Surface dispersant spraying is not included in the oil spill response toolbox of TEP Liban.

Table 5: Dispersant products part of the Global dispersant Stockpile

	MSDS	OSRL Technical Information Sheet
DASIC SLICKGONE NS	"Slickgone NS MSDS EN.pdf" in …\Vol Operational Support\Sup Op 1 Doc\ MSDS DISPERSANT\ SLICKGONE NS \.	"tis-dispersantslickgonens-june-22.pdf" in …\Vol Operational Support\Op Sup 1 Doc\OSRL TIS Dispersant
FINASOL OSR 52	"OSR 52 MSDS EN.pdf" in …\Vol Operational Support\Sup Op 1 Doc\ MSDS DISPERSANT\ FINASOL OSR 52\.	"tis-dispersantslickgonens-june-22.pdf" in …\Vol Operational Support\Op Sup 1 Doc\OSRL TIS Dispersant
COREXIT EC9500A	"COREXIT_EC9500A MSDS EN.pdf" in …\Vol Operational Support\Sup Op 1 Doc\ MSDS DISPERSANT\ COREXIT 9500\.	"tis-corexitec9500a-june-22.pdf" in …\Vol Operational Support\Op Sup 1 Doc\OSRL TIS Dispersant

6. APPENDICES

6.1 Oil Groups according to their API°

Table 6 : Oil Groups according to their API° (Source : ITOPF, 2019)

Group 1 oils

A: °API > 45 (Specific gravity < 0.8)
B: Pour point °C
C: Viscosity @ 10–20°C: less than 3 CSt
D: % boiling below 200°C: greater than 50%
E: % boiling above 370°C: between 20 and 0%

	A	B	C	D	E
Aasgard	49	-28	2 @ 10°C	58	14
Arabian Super Light	51	-39	2 @ 20°C		
Cossack	48	-18	2 @ 20°C	51	18
Curlew	47	-13	2 @ 20°C	57	17
F3 Condensate	54	<-63	1 @ 10°C	81	0
Gippsland	52	-13	1.5 @ 20°C	63	8
Hidra	52	-62	2.5 @ 10°C	60	11
Terengganu condensate	73	-36	0.5 @ 20°C	>95	0
Wollybutt	49	-53	2@ 20°C	55	4
Gasoline	58		0.5 @ 15°C	100	0
Kerosene	45	-55	2 @ 15°C	50	0
Naptha	55		0.5 @ 15°C	100	0

Group 2 oils

A: °API 35–45 (Specific gravity 0.8–0.85)
B: Pour point °C
C: Viscosity @ 10–20°C: between 4 Cst and semi-solid
D: % boiling below 200°C: between 20 and 50%
E: % boiling above 370°C: between 15 and 50%

Low pour point <6°C

	A	B	C	D	E
Arabian Extra Light	38	-30	3 @ 15°C	26	39
Azeri	37	-3	8 @ 20°C	29	46
Brent	38	-3	7 @ 10°C	37	33
Draugen	40	-15	4 @ 20°C	37	32
Dukhan	41	-49	9 @ 15°C	36	33
Liverpool Bay	45	-21	4 @ 20°C	42	28
Sokol (Sakhalin)	37	-27	4 @ 20°C	45	21
Rio Negro	35	-5	23 @ 10°C	29	41
Umm Shaif	37	-24	10 @ 10°C	34	31
Zakum	40	-24	6@ 10°C	36	33
Marine Gas oil (MGO)	37	-3	5 @ 15°C		
High pour point >5°C					
Amna	36	19	Semi-solid	25	30
Beatrice	38	18	32 @ 15°C	25	35
Bintulu	37	19	Semi-solid	24	34
Escravos	34	10	9 @ 15°C	35	15
Sarir	38	24	Semi-solid	24	39
Statfjord	40	6	7 @ 10°C	38	32

Note: High pour point oils only behave as Group 2 at ambient temperatures above their pour point. Below this treat as Group 4 oils.

Group 3 oils

A: °API 17.5–35 (Specific gravity 0.85–0.95)
B: Pour point °C
C: Viscosity @ 10–20°C: between 8 CSt and semi solid
D: % boiling below 200°C: between 10 and 35%
E: % boiling above 370°C: between 30 and 65%

Low pour point <6°C

	A	B	C	D	E
Alaska North Slope	28	-18	32 @ 15°C	32	41
Arabian Heavy	28	-40	55 @ 15°C	21	56
Arabian Medium	30	-21	25 @ 15°C	22	51
Arabian Light	33	-40	14 @ 15°C	25	45
Bonny Light	35	-11	25 @ 15°C	26	30
Iranian Heavy	31	-36	25 @ 15°C	24	48
Iranian Light	34	-32	15 @ 15°C	26	43
Khafji	28	-57	80 @ 15°C	21	55
Sirri	33	-12	18 @ 10°C	32	38
Thunder Horse	35	-27	10 @ 10°C	32	39
Tia Juana Light	32	-42	500 @ 15°C	24	45
Troll	33	-9	14 @ 10°C	24	35
IFO 180	18–20	10–30	1,500–3,000 @ 15°C		–
High pour point >5°C					
Cabinda	33	12	Semi-solid	18	56
Coco	32	21	Semi-solid	21	46
Gamba	31	23	Semi-solid	11	54
Mandji	30	9	70 @ 15°C	21	53
Minas	35	18	Semi-solid	15	58

Note: High pour point oils only behave as Group 3 at ambient temperatures above their pour point. Below this treat as Group 4 oils.

Group 4 oils

A: °API <17.5 (Specific gravity >0.95) or
B: Pour point >30°C
C: Viscosity @ 10–20°C: between 1500 CSt and semi-solid
D: % boiling below 200°C: less than 25%
E: % boiling above 370°C: greater than 30%

	A	B	C	D	E
Bachaquero 17	16	-29	5,000 @ 15°C	10	60
Boscan	10	15	Semi –solid	4	80
Cinta	33	43	Semi –solid	10	54
Handil	33	35	Semi –solid	23	33
Merey	17	-21	7,000 @ 15°C	7	70
Nile Blend	34	33	Semi-solid	13	59
Pilon	14	-3	Semi-solid	2	92
Shengli	24	21	Semi-solid	9	70
Taching	31	35	Semi-solid	12	49
Tia Juana Pesado	12	-1	Semi-solid	3	78
Widuri	33	46	Semi-solid	7	70
IFO 380	11–15	10–30	5,000–30,000 @ 15°C		

Example oils classified according to their °API (American Petroleum Institute gravity). Indicative ranges of expected viscosities and distillation characteristics are provided for each group. Generally, when spilt, persistence increases with group number. However, if an oil cools to below its pour point temperature, it will change from a liquid to a semi-solid. This can occur for certain oils irrespective of whether they are classed as Group 2, 3 or 4. The pour points of oils classed as Group 1 are sufficiently low so as not to be a concern in the marine environment.

6.2 Composition of petroleum products

Condensates and crude oil (and refined products) are complex mixture of hydrocarbons and other components.

Composition is usually characterized by the percentage of family of compounds (i.e. S.A.R.A. analysis) and of wax.

Table 7. Main compounds of hydrocarbon products

OIL	**SATURATED** **+**	**Paraffins**: n-alkanes, iso-alkanes (CnH2n+2) *Note. Methane (CH4) is the simplest paraffin and the most common in crude oil.* *Note. Majority of components in solid wax deposits are high-molecular-weight paraffins*.
		Naphthene's: cycloalkanes (hydrocarbons similar to paraffins but with one or more cyclic structures) also termed cycloparaffins
		Non-resolved: UCM (Unresolved Complex Mixture)
		Wax: complex mixture of paraffins (n-alkanes, i-alkanes, and cycloalkanes) with carbon numbers ranging approximately from 18 to 65 (or 10 to 40 for test from Cedre).
	AROMATICS **+**	Compounds that contain one ring structure: the mono-aromatics (like benzene C6H6); or that contain fused aromatic rings: Polycyclic Aromatics Hydrocarbons PAH (e.g. naphthalene).
		Non-resolved: UCM (Unresolved Complex Mixture)
	RESINS **+**	Large components with a highly polar end group and long alkane tails. The polar end group is composed of aromatic and naphthenic rings and often contains heteroatoms such as oxygen, sulphur, and nitrogen. Pure resins are heavy liquids or sticky pasty/solids.
	ASPHALTENES	Large highly polar components made up of condensed aromatic and naphthenic rings, which also contain heteroatoms. Pure asphaltenes are black, non-volatile powders.

Note. Resins & asphaltenes are often grouped as "Polar[1] Compounds".

Note. Condensates/ Crude oil also contains traces of metal: vanadium, nickel, chromium.

Hydrocarbons may also be classified as belonging to the C6- "lighter" or to the C6+ "heavier" fractions.

- The light end, C6- fraction, is composed of well-defined hydrocarbon components with carbon numbers up to 5 and the light gases nitrogen (N2), carbon dioxide (CO2), and hydrogen sulphide (H2S). C6- hydrocarbons are primarily straight-chain normal alkanes (n-alkanes) and their branched isomers (i-alkanes).
- The heavy end, C6+ fraction, consists of components with carbon numbers of 6 or greater.

Volatile Organic Compounds (VOC) are defined as: "any organic compound having an initial boiling point less than or equal to 250 °C (482 °F) measured at a standard atmospheric pressure of 101.3 kPa.".

Condensates comprise mainly light end hydrocarbons.

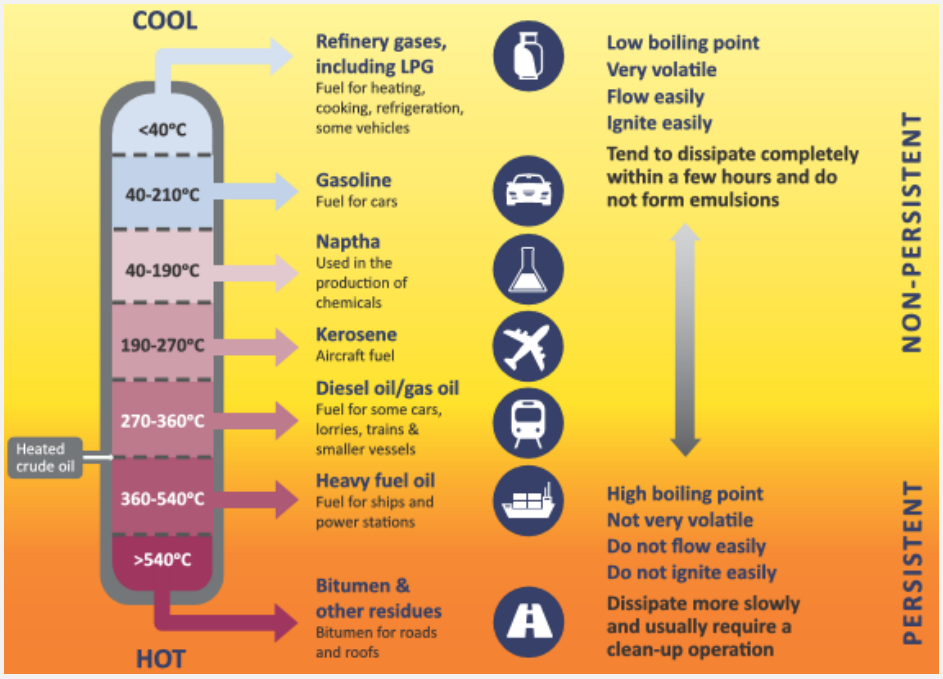
[1] *Polarity is a separation of electric charge leading to a molecule or its chemical groups having an electric dipole moment, with a negatively charged end and a positively charged end*.

6.3 Key characteristics of petroleum products

Key parameters to characterize petroleum products are in the Table 8.

Table 8. Key characteristics of hydrocarbon products.

Density (“Masse volumique” in French)	Density of a substance is its mass per unit of volume usually expressed in kg/m3 or g/cm3. Density of pure water is 1000 kg/m3 at 3.98°C, 999.972 kg/m3 at 4°C and 999.7026 kg/m3 at 10°C. Density of most oils is between 0.7 and 0.99 kg/ m3. Density of surface seawater ranges from about 1020 to 1029 kg/m3 depending on temperature and salinity. At 25 °C, 35 g/kg salinity and 1 atm pressure, density of seawater is 1023.6 kg/m3. Density is usually given for Normal Temperature and Pressure Conditions : 20 °C and 1 013 hPa or, for hydrocarbons, at 15°C (reference temperature to calculate API°).
Specific gravity for liquids (“Densité” in French)	Specific gravity is the ratio of the density of a liquid (at a defined temperature) compared to the same volume of a reference liquid (at a defined temperature). Pure water is usually used as reference. Both temperatures should always be specified for densities, e.g. Specific Gravity 15°/4°: ratio of a substance at 15° compared to that of water at 4°C. However, specific gravity of oil is usually expressed without reference to the temperatures. Generally, in the oil & gas industry, density of oil is measured at 60°F (15,56°C), same for water. Those values are used to calculate API (see below). Most oils have a specific gravity inferior to 1 at 15°C and therefore float on water. Specific gravity also gives a general indication of the oil properties, e.g. oils with a low specific gravity (high °API) contain a high proportion of volatile components and have a low viscosity.
API°	The American Petroleum Institute gravity scale, °API (dimensionless value), commonly used for petroleum products instead of the specific gravity, is: °API= (141.5/ Specific gravity of oil at 60°F) – 131.5 Specific gravity of oil is defined using the density of oil at 60°F (15.56°C) compared to the density of pure water at the same temperature (999.016 kg/ m3). API° Scale: • Pure water: 10. • Heavy crude: < 17.5 • Medium crude: 17.5 - 35 • Light crude: 35 - 45 • Very light crude: > 45
Viscosity	Viscosity is the resistance of liquid to flow. High viscosity oils flow less easily than oil with low viscosity. All oils become more viscous as the temperature falls, some more than others depending on their composition. Viscosity is always given in reference to a temperature, and can be expressed as: • Dynamic viscosity, in centiPoise (cP) or SI equivalent millipascals per second (mPas/s): 1 cP = 1 mPa·s = 0.001 Pa·s; • Kinematic viscosity (= Dynamic viscosity/ Density), in centiStokes (cSt): 1 cSt = 10 exp.−6 m²/s Examples at 20°C: • Pure water: 1 cP or 1 cSt • Olive oil: 81 cP

	• Honey: 2,000 – 10,000 cP • Ketchup: 50,000–100,000 cP • Peanut butter: +/- 250,000 cP
Pour point	Pour point is the temperature below which oil no longer flows, function of its wax and asphaltene content. It also provides an indication on its dispersibility and difficulty for pumping.
Flash point	Flash point is the lowest temperature at which vapours of a fluid will ignite when exposed to an ignition source. At the flash point temperature, the vapour may cease to burn when the ignition source is removed. • Gasoline: < - 40 °C • Diesel (automotive): > 55 to 60°C • Jet A and Jet A-1: 38 °C and 66 °C • Jet B and FP-4: -23 °C and -1 °C
Lower and Upper Explosive Limits	Lower Explosive Limit is the lowest concentration of a gas or vapor in the air capable of producing a flash of fire in presence of an ignition source (LEL, considered to be the same as Lower flammability limit LFL). Upper Explosive Limit is the highest concentration of a gas or a vapor in the air capable of producing a flash of fire in presence of an ignition source. Diesel (automotive): • Lower Explosive Limit: 0.6%. - Upper Explosive Limits: 7.5% Kerosene Jet A-1: • Lower Explosive Limit: 0.6% - Upper Explosive Limits: 5%
Distillation characteristics	Distillation characteristics describe the volatility of oil. In the distillation process, as the temperature of an oil is raised, different components reach their boiling point in succession, evaporate. The distillation characteristics are expressed as the proportions of the parent oil that distil within given temperature ranges.  *Figure 1: Crude oil and its distillation fraction (ITOPF, 2019)*

Vapour pressure	Vapour pressure provides a further indication of the volatility of an oil, usually quoted as Reid Vapor Pressure measured at 100°F (37.8°C). A vapor pressure greater than 3 kPa (23mm Hg) is the criteria for evaporation to occur under most conditions. Above 100 kPa (760mmHg), the substance behaves like a gas. • Gasoline: 40 to 80 kPa (300–600mm Hg).
Wax Appearance Temperature (WAT) or cloud point	WAT is the temperature at which a crude oil first precipitates solid wax as it is being cooled under prescribed test conditions. Similarly, Wax Disappearance Temperature (WDT) is the temperature at which the last wax solids are melted into liquid during a warming cycle. Temperature reduction is the most common cause of wax deposition because wax solubility in hydrocarbon fluids decreases as the temperature is lowered.

6.4 Types of hydrocarbons considered for oil spill response

When oil is spilled at sea, distinction is frequently made between persistent and non-persistent oils (ITOPF).

- **Persistent oils** break up and dissipate more slowly in the marine environment and usually require a clean-up operation. Persistent oils include many crude oils, fuel oils, lubricating oils and heavier grades of marine diesel oil. These oils pose a potential threat to natural resources when released, in terms of impacts to wildlife, smothering of habitats and oiling of amenity beaches.
- **Non-persistent oils** will mostly dissipate rapidly through evaporation and natural dispersion. As a result, spills of these oils rarely require an active response at sea. Non-persistent oils include gasoline, light diesel oil, marine gas oil and kerosene. Impacts from non-persistent oils may include effects on paint coatings in marinas and harbours and, at high concentrations, acute toxicity to marine organisms.

A more detailed classification allocates oils into **five groups according to their API** and is very frequently used for oil spill response. Oils of a same group are likely to behave similarly when spilled.

- Group I oils are non-persistent.
- Group II oils are non-persistent or persistent depending on product and conditions.
- Groups III and IV are persistent.
- Groups V is persistent and sinks (density above that of water).

However, some light oils behave more like heavy one's due to the presence of wax resulting in a higher pour point. Oils with wax contents greater than about 7-10% tend to have high pour points. If the ambient temperature is low, oil will be near-solid or highly viscous. Natural weathering will be slow (ITOPF, 2016).

🗎 *"Oil Groups according to their API°, p.12*

The table below classifies oils according to their API° and provides ranges for some characteristics.

*Table 9: Groups of hydrocarbons for oil spill response (* : indicative value)*

Group ITOPF	°API	Specific gravity 15°/4°C	Pour point	Viscosity cSt at 15°C	% distilled at less than 200°C	% distilled at more than 370°C	Flash point °C
1 : Very Light refined products : Kerosene, distillates, gasoline, etc.	**°API>45**	**< 0,8**	< 0°C	0,5 - 2	50 - 100%		under 40°-50°C
2 : Light Light crude and refined products : gasoil, marine gasoil, fuel domestic, lubrication light oil etc.	**35<°API<45**	**0,8 - 0,85**	<40°C (*)	< 50 cSt to (very) high if high pour point	19 - 48%	12 - 50%	40 - 65°C
3 : Medium Crude oil, fuel oil (marine diesel oil), light crude emulsified, utility oils, etc.	**17,5<°API<35**	**0,85 - 0,95**	<50°C (*)	Variable to near-solid if high pour point	14 - 34%	28 - 50%	> 50°C
4 : Heavy Heavy crude, residual fuel, (Bunker C, HFO), weathered/emulsified oil	**°API<17,5**	**> 0,95**	Variable	>1 000 cSt to near-solid	3 - 24%	33 - 92%	> 65°C
5 : Very heavy Heavy residue, very heavy crude	**°API<10**	**> 1** sinks		Very high to solid	Same as group IV		

Note. Group 1 hydrocarbons are considered mainly as VOC's.

OIL SPILL CONTINGENCY PLAN
OPERATIONAL SUPPORT N°2:
FACILITES

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

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Markings:

/!\ Warning

🗎 *Link to other documents of the TEP Liban OSCP*

ⓘ *Link to external document or information, not part of the TEP Liban OSCP*

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1. LEBANESE REPUBLIC

Source of text: https://en.wikipedia.org/wiki/Lebanon

Lebanon, officially known as the Lebanese Republic, is a country in Western Asia, between latitudes 33° and 35° N and longitudes 35° and 37° E. It is bordered by Syria to the north and east (…), while Cyprus is west across the Mediterranean Sea.

Lebanon has a coastline and border of 225 kilometres (140 mi) on the Mediterranean Sea to the west.

Figure 1 : Map of the Republic of Lebanon

Lebanon is a parliamentary democracy that includes confessionalism, in which high-ranking offices are reserved for members of specific religious groups. The President, for example, has to be a Maronite Christian, the Prime Minister a Sunni Muslim, the Speaker of the Parliament a Shi'a Muslim, the Deputy Prime Minister and the Deputy Speaker of Parliament Eastern Orthodox.

Lebanon's national legislature is the unicameral Parliament of Lebanon. Its 128 seats are divided equally between Christians and Muslims, proportionately between the 18 different denominations and proportionately between its 26 regions.

The executive branch consists of the President, the head of state, and the Prime Minister, the head of government.

The Lebanese legal system is based on the French system, and is a civil law country, with the exception for matters related to personal status (succession, marriage, divorce, adoption, etc.), which are governed by a separate set of laws designed for each sectarian community.(…)

The Lebanese Armed Forces' primary missions include defending Lebanon and its citizens against external aggression, maintaining internal stability and security, confronting threats against the country's vital interests, engaging in social development activities, and undertaking relief operations in coordination with public and humanitarian institutions.

(…)

Source of text: TEP Liban EIA 2019, p. 5-138

Lebanon's administrative structure is based on the principle of decentralisation. The country is divided into governorates (mohafazas), chaired by a governor, which are further divided into districts (cazas or qadas). Districts are presided by a district chief (qaymaqam) (DRI, 2017).

The next level down consists of municipalities, which are governed by an elected council and headed by a mayor. Municipalities can be villages or cities, and local elections are held every six years.

The governorates and their respective districts are listed below:

Governorate (coastal)	Main cities	
Akkar	Akkar	
North	Batroun Bsharri Koura	Miniyeh-Danniyeh Tripoli Zgharta
Mount Lebanon	Aley Baabda Jbeil	Chouf Keserwan (Keserwen) Matn
Beirut	Beirut, not divided into districts and limited to the city of Beirut	
South	Jezzine Sidon (Saida)	Tyre (Sur)
Baalbek-Hermel Governorate	*Baalbek*	*Hermel*
Beqaa	*Rashaya* *Western Beqaa (al-Beqaa al-Gharbi)*	*Zahle*
Nabatieh	*Bint Jbeil* *Hasbaya*	*Marjeyoun* *Nabatieh*

Figure 2 : Map of administrative divisions of the Lebanese Republic

The ministries of Lebanon, as announced 31st January 219, are detailed below, and those with key responsibilities for oil spill preparedness and response highlighted in brown.

Source: https://www.diplomatie.gouv.fr/fr/dossiers-pays/liban/presentation-du-liban/article/composition-du-gouvernement

Source: https://en.wikipedia.org/wiki/Lebanese_government_of_January_2019

Portfolio
Prime Minister
Deputy Prime Minister
Minister of Defense
Minister of Finance
Minister of Interior and Municipalities
Minister of Education and Higher Learning
Minister of Energy and Water
Minister of Justice
Minister of Public Health
Minister of Telecommunications
Minister of Public Works and Transportation
Minister of Agriculture
Minister of Culture
Minister of Economy and Trade
Minister of Environment
Minister of Industry
Minister of Information
Minister of Youth and Sports
Minister of Tourism
Minister of Labour
Minister of Foreign Affairs and Expatriates
Minister of the Displaced Affairs
Minister of Social Affairs
State Minister for Technology and Investment
State Minister for Presidential Affairs
State Minister for Refugee Affairs
State Minister for Foreign Trade
State Minister for Administrative Development
State Minister for the Economic Empowerment of Women and Youth
State Minister for Parliamentary Affairs

2. WELL & DRILLING OPERATIONS

Source: Total Exploration and Production Liban Sal. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019

On 29 January 2018, the Government of the Republic of Lebanon signed an exploration and production agreement (EPA) with TEP Liban 40%, Eni Lebanon BV 40% and NOVATEK Lebanon SAL 20% for offshore Block 4. The Minister of Energy and Water approved the exploration plan for the block in May 2018, triggering the start of an initial three-year exploration period.

TEP Liban is planning to drill its first exploration well in Block 4 in December 2019. Block 4 is in the Levant sedimentary basin, offshore northern Lebanon, with its eastern boundary about 6 km distant from the nearest coastline. The block covers 1,911 km within water depth ranging from 320 m to 1780 m (see Figure 4). The proposed location of the first exploration well in Block 4 is presented in Figure below.

If the results are positive and TEP Liban and a potential for a commercial discovery exists, a second exploration well, and possibly an appraisal well, will be drilled.

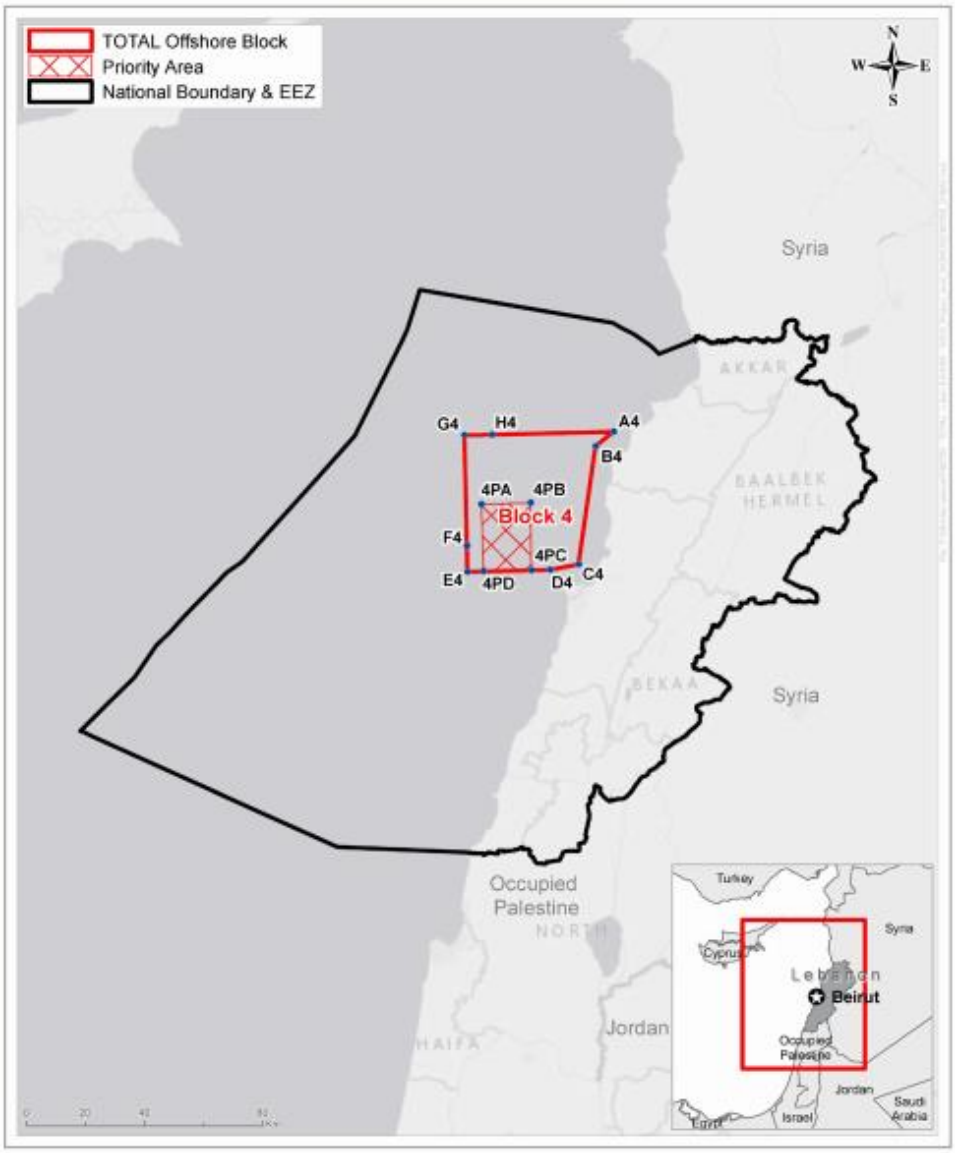


Figure 3: Location of Block 4 offshore in EEZ of Lebanon, including the priority area for drilling operations

Figure below shows the Block 4 and indicative priority area for operations in the south of Block 4 with the proposed location for the first exploration well. The minimum water depth in Block 4 is 320 m and maximum depth is 1780 m. In the priority area, the water depth ranges from 1450 m to 1760 m. Block 4 is 6 km from the nearest point on the coast.

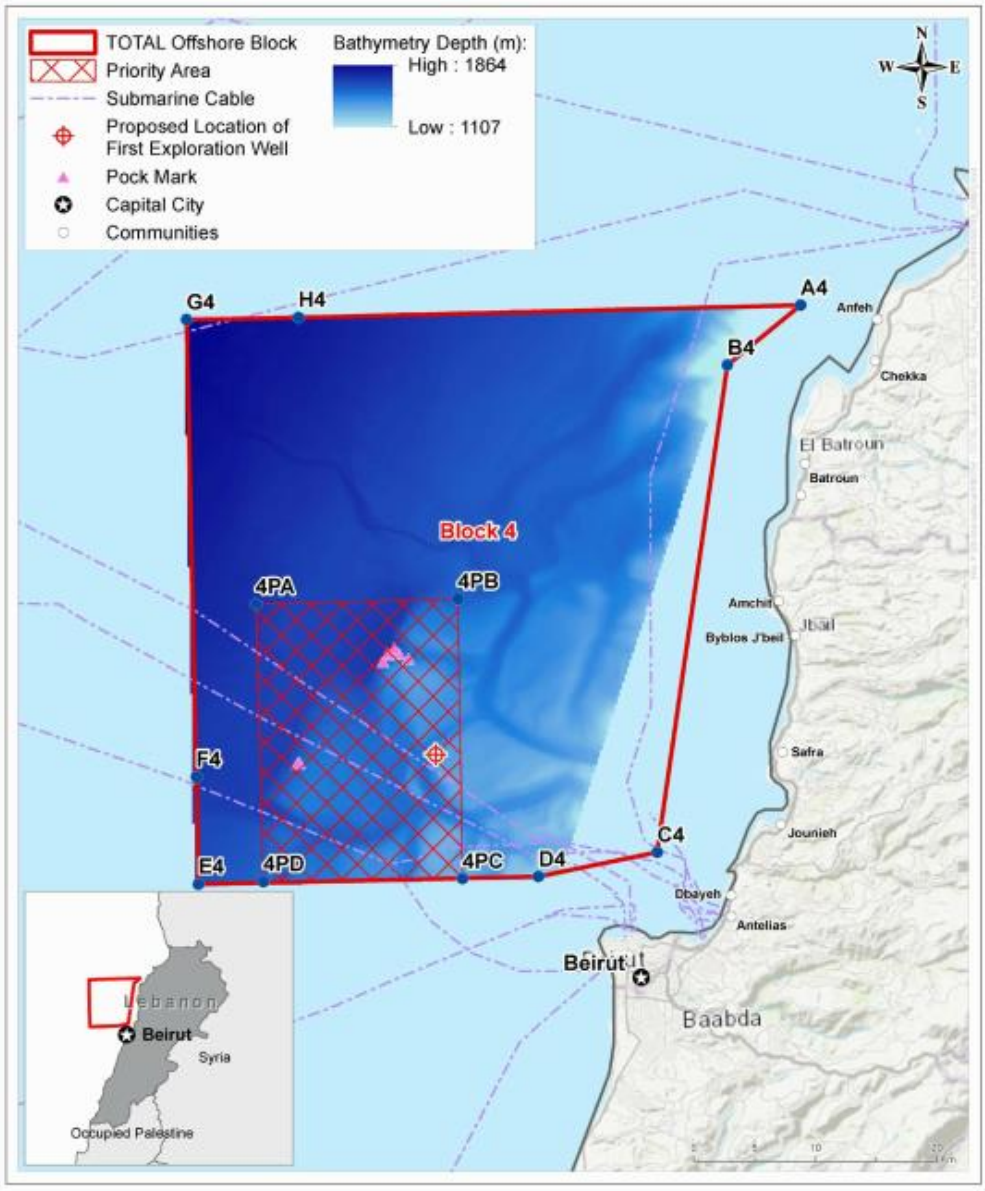


Figure 4: Location of Block 4, proposed well location and priority areas (2019)

Well location (coordinates below) was determined following analysis of the priority area using geological and environmental data. The well location will be about 12 Nm from the shore.

	Datum	Geographical		Projection*		Depth (mTVDSS)
		Latitude (deg min sec)	Longitude (deg min sec)	X (m)	Y (m)	
Well head	WGS84	34° 02' 28.713" N	35° 19' 47.511'' E	715,076	3,769,185	-1520

** WGS 84 / UTM – Zone 36°N – Central meridian 33°E*

3. DRILLING OPERATIONS & RIG

3.1 Overview of drilling process

Source: Total Exploration and Production Liban Sal. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019

The first well will be a pseudo-vertical (slightly deviated) exploration well, with a terminal depth about 4,400 m from sea level. The design of any subsequent wells will depend on the results from the first exploration well.

The design of the well is still under development, but typically a 36 inch conductor casing would be jetted through the seabed sediments to establish the wellhead in firm rock (to a depth of about 70 m below seabed level). The subsequent sections will then be drilled using drill bits of progressively smaller diameter. When each section has been drilled to its target depth, a steel casing will be lowered into the hole and cemented in place.

There will be five hole sections for the first exploration well, and a possible contingency hole. Figure 3.3 presents an approximate drilling and casing plan.

The 36 inch and 26 inch hole sections will be drilled using water-based drilling fluid, and the rock cuttings that result from this drilling will be discharged from the well directly to the seabed around the hole itself.

The 17½ inch and later sections will be drilled using non-aqueous drilling fluid (base case). A large tube, the marine riser, will be connected to the top of the well when drilling the 17½ inch section. All the rock cuttings arising from drilling of these lower hole sections will be transferred up the riser and on to the drilling unit.

Upon arriving on the drilling unit, the cuttings will be processed to remove as much of the drilling fluid as possible which is then reused in subsequent drilling.

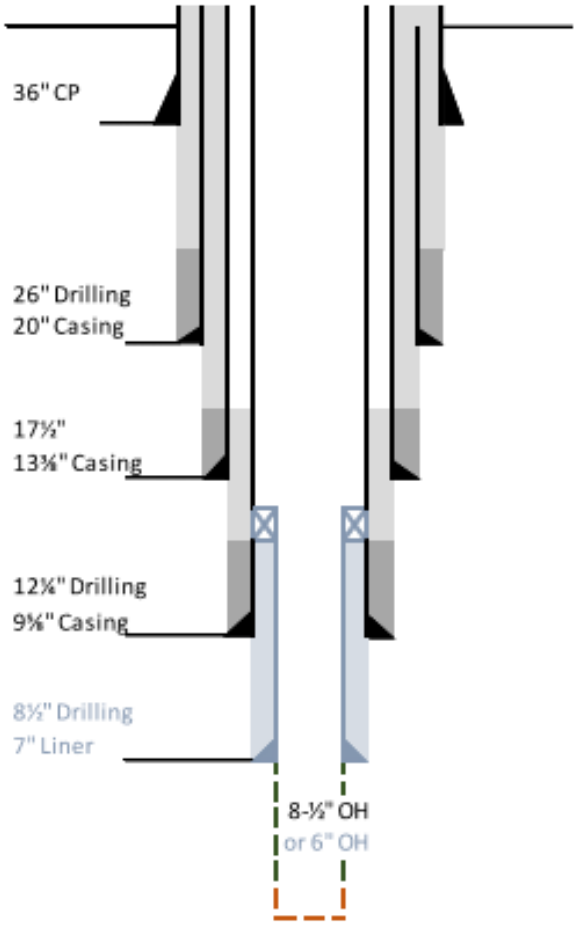


Figure 5 : Preliminary drilling and casing plan

3.2 Offshore Ultra-Deep Drill ship

Source: Total Exploration and Production Liban Sal. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019

TEP Liban proposes to use the TUNGSTEN EXPLORER from Vantage drilling company. an ultra-deep water dynamically positioned Class 3 drill ship to undertake the drilling.

Figure 6: TUNGSTEN EXPLORER from Vantage company (http://vantagedrilling.com)

For information purpose, indicative key specifications and capabilities of a drill ship (latest generation) are:

- IMO: 9631735
- MMSI: 311069300
- Year Built: 2013Call Sign: C6ZF4
- Gross Tonnage: 68486
- Deadweight: 64969 t
- Length Overall: 238m
- Breadth Extreme: 42m
- POB: approximately 200 persons
- Fuel storage: > 9,480 m3
- Mud storage capacity:
  - Active mud: 1412 m3
  - Reserve mud: 1,679 m3
- Base oil storage capacity: range of 813 m3
- Bulk storage capacity
  - Cement: 1,796 m3
  - Barite/bentonite: 2694 m3

In accordance with the 'Barcelona Convention – Offshore Protocol' a certificate of safety and fitness for the drillship will be submitted to the competent authority (Article 15) and a contingency plan to combat accidental pollution will be developed for the drilling campaign (Article 16).

A 500m Marine Restricted Area (MRA)[1] will be in place around the drillship during the drilling programme. The purpose of this zone is to protect the safety of people working on, or in the immediate vicinity of, the ship; and the drillship itself against damage. Safety zones also protect fishermen and other mariners by reducing the risk of collision with the temporary installation and preventing loss of gear that can become snagged on underwater equipment.

[1] The 'United Nations Convention on the Law of the Sea (UNCLOS)' 1982 requires all ships to respect safety zones around offshore installations.

4. LOGISTICS SUPPORT

4.1 Logistics base

Source: Total Exploration and Production Liban Sal. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019

The logistics base for the Block 4 exploration drilling will be within the port of Beirut; the activities at the base will be within the port's usual range of operations. Main activities at the logistics base will be:

- storage of drilling and wells equipment;
- storage of chemicals and hydrocarbons;
- lifting operations;
- loading and back loading of supply boats;
- support for third-party installations for chemicals storage, drilling fluids mixing and transfer of logging equipment (sealed radioactive sources).

See "Port of Beirut", p.18

The logistics base is expected to be available by late November 2019. At the time of writing, the location of the Logistics Base is identified at the yard in the eastern part of basin n°1. Facilities will include

- a pipe yard (outdoor storage up to 7,000 m2);
- warehousing (indoor storage up to 300 m2 100 m2 for chemical storage / dangerous goods, and 6 m2 for cold room);
- a 100-m linear jetty with 1,000 m2 for laydown area and mobile cranes for vessels operations;
- a drilling-fluids mixing plant and drilling fluids storage (1,250 m2);
- areas for offices, canteen, vehicles, marshalling areas, cargo containers, waste transfer and transit areas (no waste treatment).

The logistic base is operated by FAST BOLLORÉ with a TEP Liban representative on site. The logistics base will be staffed by a maximum of 35 people during the exploration drilling phase.

Two options are identified for bunkering (Marine Gas Oil for the supply vessels and drilling unit):

- An auto propelled barge will come alongside the support/supply vessel when berthed at the logistics base jetty inside the Port of Beirut, subject to prior authorisation.
- A specialised tanker will carry out the refuelling of the support/supply vessel at a dedicated area outside the Port of Beirut perimeter (anchorage area).

The operator of the logistics base sets-up some capabilities to respond to oil spills on land and in port waters:

- Trained personnel to manage minor spills on land and initiate response in case of larger spills;
- Gas monitoring equipment;
- Personal Protective Equipment;
- Sorbent material;
- Booms, skimmer;
- Offloading pumps;
- Temporary storage of recovered oily material.

4.2 Platform Supply Vessels – PSV

For the duration of the drilling campaign, TEP Liban will charter 3 Platform Supply Vessels PSV. One vessel will be located permanently at the drill site providing security and 2 vessel(s) will transfer supplies, materials, equipment and waste between the rig and the logistics base (8–10 return trips are estimated per week).

All vessels will comply with MARPOL and have a crew size of up to 15 persons.

Indicative key specifications (provided as example) for large type of PSV are as follow (indicative):

- Gross tonnage: range of 3,500 t
- Length overall: 80m
- Breadth: 18m
- Draught: 6.5m
- Usable deck area: >700m²
- DP 2 class
- Maximum speed (100%): 14 knots (23m3/day)
- Service speed (80%): 12 knots (14 m3/day)
- Range of capacities
  - Fuel oil: > 800 m3
  - Liquid mud: > 1,000 m3
  - Dry Bulk/Cement: >300 m3
  - Base oil: range of 150 m3
  - Methanol: > 200 m3

Figure 7: Example of large offshore Platform Supply Vessels PSV

Note. Detailed information available upon request to Total EP Liban.

4.3 Helicopter

Aeronautical transfers between the shore and the rig may be ensured by helicopter, operated from Beirut R. Hariri International Airport to ensure operational crew rotations (4–5 return trips per week), after the approval of Lebanese authorities.

/!\ It is acknowledged that helicopters flights are normally restricted to Lebanese Air Forces in Lebanon.

Twin-engine Eurocopter AS 365 N3 Dauphin helicopter would be chartered for:

- the transfer of personnel,
- medical evacuation,
- search and rescue,
- aerial surveillance in case of oil spills at sea.

Figure 8: DAUPHIN AS 365 N3 (Heli Union)

Max. Capacity: 11 Pax	Max. speed 165 knots
Max Take-off Weight: 4 300 kg	Max range: 447 nautical miles

4.4 Airport

Beirut–Rafic Hariri International Airport (https://www.beirutairport.gov.lb/index.php?lang=en) is used.

- Airport type: public
- Owner/Operator: Directorate General of Civil Aviation (DGCA)
- Codename: IATA: BEY, ICAO: OLBA
- Coordinates (WGS 84): LAT 33°49′16″N - LON 035°29′18″E
- Runway:
  - Direction: 03/21, Length: 3,800 m
  - Direction: 16/34, Length: 3,395 m
  - Direction: 17/35, Length: 3,250 m
- Ground handling providers (cranes, large forklift, lorries)
  - To be mobilized on a case-by-case basis through FAST BOLLORÉ.
- Contacts: Tel. 009611628000 or 150 from Lebanon

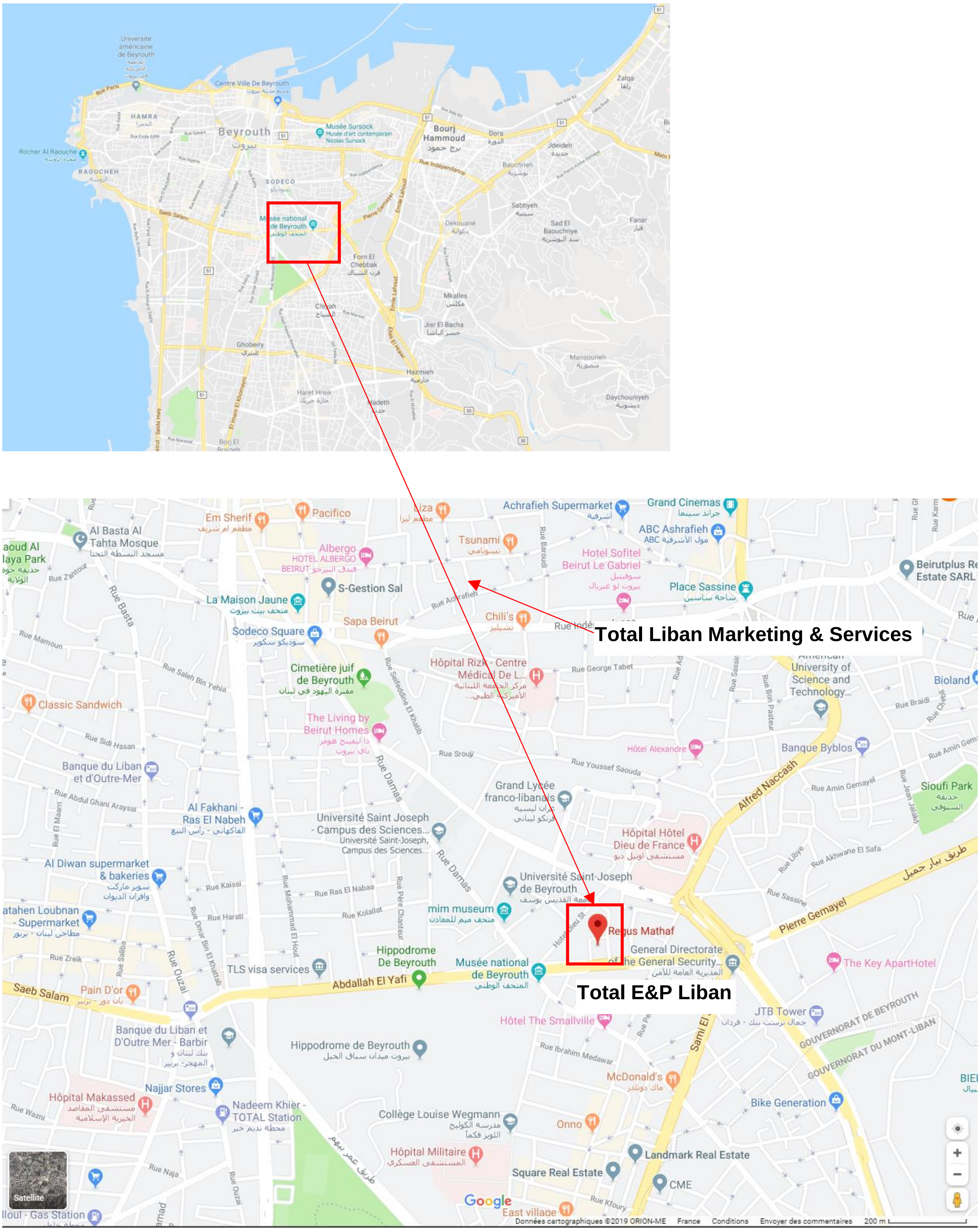
3 other airports are identified (military): Akkar, Rayak and Hamat. There is an airstrip at Baadaran.

4.5 TEP Liban office & Incident Management Room

The Incident Management Team has a dedicated Incident management room within the premises of TEP Liban in Beirut: Regus Mathaf – Building Le Bureau, 4th floor, Pierre Gemayel Street, Beirut, Lebanon.

Total Liban Marketing & Services is also present in Lebanon: Beirut: 2nd floor, Block B, Tilal Beirut building, Achrafieh street, Achrafieh sector Beirut P.O. Box 11-3636.

ⓘ See TEP Liban ERP 2019 for full details (Source: maps.goo.



5. APPENDICES

5.1 Distance & transit times

Transit times are as follow

	Distance		Time
Flight **from Beirut Airport to Byblos - D**	28 km	15 NM	Flight time ~ 8 min
Sailing **from Beirut Port to well location**	25 km	13.5 NM	Sailing time 30min (Crew boat) 1h40min (PSV)
Sailing **from Beirut Port to Limassol (Cyprus)**	245 km	132 NM	Sailing time +/-12 hrs (PSV)

5.2 Port of Beirut

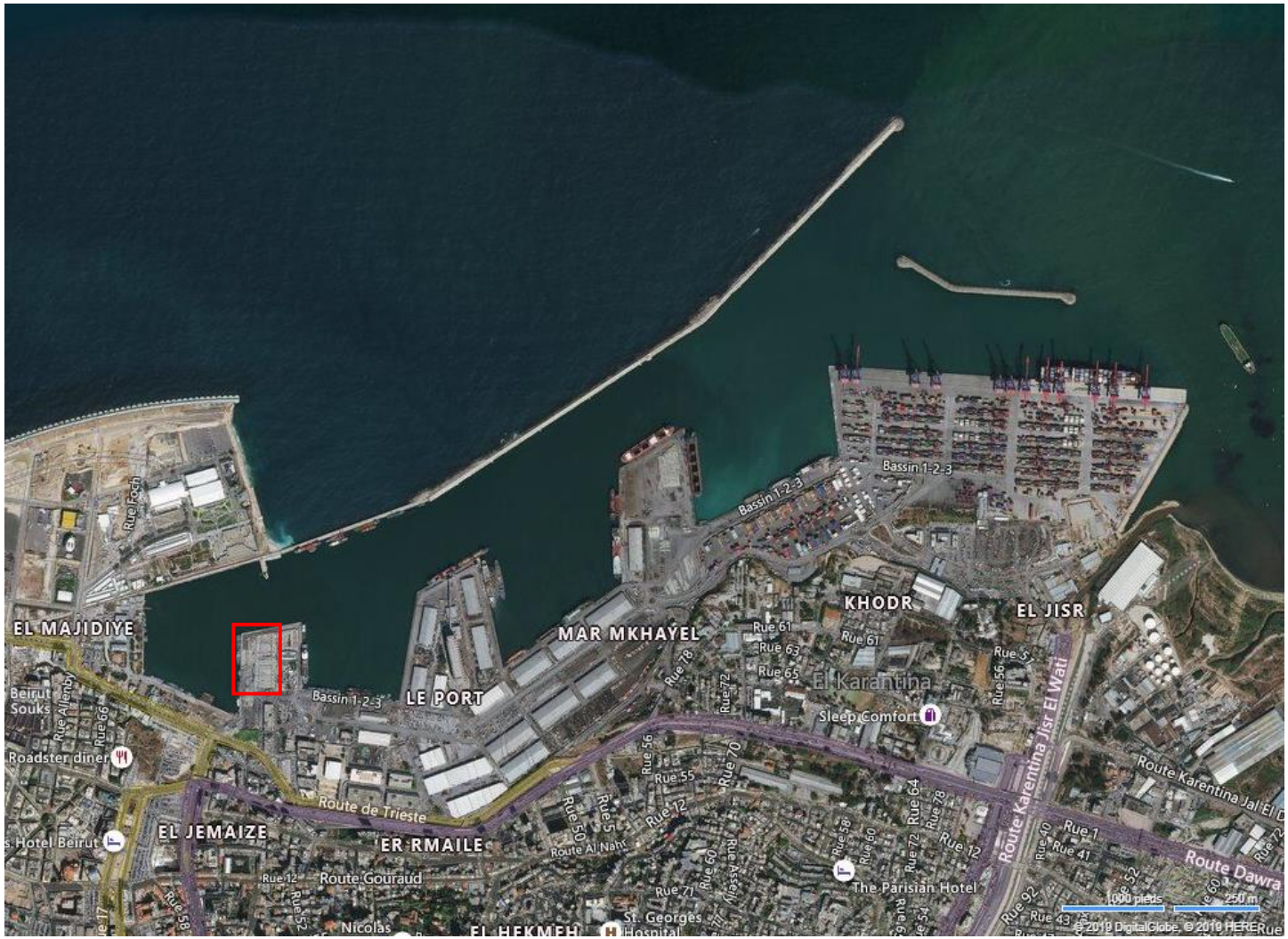


Figure 9 : Port of Beirut (Map: Bing Map)

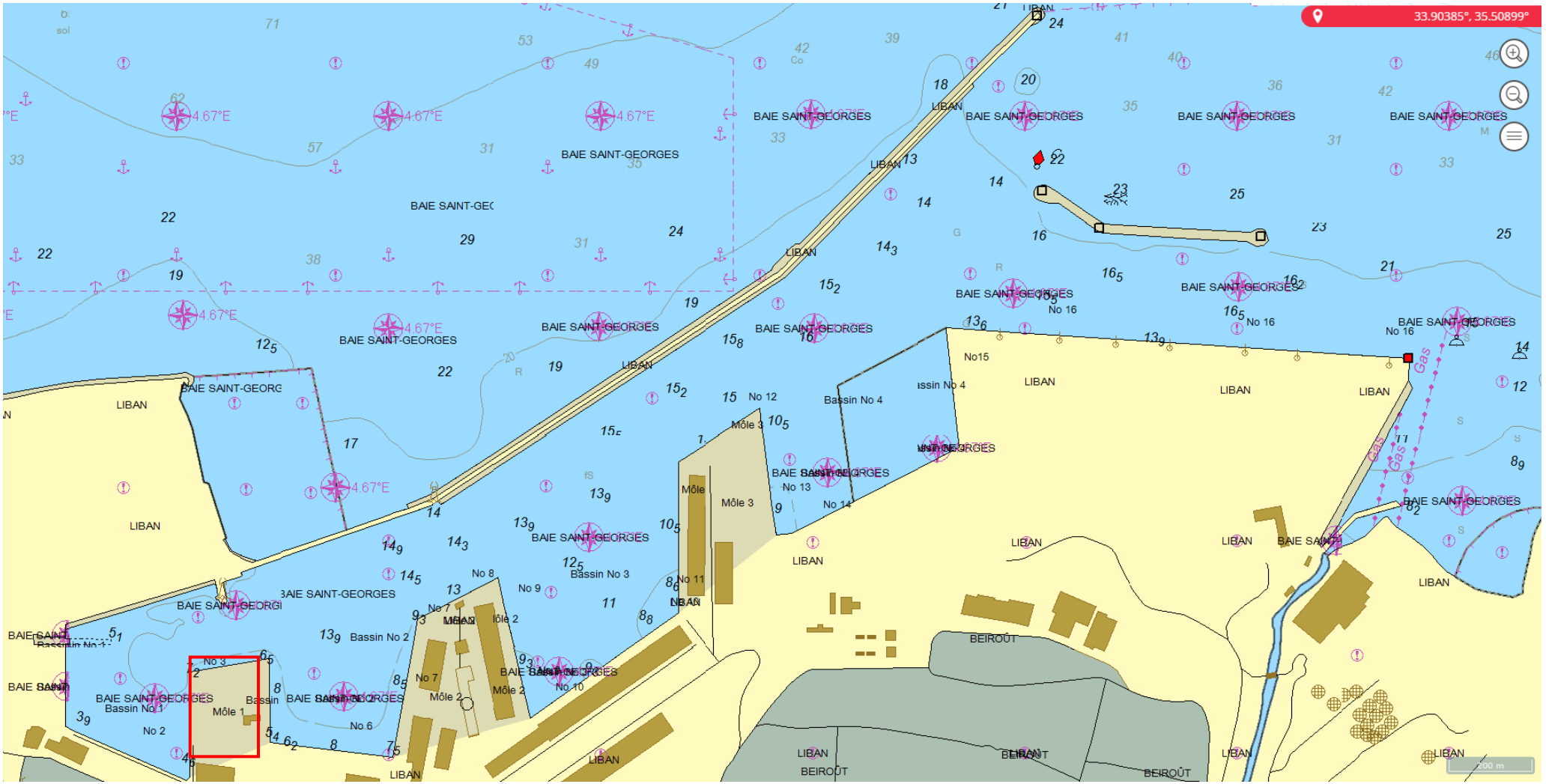


Figure 10 : Beirut port (Source CLS System)

5.3 TEP Liban Logistics base

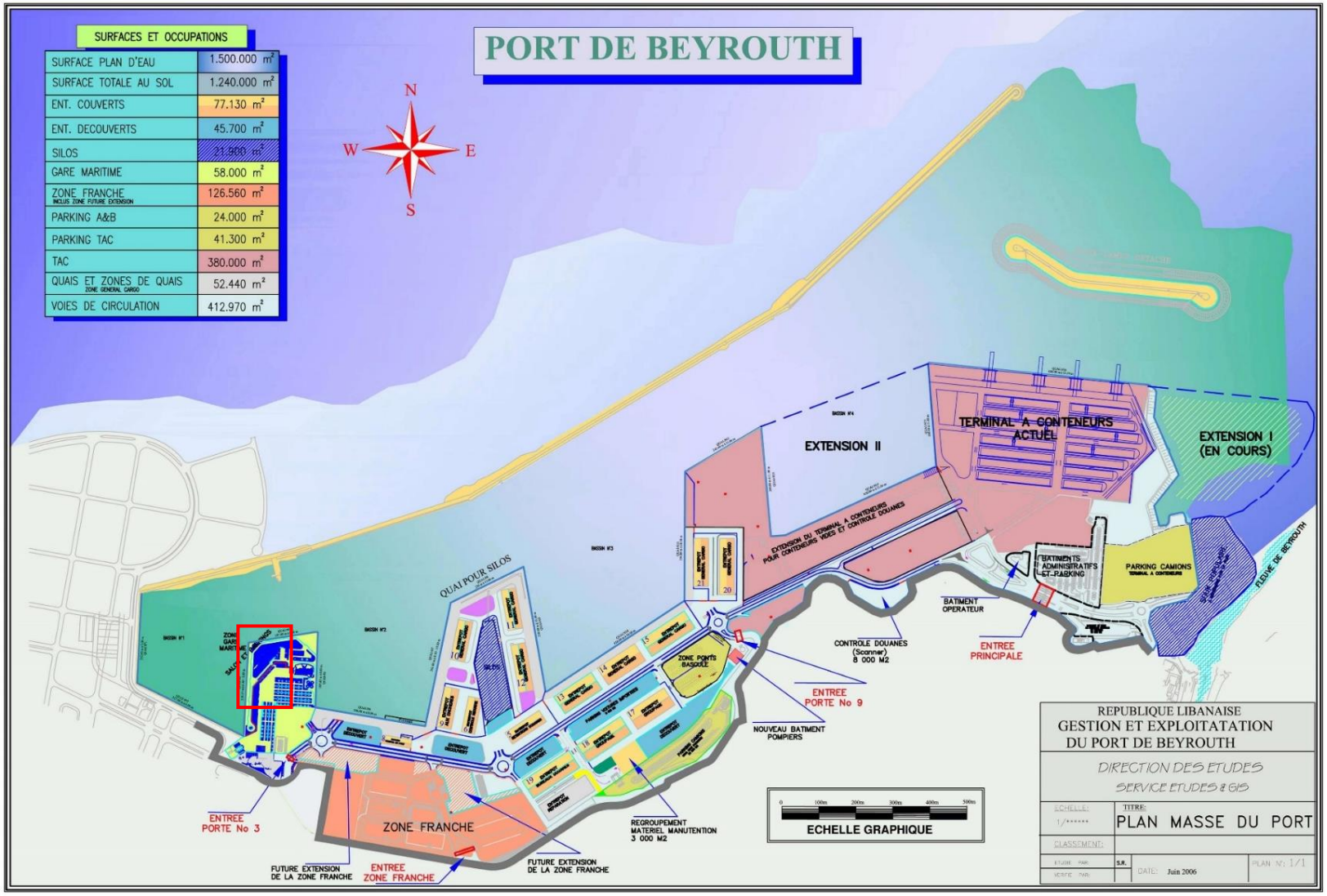


Figure 11 : Beirut port layout and location of the Logistics Base (in red) (Source: http://portdebeyrouth.com/)

5.4 General maps

General maps are provided below.

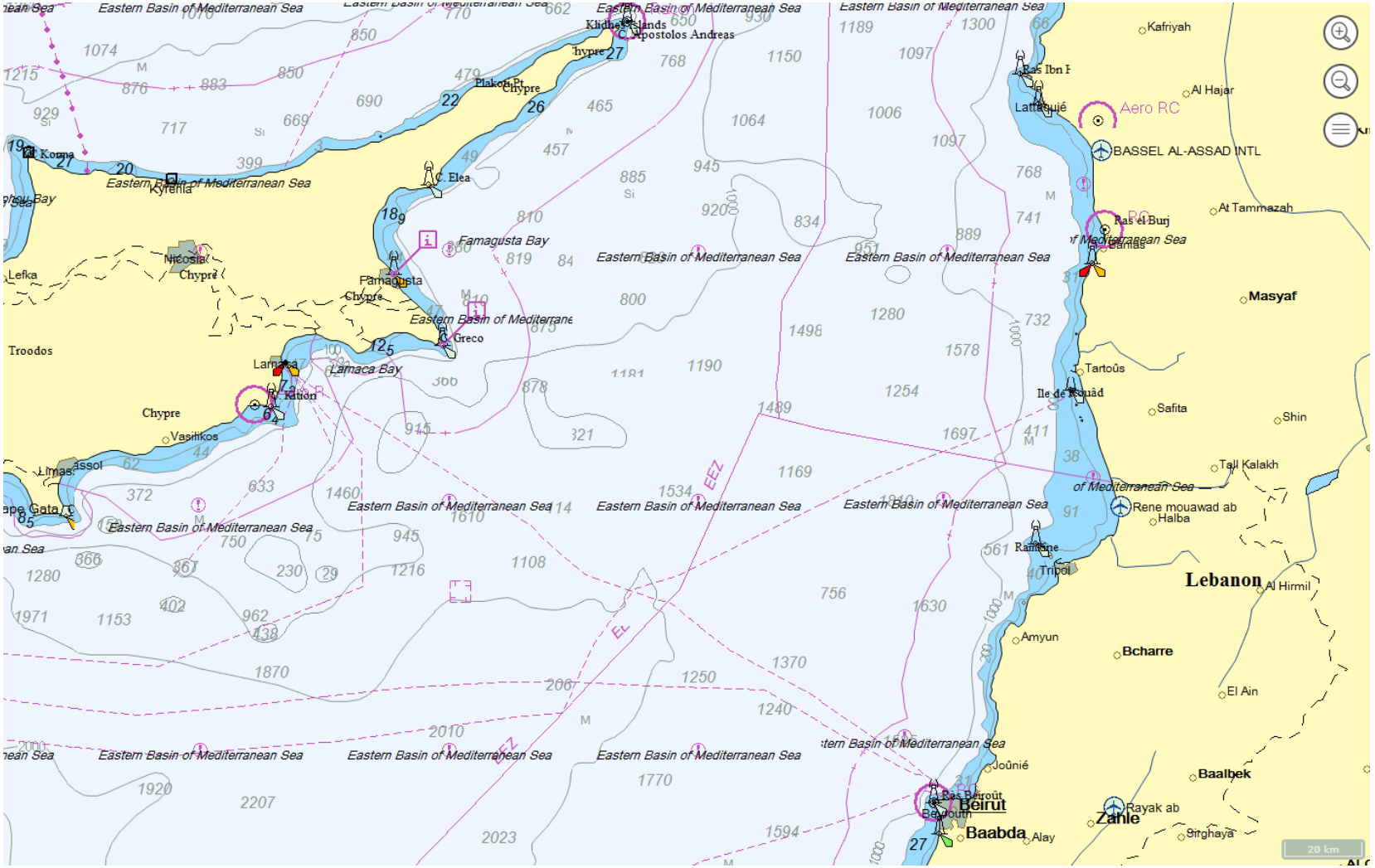


Figure 12 : Lebanon and Eastern Mediterranean Sea (CLS System)

Figure 13 : Lebanon and Eastern Mediterranean Sea (Bing Map)

Figure 14 : Lebanon (Bing Map)

Figure 15 : Lebanon (https://www.ezilon.com/maps/asia/lebanon-maps.html)

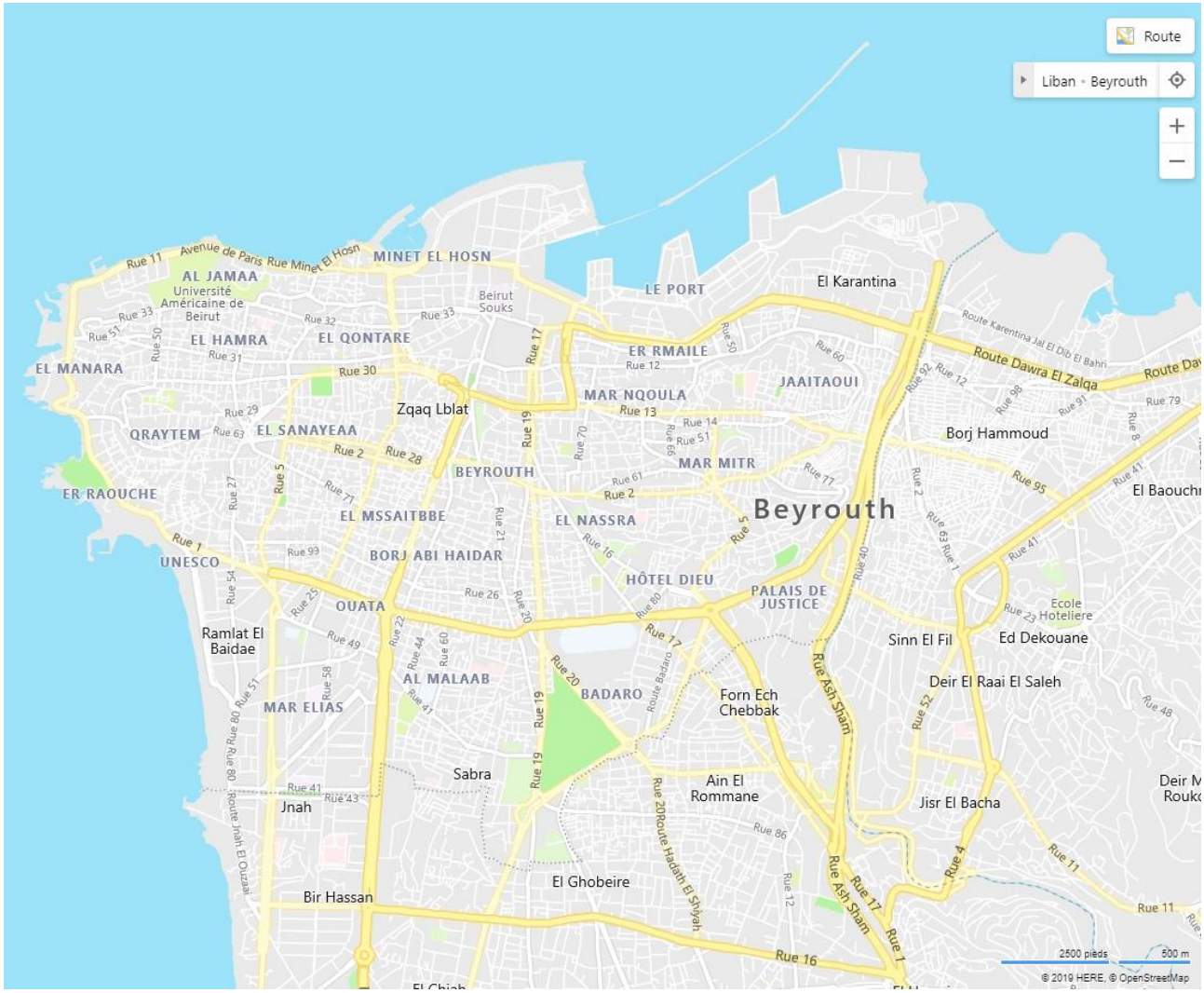


Figure 16 : Beirut (Bing Map)

5.5 Maritime boundary definitions

Source: Australian Government. Geoscience Australia

http://www.ga.gov.au/scientific-topics/marine/jurisdiction/maritime-boundary-definitions

Nautical Mile

A nautical mile (NM) is a unit of distance equal to 1 852 metres. This value was adopted by the International Hydrographic Conference in 1929 and has subsequently been adopted by the International Bureau of Weights and Measures.

The length of the nautical mile is very close to the mean value of the length of 1 minute of latitude, which varies from approximately 1 843 metres at the equator to 1 861.6 metres at the pole.

Territorial Sea Baseline

The term Territorial Sea Baseline (TSB) refers to the line from which the seaward limits of a country are measured. These include the breadth of the territorial sea; the seaward limits of the contiguous zone, the exclusive economic zone and, in some cases, the continental shelf.

Territorial Sea (12 nautical mile limit)

The Territorial Sea is a belt of water not exceeding 12M in width measured from the territorial sea baseline. A country's sovereignty extends to the territorial sea, its seabed and subsoil, and to the air space above it. This sovereignty is exercised in accordance with international law as reflected in the Convention.

Contiguous Zone (24 nautical mile limit)

The Contiguous Zone is a belt of water contiguous to the territorial sea, the outer limit of which does not exceed 24M from the territorial sea baseline. In this zone, a country may exercise control necessary to prevent and punish infringement of its customs, fiscal, immigration or sanitary laws and regulations within its territory or territorial sea.

Exclusive Economic Zone (200 nautical mile limit)

The Exclusive Economic Zone (EEZ) is an area beyond and adjacent to the territorial sea. The outer limit of the exclusive economic zone cannot exceed 200M from the baseline from which the breadth of the territorial sea is measured. In the EEZ, a country has sovereign rights for the purpose of exploring and exploiting, conserving and managing all natural resources of the waters super-jacent to the seabed and of the seabed and its subsoil together with other activities such as the production of energy from water, currents and wind. Jurisdiction also extends to the establishment and use of artificial islands, installations and structures, marine scientific research, the protection and preservation of the marine environment, and other rights and duties.

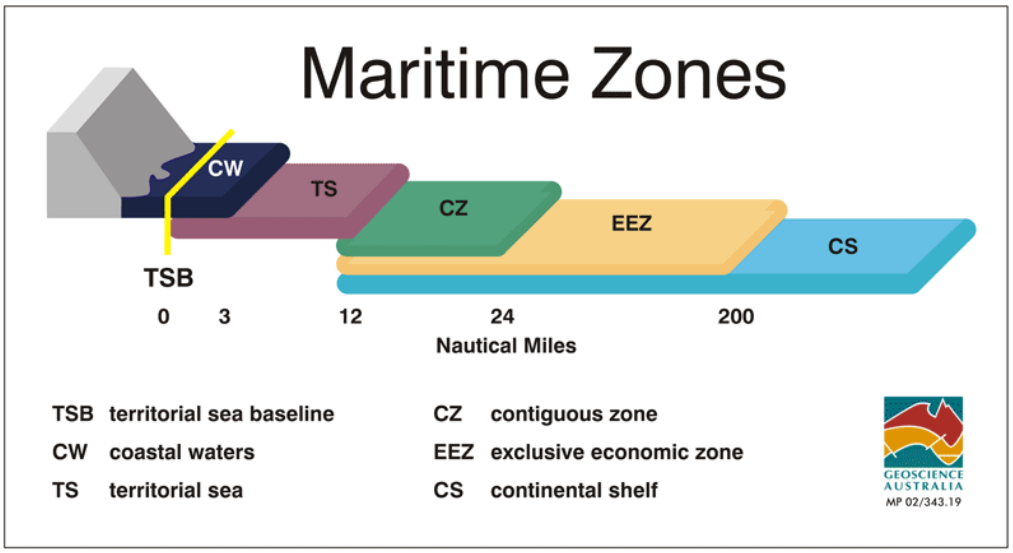


Figure 17 : Maritime zone definitions

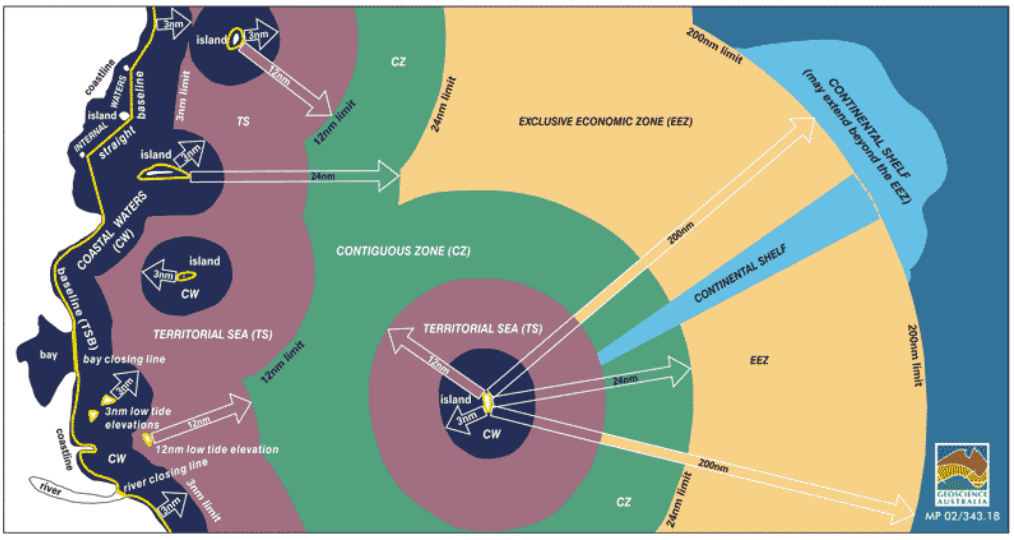


Figure 18 : Maritime features, limits and zones

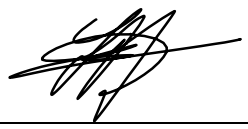
OIL SPILL CONTINGENCY PLAN

OPERATIONAL SUPPORT N°3:

FATE & BEHAVIOUR OF OIL AT SEA

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		
OTRA advisor L. Page-Jones	HSE Engineer Aram Chehayeb	HSE Manager François Bourrillon

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

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Markings:

/!\ Warning

Link to other documents of the TEP Liban OSCP

ⓘ *Link to external document or information, not part of the TEP Liban OSCP*

TABLE OF CONTENTS

Figures

Tables

1. SUMMARY OF FATE & BEHAVIOUR ASSUMPTIONS

Characteristics and expected behaviour at sea of main hydrocarbon products that could be released into the environment, after an incident linked to TEP Liban activities, are summarized in the table below.

These results are considered to develop the spill response strategies. Behaviour is detailed in the present volume, characteristics in Operational Support n°1, and response strategies in Operational Support n°4.

Note. HI 330/349 CONDENSATE, PHILLIPS is chosen as surrogate for condensates. Choosing lighter condensate (API° > 45) would evaporate even faster and more completely, would not emulsify and remain of low viscosity (behaviour similar to that of gasoline).

/!\ It is acknowledged that exact characteristics of gas and possible condensates are not known.

Table 1: Main hydrocarbon: summary of characteristics and behaviour

CHARACTERISTICS	**CONDENSATE** (HI 330/349 CONDENSATE, PHILLIPS)	**MARINE GAS OIL**
API	44.9	35-37
Oil Group	2	2
Specific gravity	0.802 (15°C)	0.840 – 0.860 (15°C)
Viscosity	1.85 cSt at 38°C	2 – 6 cSt at 40°C
Pour point	-65°C	-6 to 0°C
BEHAVIOUR *	**CONDENSATE** (HI 330/349 CONDENSATE, PHILLIPS) *	**MARINE GAS OIL ***
Oil spreading	Very fast	Very fast
Slick appearance & break-up	Very thin slicks, rainbow and silver easily breaking up	Very thin slicks, mainly rainbow and silver easily breaking up
Thickness	Fresh oil: initially <0.005 mm Can increase with possible emulsification	Fresh oil: initially <0.005 mm
Evaporation *	Maxi 80% in 4-5 days (2 kts wind) to 60-65% (15 kts wind)	50% (2 kts wind) to <20% (15 kts wind)
Natural dispersion, waves*	0% (2 kts wind) to 16% (15 kts wind)	0% (2 kts wind) to >80% (15 kts wind)
Viscosity after 24-48 hrs *	Range of 500 cSt (2 kts wind) to >10,000 (15 kts wind)	10-20 cSt
% Water content * after 24 hrs (emulsification)	10-15% (2 kts wind) to >90% (15 kts wind)	N/ A
Chemical dispersibility	N/ A	N/ A
Biodegradability in sea water	20-50% (minimum, possibly more)	80-90%
Surface oil after 48 hrs *	**< 20-30% in 2 days (with 2, 8 or 15 kts wind)**	**>50% after 5 days (2 kts wind) to 0% after 12 hrs (>15 kts wind)**

(*) Indicative behaviour based on ADIOS 2.0 modelling. Average sea surface temperature: 20°C. Avera sea salinity: 38 ppt (above oceanic usual salinity).

Drilling mud will sink. Drilling fluid remains at sea surface, disperses and evaporates (similarly to MGO).

Jet A1 evaporates very rapidly and can also disperse with waves (no oil at sea surface after 3 to 12 hrs).

2. MET-OCEAN CONDITIONS SUMMARY

The eastern Mediterranean environment distinguishes itself from oceanic seas and also the rest of the Mediterranean Sea because of its higher salinity, lower nutrients, transparency and higher sea surface temperatures.

Offshore wind, swell, wave and energy forecasts for the Levantine Basin are carried out by Cyprus Oceanographic Centre and are available at:

http://www.oceanography.ucy.ac.cy/cycofos/offshore.html

MetOcean conditions in the area of Beirut and the very close Block 4 are summarized in the table below for the four seasons and detailed after.

Table 2. Summary of MetOcean Conditions for Beirut and close Block 4

	Winter (December-March)	**Spring** (April-May)	**Summer** (June-September)	**Autumn** (October-November)
Beirut area				
Air temperature day average	13° - 15° C	18° - 20° C	23° - 27° C	18° - 22° C
Rain fall monthly average	> 150 mm	15 – 50 mm	<1 mm	50 – 100 mm
Day length (sun light)	9 – 11 hrs	13 – 14 hrs	12 – 14 hrs	10 – 11 hrs
Currents average in Block 4 (source: EIA)	0.4 kts (possibly up to & above 1 kt)	0.3 kts (possibly up to & above 1 kt)	0.6 kts (possibly up to & above 1 kt)	0.3 kts (possibly up to & above 1 kt)
	Predominantly to the North-North-East			
Currents coastal	Complex & variable (eddies). Possibly strong around caps (above 1 knot at Ras Beirut)			
Block 4 area (source: EIA)				
Wind monthly average speed	7 – 8 kts	7 – 8 kts	9 – 10 kts	5 – 6 kts
Wind direction (from)	Predominantly from the South-South-West to South-West.			
Beirut area				
Wind monthly average speed	7 – 8 kts	6-7 kts	6 kts	5 – 7 kts
Wind direction	From SSW to SW	From SW	From S & W	From NW to SW (NE)
Beirut area				
Wave direction	From the West			
Wave monthly average height	1 – 1.4m	0.6 to 0.7 m	0.5 to 0.7 m	0.5 to 0.6 m
Beirut & Block 4 area				
Sea Surface Temperature SST (average)	Around 17°C	Increasing from 18° to 30°	Around 30°C	Decreasing from 30° to 18°

2.1 Climate, temperature and precipitation

Climate

Lebanon is in the Mediterranean climatic region. Winter storms formed over the Atlantic Ocean move eastward through the Mediterranean, bringing precipitation at that season. In summer, the Mediterranean receives little or no precipitation. The climate of Lebanon is generally subtropical: hot, dry summers and mild, humid winters (Source: https://www.britannica.com/place/Lebanon/Climate).

Seasons are:

- Winter: December – March
- Spring: April – May
- Summer: June – September
- Fall: October – November

Temperature and air humidity

Climate on the Lebanese coasts is fresh in winter (10° to 15°C from December to March with temperatures down to 6° to 8°C) and hot in summer (temperatures of 25°-30°, sometime above 35°C, exceptionally 40°-42°C during "khamsine" period). Air on the coast is very humid particularly in summer, less in winter. Humidity varies from 65% to 72% on the coast with a maximum during spring and in minimum during fall, maintained by west to south-west marine winds.

Humidity decreases to the North.

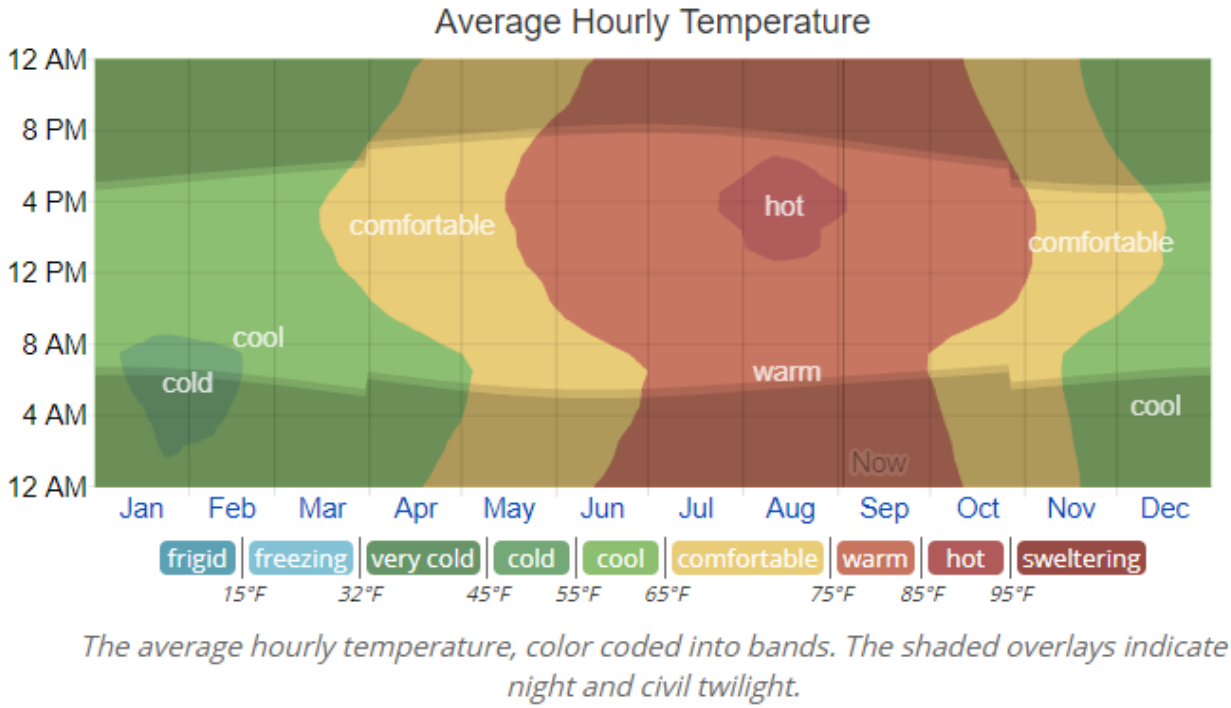


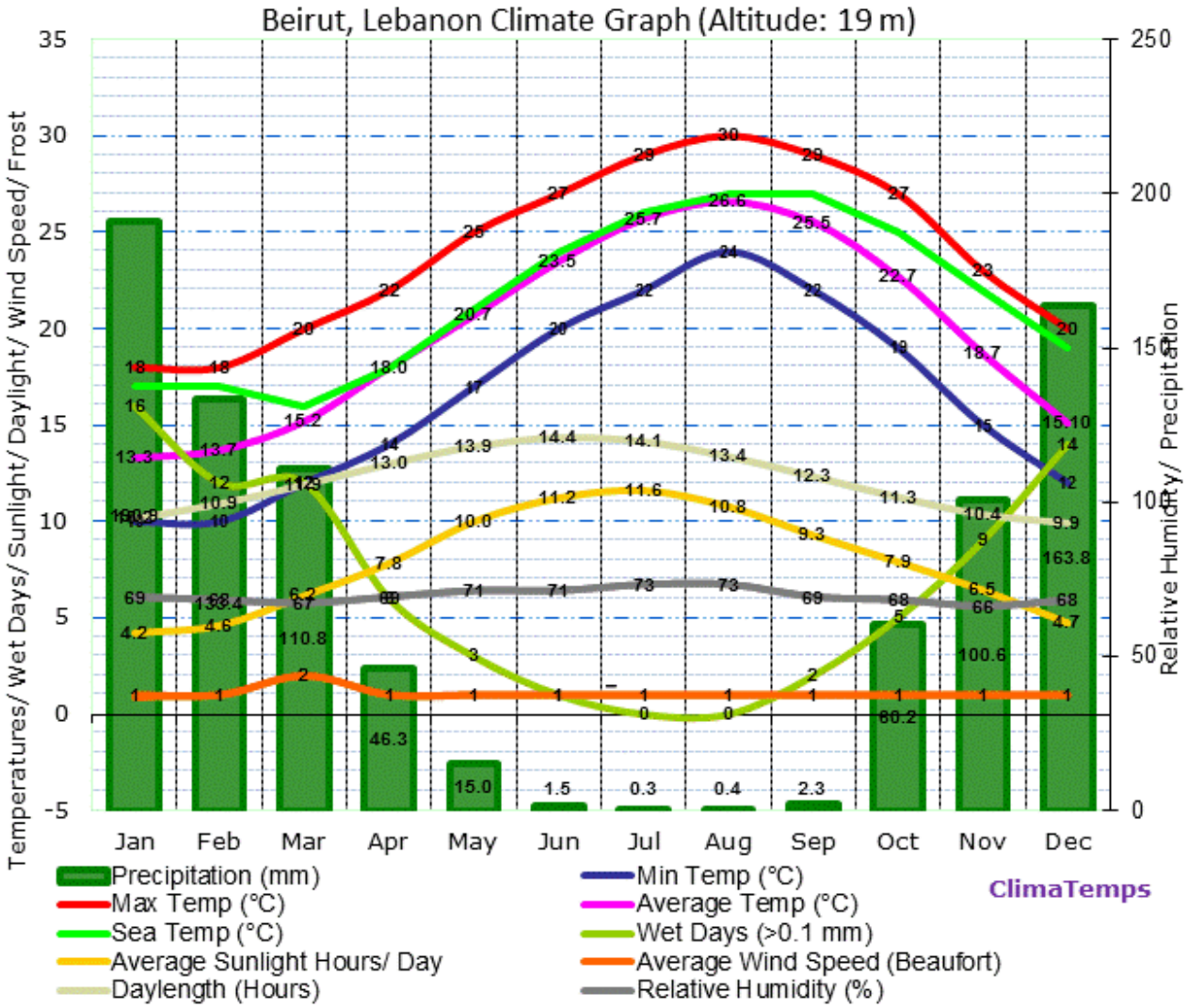
Figure 1 : Average hourly temperatures for Beirut (Source: https://weatherspark.com/y/99217/Average-Weather-in-Beirut-Lebanon-Year-Round)

Precipitation

Nearly all precipitations fall in winter (December to March), averaging 750 to 1,000 mm on the coast (approximately 1,000 mm in Beirut) and rising to more than 1,270 mm in higher altitudes. Some storms bring rain falls in spring and fall.

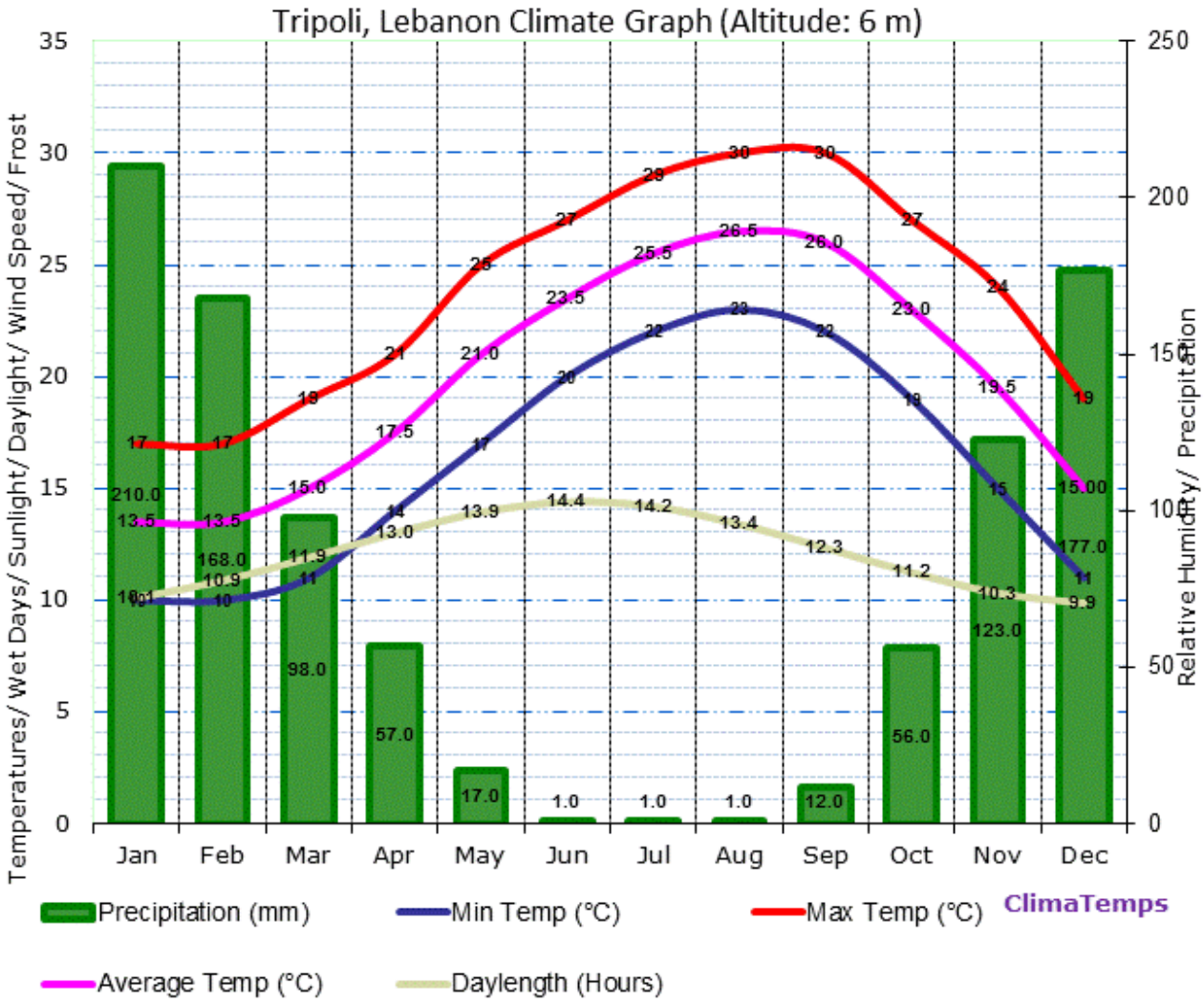
Rain falls increase up in the north Lebanon and is close to none in summer.

Figure 2: Climate data for Beirut (Source: http://www.beirut.climatemps.com)



Note. Average wind speed is considered not representative in this figure and is detailed after.

Figure 3: Climate data for Tripoli (Source: http://www.beirut.climatemps.com)



2.2 Mediterranean Sea

2.2.1 Basins and sub-basins

Mediterranean Sea is divided in two main basins (western and eastern) and various smaller sub-basins: Alb: Alboran; Alg: Algerian; Tyr: Tyrrhenian; Ion: Ionian; Cre: Cretan: Lev: Levantine; Sou-Aeg: South-Aegean; Nor-Aeg: Nor-Aegean; Sou-Adr: South-Adriatic; Nor-Adr: North-Adriatic; Lig: Ligurian; Pro: Provencal; Cat: Catalan.

SigmaAE, SigmaLW and SigmaLE are areas where eddies tend to accumulate and interact, up to merging and/or decaying, in the east Algerian, west and east Levantine sub-basins.

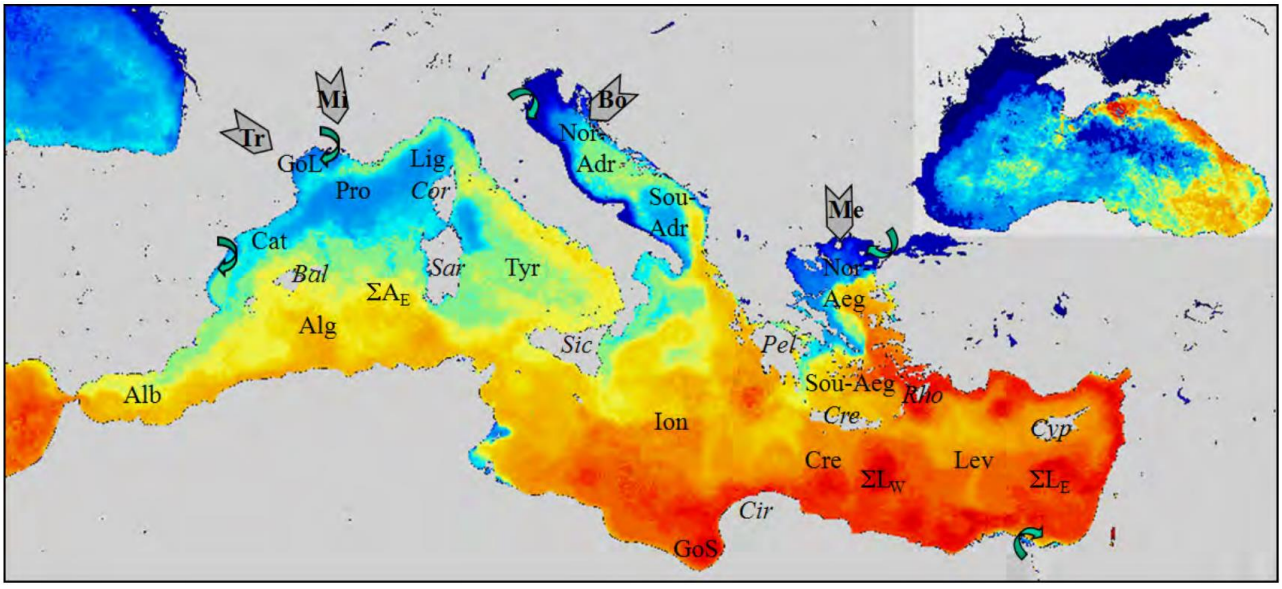


Figure 4 : Main and sub-basins of the Mediterranean Sea (Source: http://www.ifremer.fr/lobtln/OTHER/Terminology.html)

Notes:

- *Toponyms: Bal: Balearic Islands; Sar: Sardinia; Sic: Sicily; GoS: Gulf of Syrte; Cir: Cirenaica; Cre: Crete; Cyp: Cyprus; Rho: Rhodes; Pel: Peloponnese; Cor: Corsica; GoL: Gulf of Lions.*
- *Main winds are indicated with grey arrows: Tr: Tramontane; Mi: Mistral; Bo: Bora; Me: Meltem.*
- *Curved green arrows represent the main river outflows*.

2.2.2 Water circulation

Adapted from:

- https://e-cours.univ-paris1.fr/modules/uved/envcal/html/oceans/2-exemples-phenomenes-physiques/tsm-courants-marins-surface/2-2-circulation-oceanique-mediterranee.html
- Claude Millot, Isabelle Taupier-Letage. Circulation in the Mediterranean Sea: Updated description and schemas of the circulation of the water masses in the whole Mediterranean Sea. A. Saliot. The Mediterranean Sea, The Mediterranean Sea (5-K), Springer, pp.29-66, 2005, Handbook of Environmental Chemistry, 9783540314929

General circulation in the Mediterranean Sea is complex due to its morphology and the varying bathymetry.

Atlantic waters AW (less salty) penetrate by the Gibraltar Strait. Overall, and due to the Coriolis effect, all waters (Atlantic and Mediterranean) that circulate at basin scale tend to follow, in the counter-clockwise sense,

the isobaths. Hence, they tend to describe, in both western and eastern basins, quasi permanent gyres[1] a few 10s km thick and a few 1000s km long along the continental slope.

This simple schema is complicated by the fact that the southern parts of both gyres described by Atlantic water are markedly unstable. The Atlantic water inflow being identified with the so-called Algerian Current and Libyo-Egyptian Current and generating specific systems over the whole depth. Surface currents are also influenced by weather and seasonal variations. Both resulting in changes of gyres and formation of very variable eddies.

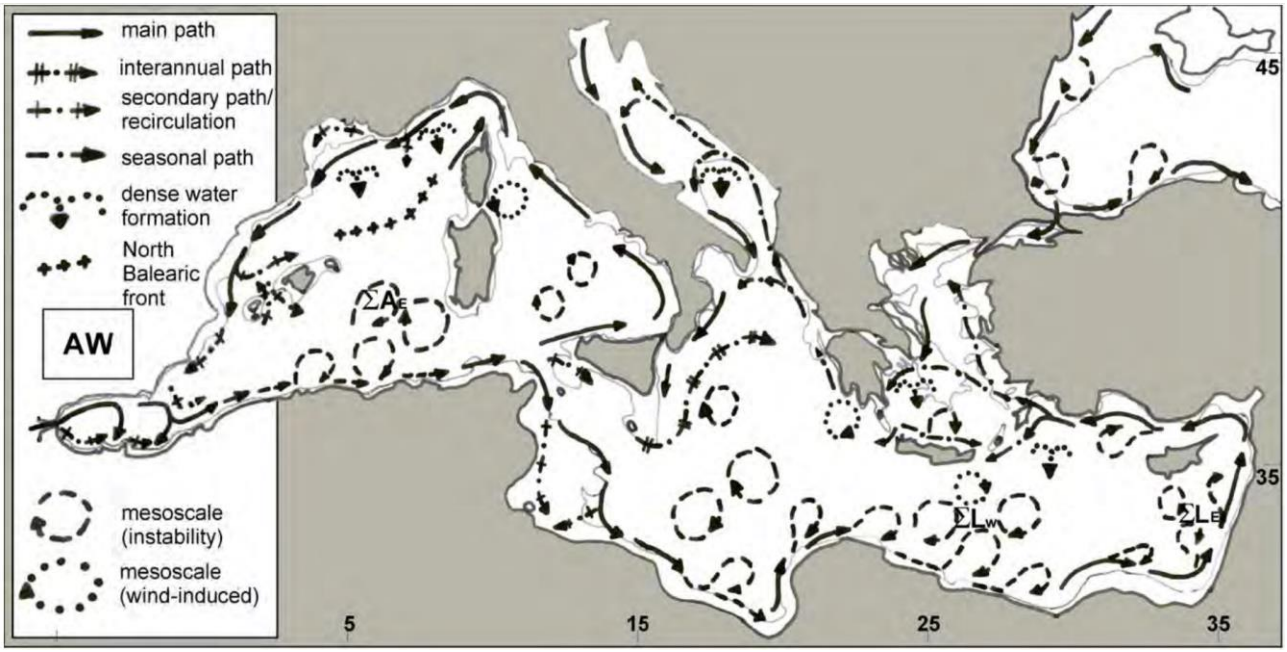


Figure 5 : General surface circulation in the Mediterranean Sea (Source: Claude Millot, Isabelle Taupier-Letage. Circulation in the Mediterranean Sea: Updated description and schemas of the circulation of the water masses in the whole Mediterranean Sea. A. Saliot. The Mediterranean Sea, The Mediterranean Sea (5-K), Springer, pp.29-66, 2005, Handbook of Environmental Chemistry, 9783540314929)

2.3 Currents along Lebanese coast and in Block 4

2.3.1 Currents along Lebanese coast

Eddies that decay in the ∑LW zone (North of east Libya and West Egypt) release Atlantic water that, at least partly, re-joins the along slope Libyo-Egyptian Current. Up to the Nile delta, the restructured eastern basin gyre generates medium (50-150 km) anticyclonic eddies (clockwise).

From the Nile delta up to the southern and central Middle East, instability processes only generate small eddies (up to 50 km) and mushroom-like features that rapidly propagate downstream (up to 10 km/day). Such characteristics might be due to the shallower topography that prevents larger and better-organised features to develop.

[1] Terminology used is from: http://www.ifremer.fr/lobtln/OTHER/Terminology.html

- Gyres are circulation features induced by wind and/or thermohaline forcing and/or topographic features (such as straits) that are clearly constrained by the bathymetry (at basin and sub-basin scales), and thus they do not propagate. They are characterised as clockwise in the Alboran (mainly due to the orientation of the Strait of Gibraltar) and everywhere else as counterclockwise (due to the Coriolis effect). Parts of the gyres can be unstable.
- Eddies are phenomena generated either by processes that destabilise along slope currents (such as the Algerian or the Libyo-Egyptian Currents), or by the wind stress curl locally induced by orographic effects (e.g. Ierapetra and Pelops). They are characterised as cyclonic / anticyclonic, not constrained by the bathymetry and can propagate. Eddies are mesoscale (some 10s to a few 100s km) features that will be characterised as small (up to ~50 km), medium (50-150 km) or large (150-250 km).

In any case, these features spread Atlantic water seaward and feed the ∑LE (accumulation of eddies in the eastern Levantine) formerly known as the Shikmona zone. When these features decay, the released Atlantic water re-feeds, at least partly, the eastern basin gyre along the northern Middle East slope.

Marine surface currents along the Lebanese coast are generally South to North keeping up with the general counter clockwise gyre of the Eastern Mediterranean and can be strong (particularly around Ras Beirut, above 1 knot), due to the configuration of the coast and the frequent strong south-western winds.

Smaller clockwise eddies detach from this general current into the bays, shaped by the coastal morphology and bathymetry. These eddies create surface convergence areas which tend to accumulate the floating debris at the sea surface into ribbons orientated South to North.

Offshore surface currents along Lebanese coasts are generally weak: 0.2 to 0.4 kts (0.1 to 0.2 m/s) and up to 1 kts (0.5 m/s), sometimes up to 1.4 kts (when forced by south-westerly winds at the end of winter). Summer and autumn currents are usually weaker (under 1 kt).

The general South to north current along Lebanese coasts can be slowed down significantly by the north-west winds or even inverted particularly in autumn (north-easterly winds).

Circulation in the eastern basin is still discussed, some studies contradicting with others.

2.3.2 Currents in Block 4

Source: Total E&P Liban Sal. Block 4 (Lebanon) offshore exploration drilling Environmental impact assessment - 80754. JUNE 2019 RSK

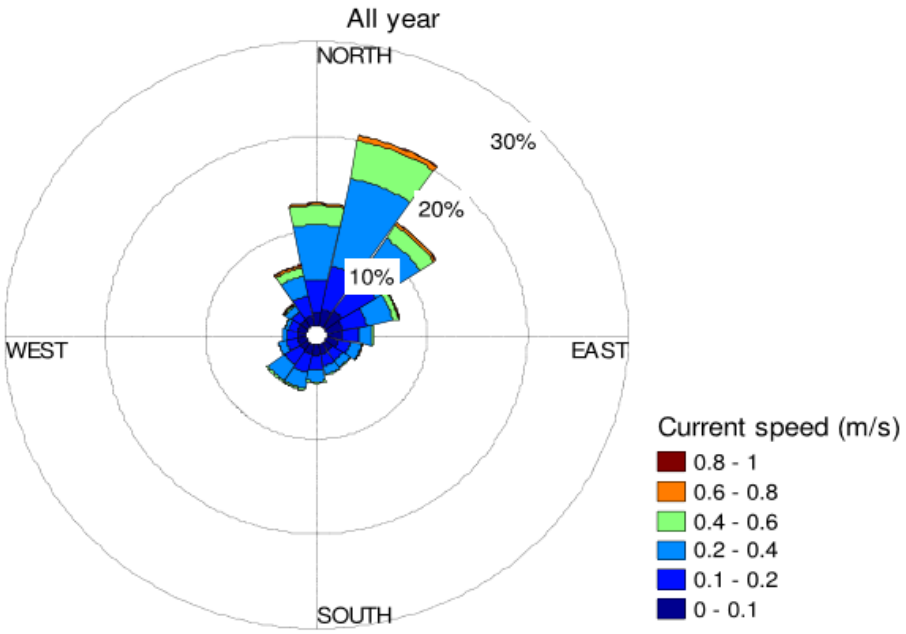


Figure 5.16: Year-round surface current rose for a single location in Block 4
Source: MeteoGroup (2019)

Table 5.3: Percentage occurrence of current speed measured in Block 4

Percentage occurrence of current speed (m/s)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All year
0.9 - 1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.8 - 0.9	1.0	0.0	0.0	0.0	0.0	0.0	0.6	0.1	0.0	0.0	0.0	0.5	0.2
0.7 - 0.8	0.8	0.1	0.0	0.0	0.0	0.0	1.2	0.3	0.0	0.0	0.0	0.5	0.2
0.6 - 0.7	1.3	0.5	0.3	0.1	0.2	0.0	4.8	2.9	0.4	0.0	0.0	2.8	1.1
0.5 - 0.6	5.2	2.7	0.0	1.2	0.8	1.2	10.6	7.5	2.3	1.2	0.1	5.0	3.1
0.4 - 0.5	13.0	7.1	2.4	3.6	3.2	6.8	18.2	9.7	8.9	3.6	1.2	9.4	7.2
0.3 - 0.4	13.9	15.2	16.5	8.0	10.9	21.0	22.1	15.7	13.3	10.5	4.0	13.3	13.7
0.2 - 0.3	22.8	27.2	24.9	26.2	24.3	31.9	19.9	24.2	16.5	24.5	18.2	16.9	23.1
0.1 - 0.2	30.3	29.8	34.3	38.5	39.9	29.1	15.3	24.3	26.9	35.6	41.6	28.9	31.3
0.0 - 0.1	11.5	17.4	21.5	22.5	20.6	10.1	7.3	15.3	31.7	24.7	34.8	22.8	20.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.2	0.2
Maximum	0.9	0.7	0.7	0.6	0.6	0.6	0.9	0.8	0.6	0.6	0.6	0.9	0.9
Standard deviation	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.1

Source: MeteoGroup (2019)

2.4 Winds

2.4.1 Winds in Block 4

Source: Total E&P Liban Sal. Block 4 (Lebanon) offshore exploration drilling Environmental impact assessment - 80754. JUNE 2019 RSK

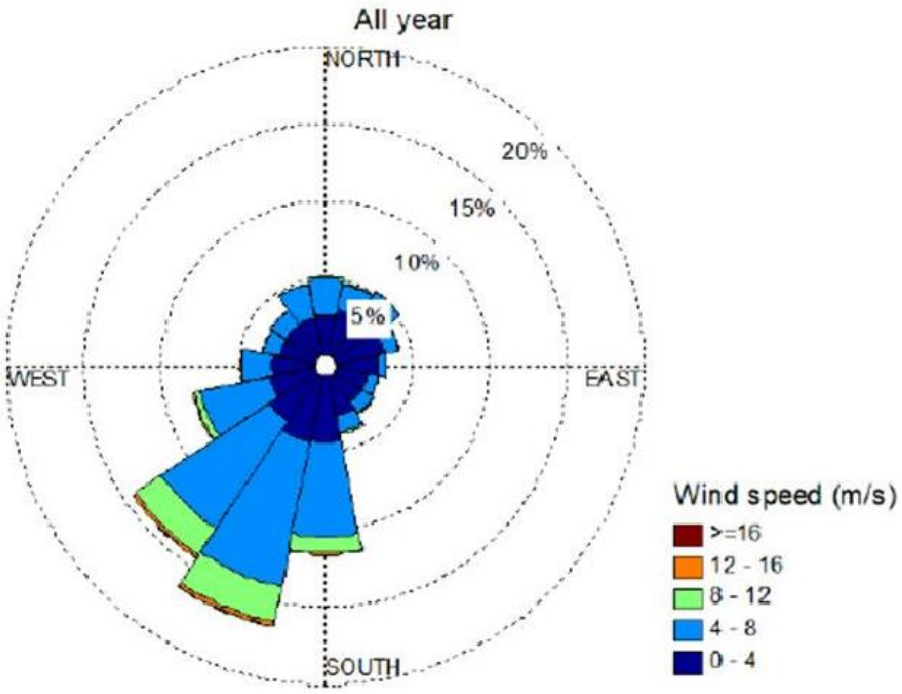


Figure 5.15: Year-round wind rose for a single location in Block 4
Source: MeteoGroup (2019)

Table 5.2: Percentage occurrence of wind speed measured in Block 4

Percentage occurrence of wind speed (m/s)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All year
20 - 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19 - 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18 - 19	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17 - 18	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 - 17	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
15 - 16	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
14 - 15	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.1
13 - 14	0.5	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.2
12 - 13	0.9	1.0	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.4
11 - 12	1.6	1.7	1.2	0.6	0.2	0.1	0.0	0.0	0.0	0.1	0.8	1.5	0.7
10 - 11	2.0	2.6	2.0	1.2	0.6	0.3	0.0	0.0	0.1	0.3	1.1	2.3	1.0
9 - 10	3.0	3.6	3.5	2.8	1.6	0.9	0.4	0.2	0.4	0.7	1.8	3.1	1.8
8 - 9	4.1	4.4	4.5	4.6	3.1	2.4	2.2	0.8	1.5	1.4	2.4	4.1	2.9
7 - 8	6.4	5.9	7.2	7.4	5.8	6.3	6.1	3.5	4.3	3.3	3.3	5.4	5.4
6 - 7	8.1	9.2	10.0	10.5	9.8	10.1	12.6	9.6	8.3	6.0	5.5	6.4	8.8
5 - 6	10.7	11.5	13.2	15.0	14.1	14.6	20.0	18.4	14.1	11.2	9.5	8.9	13.4
4 - 5	12.7	15.3	16.5	16.5	18.2	19.9	20.4	21.6	19.1	19.0	16.3	13.2	17.4
3 - 4	17.1	16.8	16.9	16.5	17.4	18.1	16.6	17.8	18.5	20.9	20.4	17.4	17.9
2 - 3	16.0	14.0	12.5	12.6	14.8	14.0	11.6	14.9	16.9	18.5	19.6	17.8	15.3
1 - 2	11.7	9.4	8.5	8.6	10.3	10.2	7.5	9.9	12.1	13.4	13.9	13.1	10.7
0 - 1	4.2	3.2	2.9	3.3	3.8	3.2	2.5	3.2	4.6	5.0	4.5	4.7	3.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
Minimum	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Average	4.7	4.9	4.9	4.7	4.3	4.3	4.5	4.1	3.9	3.7	4.0	4.5	4.4
Maximum	21.0	19.6	17.7	14.8	14.6	12.5	10.1	10.2	12.7	13.5	16.7	19.4	21.0
Standard deviation	2.9	2.9	2.6	2.3	2.1	2.0	1.8	1.7	1.9	1.9	2.4	2.9	2.4

Source: MeteoGroup (2019)

2.4.2 Winds in Beirut area

In Beirut, south-western to west-south-westerly winds dominate over the year.

- Winter (December to March) is characterized by the Atlantic depressions and associated stronger winds mainly from the south-west (20 to 30 knots, 10% of yearly observations in Beirut). North & East winds occur.
- During spring, south-westerly winds prevail. North & East winds occur.
- In summer, winds are well established, mainly from the South and West, and weaken in August and September.
- From October to November, winds speed is the weakest of the year. Wind may come from the north to north-east.

Overall in Beirut, winds from 5 to 8 knots are the most frequent, while winds between 11 and 20 knots account for 30-40% of the observations. It is considered that winds in the drilling area follow a similar trend.

Daily variation (night / morning / afternoon) are important. In summer, coastal winds are strongly influenced by sea breezes, which can overtake the general synoptic winds some days.

"Sea breeze and land breeze", p.56

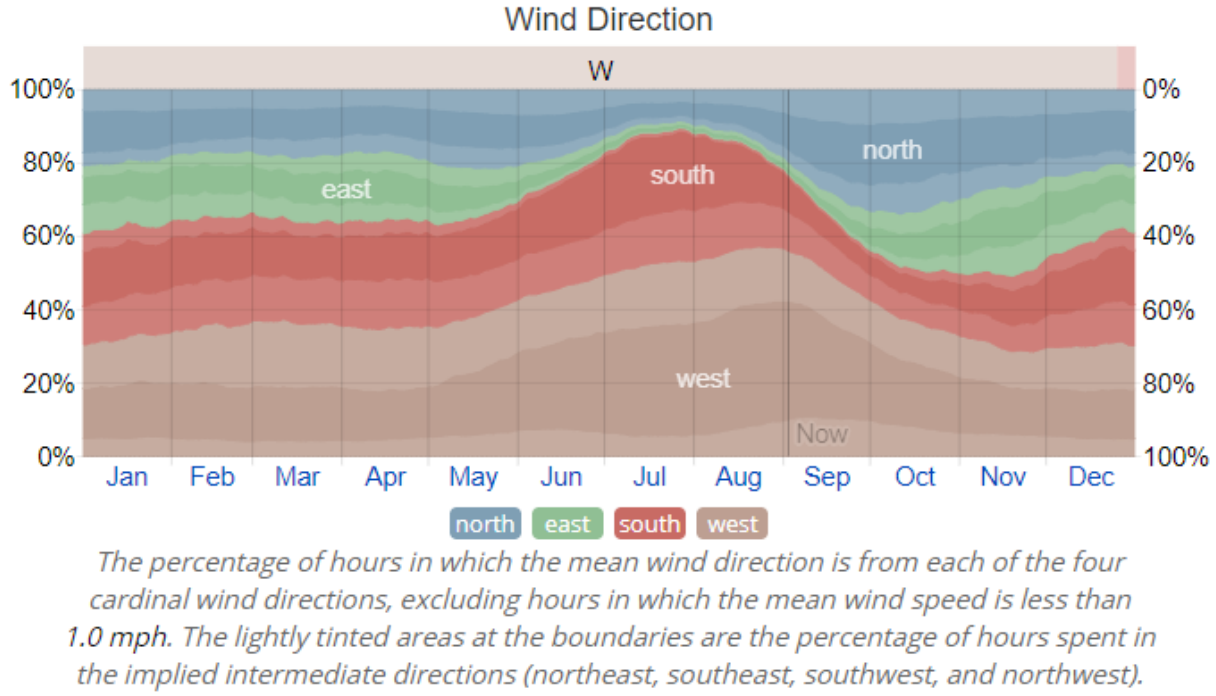


Figure 6 : Wind direction for Beirut, blowing from (Source: https://weatherspark.com/y/99217/Average-Weather-in-Beirut-Lebanon-Year-Round)

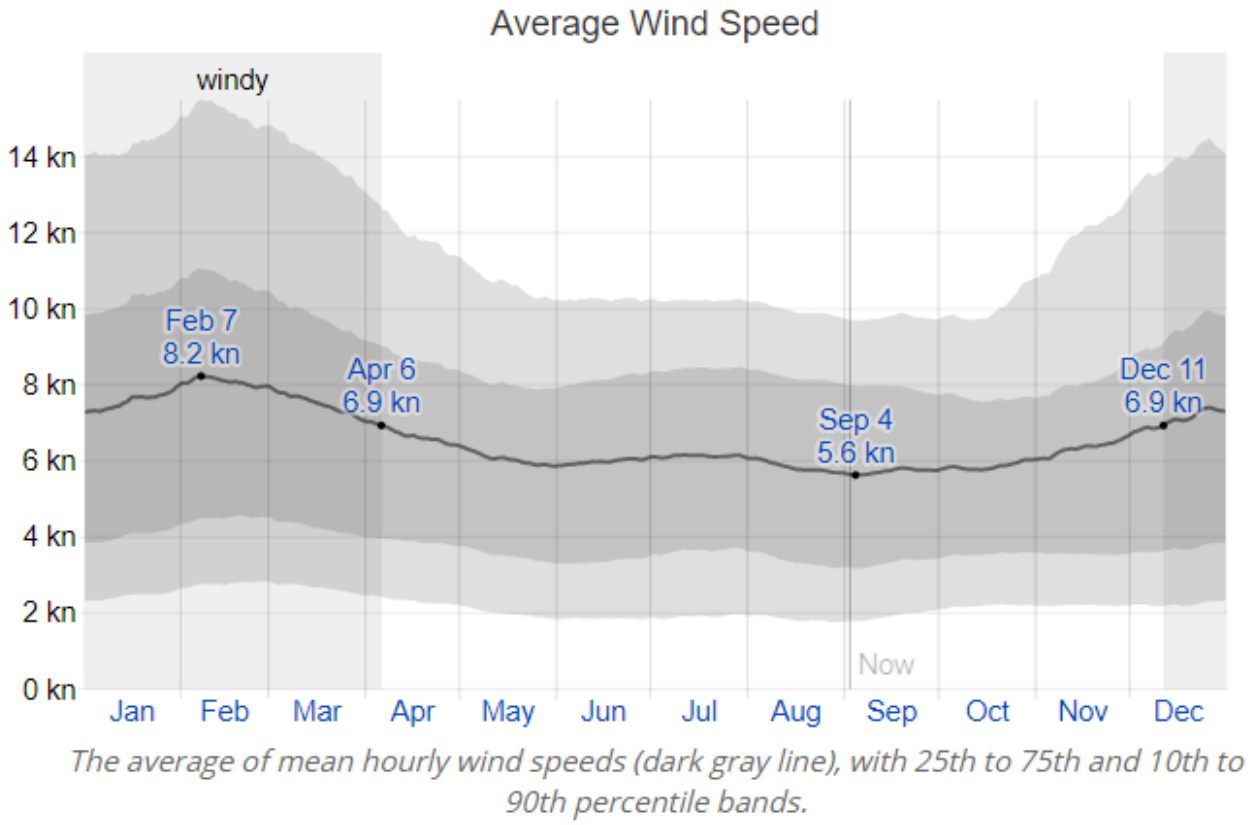


Figure 7 : Wind speed for Beirut (Source: https://weatherspark.com/y/99217/Average-Weather-in-Beirut-Lebanon-Year-Round)

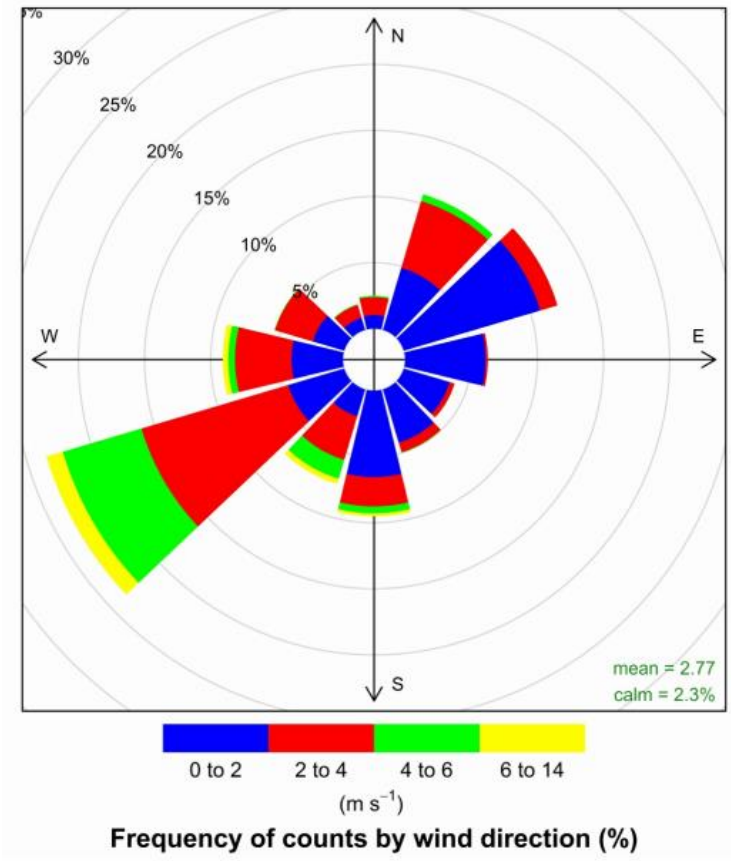


Figure 8 : Wind rose for 2008-2011 (direction: blowing from). Data collected from the CIRRO operated Beirut Golf weather station (Source: Lebanese Nations OSCP, Vol. D, 2017)

2.5 Waves

Offshore

Significant wave height is mainly under 1.2m, nearly exclusively from the West. Significant wave height can exceptionally reach above 4m.

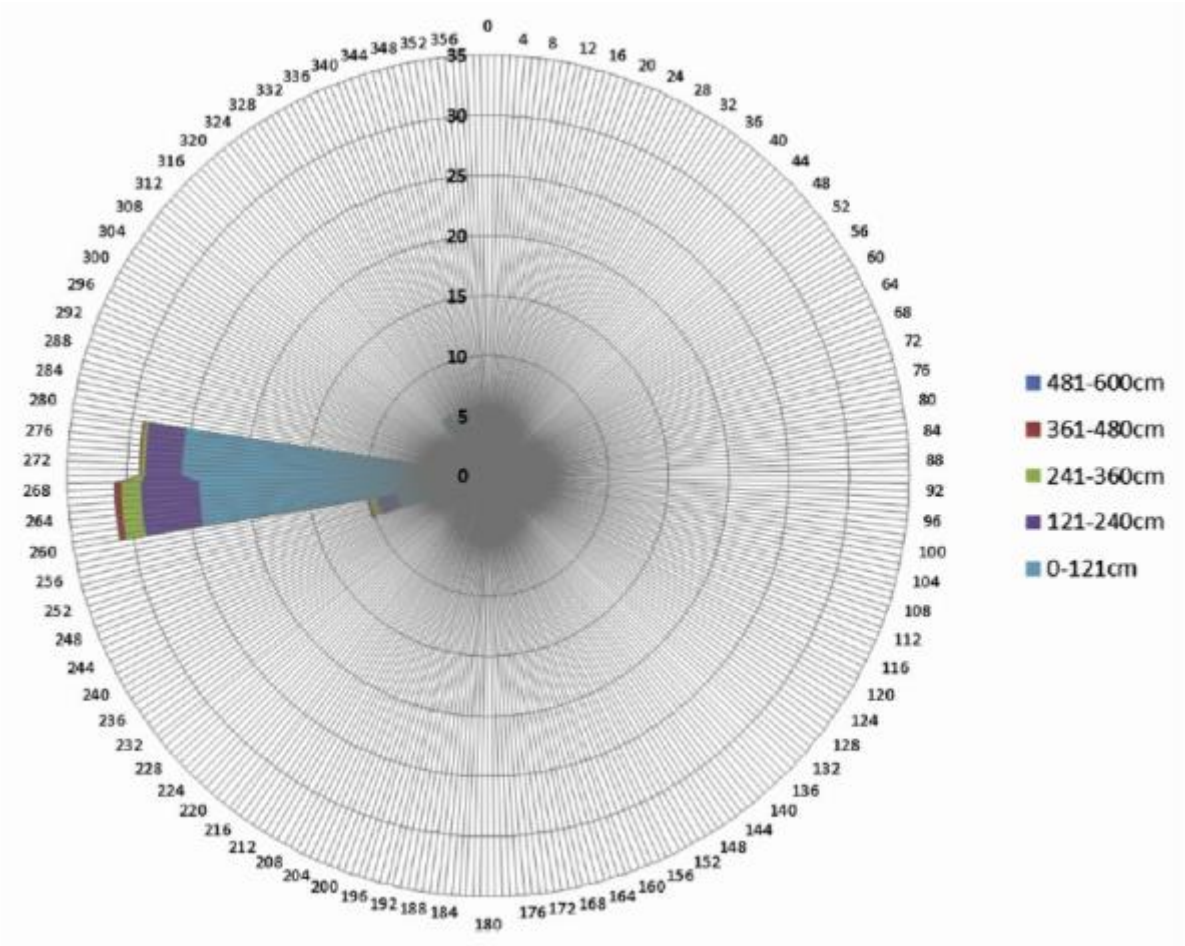


Figure 9. Wave rose for 2003 (significant wave height) offshore Beirut (Source: TEP Liban. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019)

Beirut

The maximum average monthly wave height off Beirut is 1.41 m (February). The average significant wave height drops steadily until June (Figure below). Most waves travel from west to east.

More forceful waves are expected in windier areas, specifically in northern Lebanon, where average offshore winds were found to be strongest with speeds reaching 7 m/sec (Aoun et al., 2013).

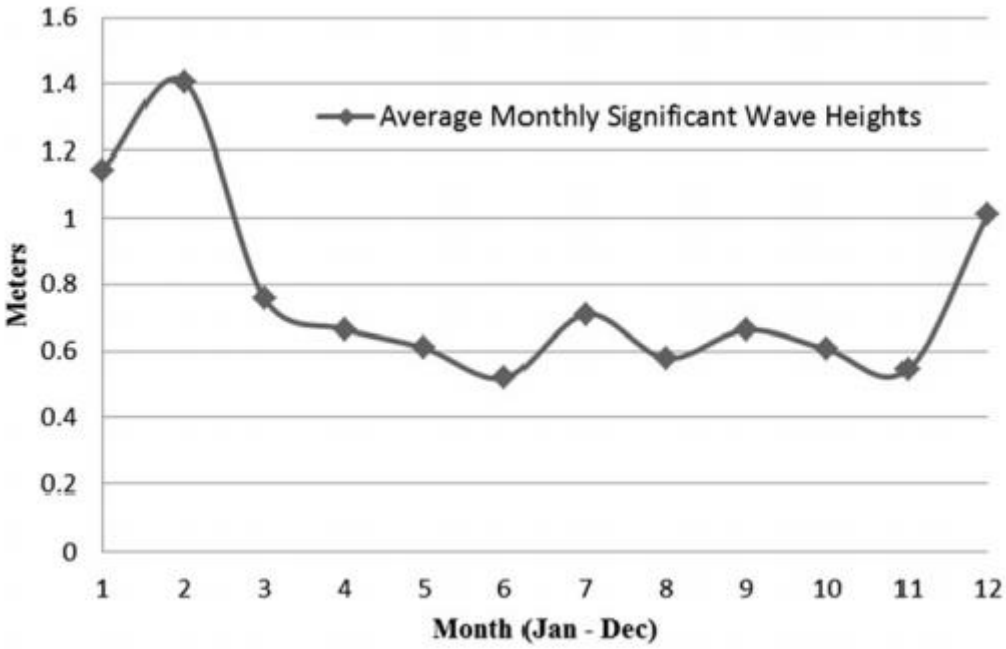


Figure 10. Average monthly significant wave heights offshore Beirut (Source: TEP Liban. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019)

2.6 Water Sea Surface Temperature & salinity

Source: TEP Liban. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019

The Cyprus coastal ocean forecasting system (CYCOFOS) provides data on surface water velocity and temperature in the Eastern Mediterranean.

Offshore surface water temperatures show significant fluctuations, ranging from 17.3°C in January to 28.9°C in August. Winter is characterised by a vertical homothermy at around 17°C in the uppermost 100 m, which persists until April, when a gradual warming up of this layer occurs.

The four permanent layers of water that characterise the Eastern Mediterranean Sea are shown in the table below.

Table 3 : Water layer characteristics in the eastern Mediterranean Sea

Water layers	Depth (m)	Temperature (°C)	Salinity (%)
Surface water	30–50	22–29	38.80–39.30
Low salinity water mass	50–75	18–23	38.60–38.80
Intermediate water	150–400	16–17	< 39
Deep water	> 400	14–15	About 39

Coastal waters ranges from 16°C (February) to 30-31°C (August).

2.7 Tides

Figure below describes the amplitude of the semi-diurnal principal lunar tide M2 in the Mediterranean Sea.

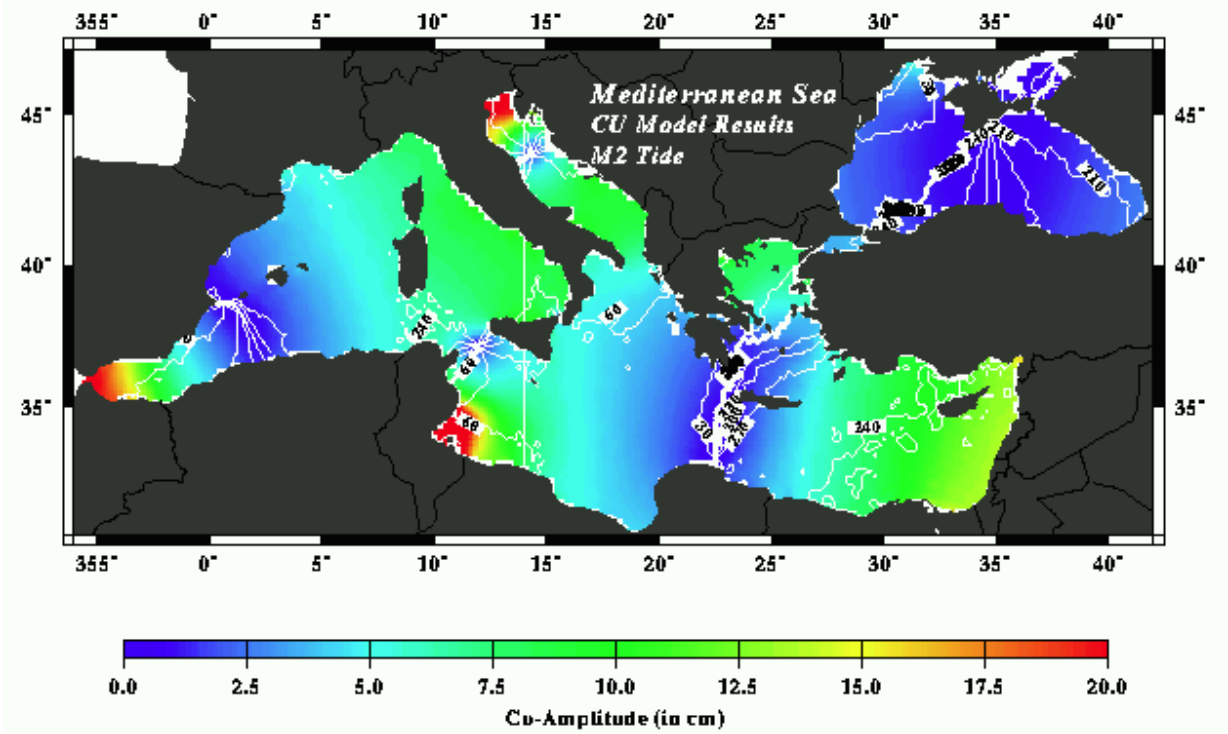


Figure 11 : Model prediction for the co-amplitude of the M2 tidal wave in the Mediterranean (Source: TEP Liban. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019)

Tides in Lebanon are semi-diurnal and micro-tidal (less than 2m tidal range).

Tidal activity on the Lebanese coast is weak. Tidal range is between 10 and 50 cm maximum. The tidal current along the coast of North Africa generally flows eastward, before turning in a north-eastern-northern direction along the coasts of Lebanon and Syria, where it becomes weak and variable and affected by winds. (Source: TEP Liban. Block 4 (Lebanon) offshore exploration drilling. Environmental and social impact assessment scoping report. June 2019)

In Beirut, the mean spring tidal range is about 0.4 to 0.5m, and mean neap range about 0.1 m. Tidal variations can be completely masked by variation of atmospheric pressures (particularly sea level increase with low atmospheric pressures).

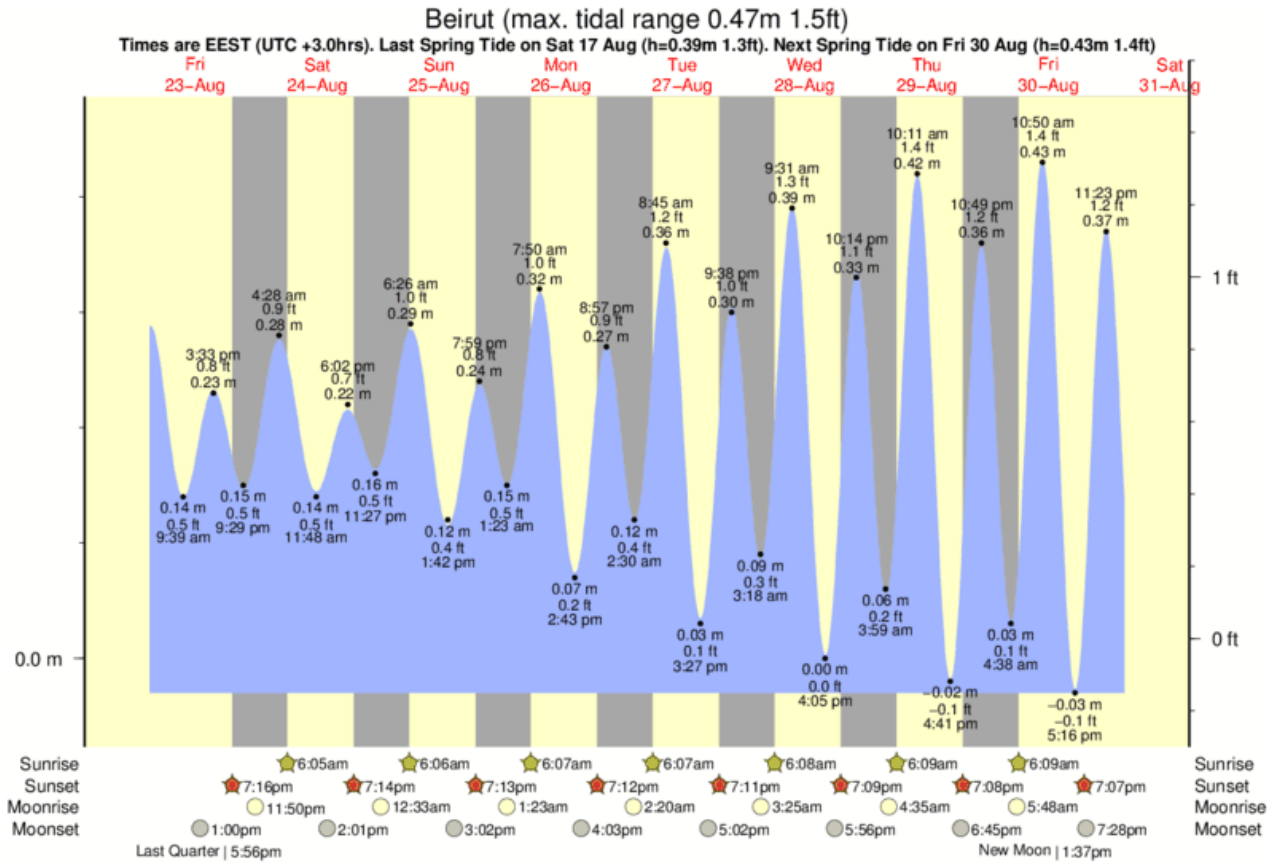
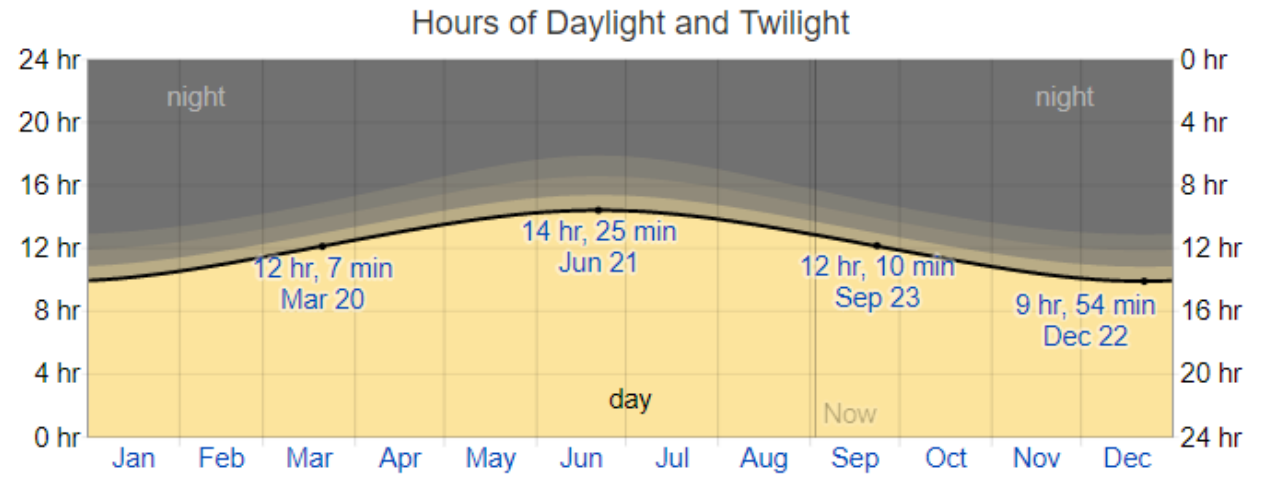


Figure 12 : Example of tide predictions for Beirut (Source: https://www.tide-forecast.com/locations/Beirut/tides/latest)

2.8 Sun

In 2019, the shortest day is December 22, with 9 hours, 54 minutes of daylight; the longest day is June 21, with 14 hours, 25 minutes of daylight.



The number of hours during which the Sun is visible (black line). From bottom (most yellow) to top (most gray), the color bands indicate: full daylight, twilight (civil, nautical, and astronomical), and full night.

Figure 13 : Daylight times - number of hours during which the Sun is visible for Beirut (Source: https://weatherspark.com/y/99217/Average-Weather-in-Beirut-Lebanon-Year-Round)

3. SPREADING & DRIFT OF HYDROCARBONS SPILLED AT SEA

3.1 Principles of slick drift

Rule of thumb: oil slicks moves at sea surface with 100% of current speed + 3 to 5% of wind speed.

- Oil moves at the same speed and direction as the current: 1 kt current moves oil at 1 kt.
- Oil moves at 3% of the wind speed in the same direction: 10 kts wind moves oil 0.03 kts. Stronger winds contribute more, up to 5%.

Example. A current of 2 kts to the East combined with a wind of 20 kts from the South creates a surface drift of 2.08 kts to the 73°, as illustrated in the figure below.

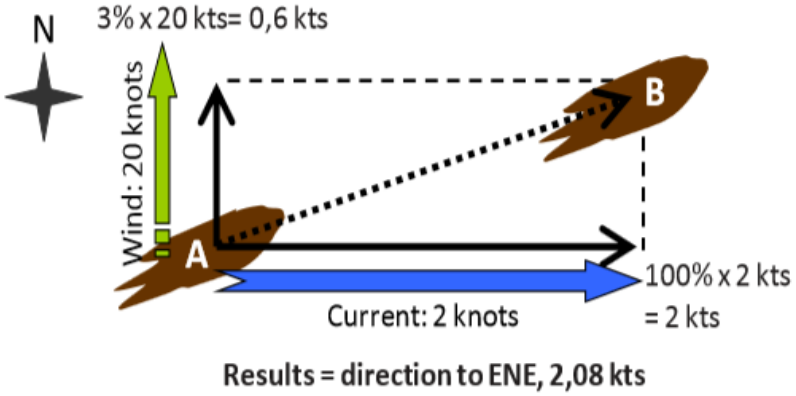


Figure 14: Oil spill drift at sea

3.2 Estimated slick drifting speed offshore

The average drifting speed of slicks are estimated in the table below, based on average currents and winds conditions for winter and spring (estimated period for the drilling).

Table 4: Average drifting surface speed and direction

CURRENT	WIND		DRIFT		DRIFT DISTANCE	
	Direction	Speed	Direction	speed	6hrs	24 hrs
To the north At 0.3 kts	From the south-west	8 kts	19°	0.5 kts	3 NM	12 NM
		15 kts	17°	0.7 kts	4.2 NM	17 NM
To the north At 1 kt	From the south-west	8 kts	8°	1.18 kts	7.1 NM	28 NM
		15 kts	13°	1.36 kts	8.2 NM	33 NM

Note. Due to the frequent eddies, it is not expected that oil will not drift in a straight line.

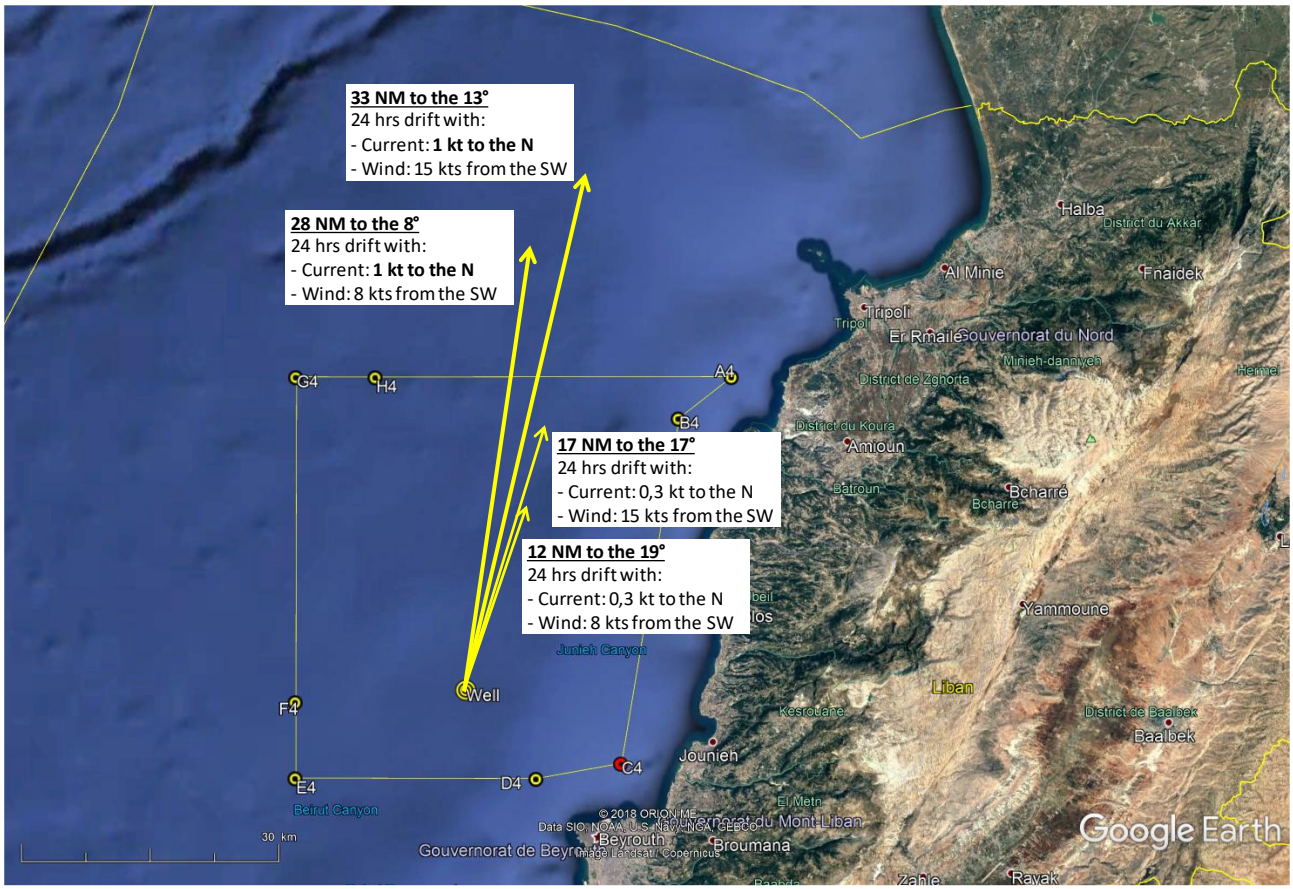


Figure 15 : Average offshore drifting surface estimated speed and direction (OTRA)

3.3 Spreading of oil spilled offshore

Rule of thumb: 80-90% of the oil is in 20-10% of the slick surface (for low to medium winds).

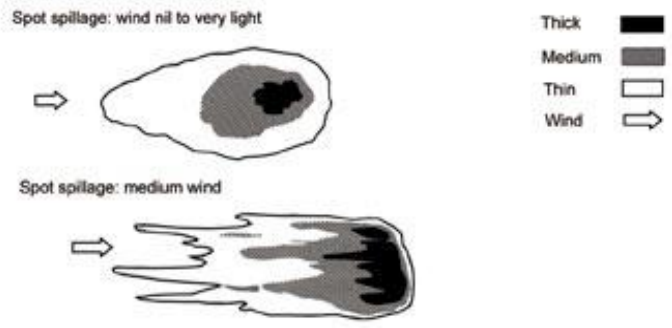
Spilled oil at the sea surface forms a slick spreading rapidly on the sea surface. The lighter the oil, the faster the spreading will be. In the next days, the slick breaks up (with the currents and winds). The slicks exhibit different colours, representative of the thickness of the oil.

Table 5. Shape of oil slicks depending on wind and current (figures: Cedre).

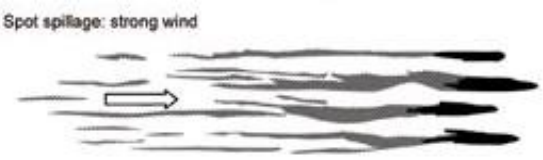
Heavy accumulations are usually found downwind. Thick slicks drift faster, and concentrate upwind, forming the leading edge.

They are followed by rainbow and silver sheens.

The shape of oil slicks can vary widely, depending on the local wind conditions.

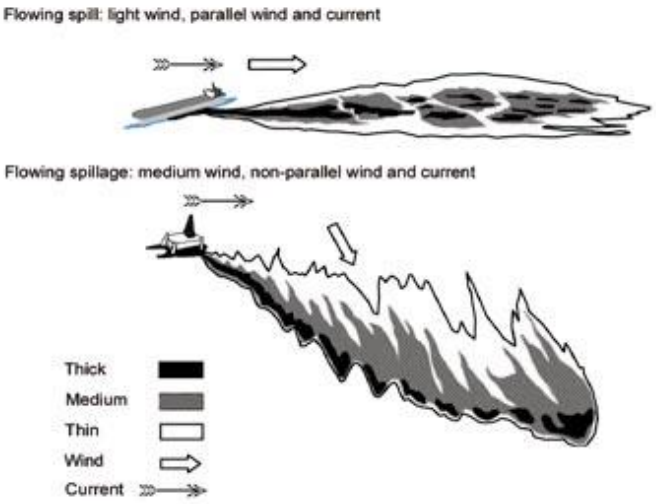


Above 10-15 kts, oil tends to form **windrows** (elongated strips due to Langmuir cell water circulation).



Above 20-25 kts, sea is rough, oil is partially dispersed, and slicks are not easily observed.

The combined directions of the current and wind also influence the distribution of thicker oil slicks.



The following table shows the dimensions of slicks and theoretical mini. / maxi. volumes for various thicknesses (based on the Bonn Colour Code).

Table 6: Coverage, thickness and min./max. volume of oil slicks (based on Bonn Colour Code)

Bonn Code	**Silver**	**Coverage**	**Min vol. m³**	**Max vol m³**
1	Thickness: 0.04 to 0.3 µm Volume: 0.04 to 0.3 m^3/km^2	0.1 x 0.1 km	0.0004	0.003
		1 x 1 km	0.04	0.3
		1 x 10 km	0.4	3
		5 x 50 km	10	75
		5 x 100 km	20	150
Bonn Code	**Rainbow**	**Coverage**	**Min vol. m³**	**Max vol m³**
2	Thickness: 0.3 to 5 µm Volume: 0.3 to 5 m^3/km^2	0.1 x 0.1 km	0.003	0.05
		1 x 1 km	0.3	5
		1 x 10 km	3	50
		5 x 50 km	75	1 250
		5 x 100 km	150	2 500
Bonn Code	**Metallic**	**Coverage**	**Min vol. m³**	**Max vol m³**
3	Thickness: 5 to 50 µm Volume: 5 to 50 m^3/km^2	0.1 x 0.1 km	0.05	0.5
		1 x 1 km	5	50
		1 x 10 km	50	500
		5 x 50 km	1 250	12 500
		5 x 100 km	2 500	25 000
Bonn Code	**True Colour discontinuous**	**Coverage**	**Min vol. m³**	**Max vol m³**
4	Thickness: 50 to 200 µm Volume: 50 to 200 m^3/km^2	0.1 x 0.1 km	0.5	2
		1 x 1 km	50	200
		1 x 10 km	500	2 000
		5 x 50 km	12 500	50 000
		5 x 100 km	25 000	100 000
Bonn Code	**True Colour Continuous**	**Coverage**	**Min vol. m³**	**Max vol m³**
5	Thickness: 200 and more µm (0.2mm) Volume: 200 and more m^3/km^2	0.1 x 0.1 km	2	Or more
		1 x 1 km	200	Or more
		1 x 10 km	2 000	Or more
		5 x 50 km	50 000	Or more
	True Colour Emulsified	**Coverage**	**Min vol. m³**	**Max vol m³**
	Thickness: 1 000 µm (1 mm) or more Volume: 1 000 m^3/km^2 or more	0.1 x 0.1 km	10	Or more
		1 x 1 km	1 000	Or more
		1 x 10 km	10 000	Or more
		5 x 50 km	250 000	Or more

Table 7: Coverage and volumes according to various appearances (based on Bonn Colour Code)

Group 2	Diesel Fuel Oil/ Marine gas oil	Area covered	Min. vol.	Max. Vol.
	Appearance: 100% of area covered by Rainbow sheens (Bonn Code 2) **Thickness:** 0.3 to 5 µm **Volume:** 0.3 to 5 m3/km^2	180 x 180 m	0.001 m^3	0.16 m3 (1 bbl)
		730 x 730 m	0.16 m3 (1 bbl)	2.66 m^3
		1.8 x 1.8 km	1 m^3	16 m^3
		4.1 x 4.1 km	5 m^3	85 m^3
		18.3 x 18.3 km	100 m^3	1675 m^3
Group 3	**Lubricating oil**	**Area covered**	**Min. vol.**	
	Appearance: 100% of area covered by True continuous colour (Bonn Code 5) **Thickness** of 200 µm (0.2mm) or more **Volume** of 200 m3/km2 or more	28 x 28 m	0.16 m3 (1 bbl)	
		70 x 70 m	1 m^3	
		225 x 225 m	10 m^3	

3.4 Appearance of oil on water and quantification – Bonn Colour Code

The dimensions of the slick and oil appearances within the slick are first assessed. As oil appearance can be related to an approximate oil thickness, knowledge of thickness and dimension allows to estimate (roughly) the volume of oil in the slicks.

Relation between oil appearance and slick thickness has been codified in various systems. Total uses the Bonn Agreement Oil Appearance Code (BAOAC), as shown in the table below.

See Operational Support 6: Instructions for OSRA Quantification tool.

Table 8. Bonn Agreement Oil Appearance Code.

CODE	NAME	PHOTO	THICKNESS	QUANTITY PER KM^2
1	Silver sheen		0.04 to 0.3 µm	0.04 to 0.3 m^3/km^2
2	Rainbow sheen		0.3 to 5 µm	0.3 to 5 m^3/km^2
3	Metallic appearance		5 to 50 µm	5 to 50 m^3/km^2
4	Discontinuous true colour		50 to 200 µm	0.3 to m^3/km^2
5	Continuous true colour		>200 µm	>200 m^3/km^2
6	Custom		1 mm	1,000 m^3/km^2 or more

Comments:

- It is considered that if thickness is less than 0.04 µm, oil is not visible.
- Codes 1, 2 and 3 (maximum thickness: 50 µm) represent very thin layers:
  - Response offshore may not be justified, as volume per surface unit is very low.
  - Slick of codes 1 & 2 weather naturally rapidly (hours-day).
- Codes 4 and 5 represent thicker layers, higher quantities of oil, requiring a response. It is therefore Important to **focus the response efforts** on these parts of the slick.
- Additional custom categories can be added to describe thick slicks (emulsified oil: 1 mm or more, or near-solid oil when pour point is above sea temperature, few mm's)

4. BEHAVIOUR OF HYDROCARBONS SPILLED AT SEA SURFACE

4.1 Principles of behaviour of oil spilled at sea

The physical and chemical changes that spilled oil at sea undergoes are known as **weathering**. Knowledge of these processes and how they alter the nature and composition of the oil with time is essential to adapt the response strategies.

Emulsification is a particularly important process as the water-in-oil emulsion has a greatly increased volume compared to the oil spilt, which can create problems for oil recovery and waste disposal. In addition, emulsions have higher viscosity and are less amenable to chemical dispersants.

Figure below illustrates the main weathering processes, and the following table provides a short description of each one.

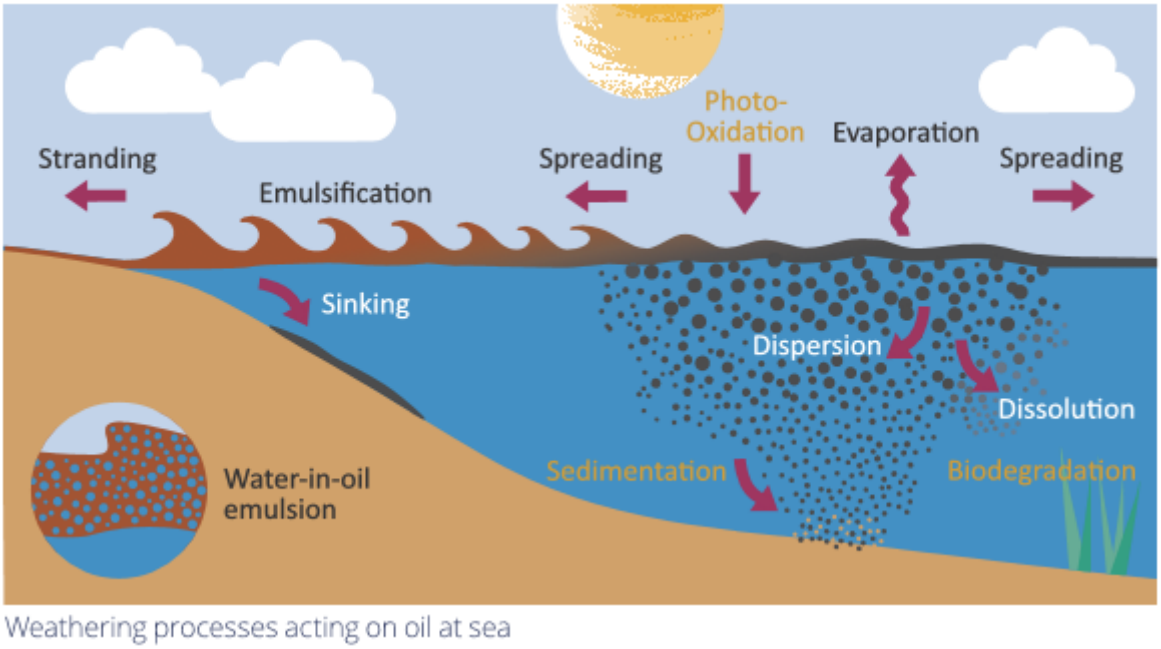


Figure 16: Weathering processes acting on spilled oil at sea (ITOPF, 2019)

Table 9: Weathering processes.

PROCESS	DETAILS
Drifting	Movement of oil at sea surface due to the combined effects of 100% current and 3% to 5% wind.
Spreading	Increase of the slick dimension as it spreads and thins on the sea surface.
Evaporation	Evaporation of lighter hydrocarbons from the slick to the atmosphere.
Photo-Oxidation	Chemical degradation reaction promoted by sunlight, leading to the formation of soluble products or persistent tars. Its overall effect on dissipation is minor.
Emulsification	Formation of water in oil emulsions, resulting in an increase in oil viscosity. Oils with a high asphaltene content are more likely to form stable emulsions. 0.5% to 1% asphaltene content is usually required for emulsification process.

PROCESS	DETAILS
Dispersion	The transport of oil from the sea surface into the water column as oil droplets due to breaking waves.
Dissolution	Process resulting in oil from the oil slick (or from suspended oil droplets) dissolving into the water column.
Sedimentation	Increase in density of oil, due to weathering and interaction with suspended sediments or biological material, leading to the sinking of the oil.
Biodegradation	Biological-chemical process altering or transforming hydrocarbons through the action of microbes.
Stranding or grounding	Impact of oil on the shoreline where it may strand on the surface, or become buried in layers, or may re-float and move elsewhere. The rate of weathering of stranded oil depends on several factors, in particular the amount of exposure to waves.

4.2 API oil groups: behaviour & potential impacts

Table 10: Weathering of the oil groups (American Petroleum Institute API Report 1146 – September 2013 and Cedre, 1993, Evaluation des risques de nettoyage des plages)

GROUP	EVAPORATION	SOLUBILITY	DISPERSION	VISCOSITY	SPREADING	ADHERENCE	SUBSTRATE	TOXICITY	ECO-TOXICITY
1 : Very Light °API> 45 **SG < 0.80** Light refined products : Jet-A1, Kerosene, distillates, oil…	In few hours Very volatile, Highly inflammable	Very high	Very high	Low	Very fast (sheens silver & rainbow)	None	Will penetrate substrates but not sticky	(Very) High by contact (transcutaneous product) and inhalation.	High acute toxicity to plants and animals. High content in aromatics (soluble and toxic) as well as toxic additives to oil. Fixation on Suspended Particle Matter.
2 : Light 35<°API< 45 **0.80 < SG < 0.85** (Very) light crude and refined products: Gasoil, domestique fuel, light lubrication oil…	High to complete in 1 or 2 days. Flash point > 50-60°C	High/ moderate	Easy and fast	Low to moderate	Very fast (not likely to form stable emulsion)	Low to medium	Will penetrate substrate, moderate stickiness	High by contact (transcutaneous product) and inhalation.	More bioavailable than Group 1 (longer persistence) so more likely to affect animals and plants. solubilisation of compounds in the water column and to natural dispersion of gas oil.
3 : Medium 17,5<°API< 35 **0.85 < SG < 0.95** Medium crude oil, marine gas oil, light oil with low emulsion, lubrication oil…	Up to 30-50% in 2 or 3 days	Medium	Only certain compounds	Moderate to high	Moderate to fast (can form stable emulsion)	High	Will not penetrate substrate deeply immediately, but possible over time	Limited, mainly by contact and spray inhalation	More bioavailable than Group 1 (longer persistence) so more likely to affect animals and plants
4 : Heavy °10< API< 17,5 **0.95 < SG < 1** Heavy crude, residual products (Bunker C.F.O. n°6), weathered/ emulsified oil…	Less than 10-20%	Low	Poor	High to semi-solid	Low to Medium (can form stable emulsion, tend to break into tar balls)	Very high	Will not penetrate substrate deeply immediately, but possible over time	Limited, mainly by contact and spray inhalation (ex. During high pressure clean-up operations).	Low acute toxicity to biota (except if blended with a lighter – more toxic, diluent) Can cause long term effects via smothering/ coating or as residues on or in sediments
5 : Residual °API<10 **SG > 1** Heavy residual, weathered oil.	Low to none	Very low	None	(Very) High to (semi-) solid	Very low. Sinks at sea.	Very high			

See *Operational Support 1: "Oil and Products"*

The volume of oil and water-in-oil emulsion remaining at the sea surface from an originally 100% spilled volume for each group is presented below. The initial volume increase is due to emulsification. The behaviour of a particular product may differ depending on its properties and the environmental conditions at the time of the spill (ITOPF, 2016).

High pour point oils of Groups 2 & 3 behave similarly to Group 4 oil at sea.

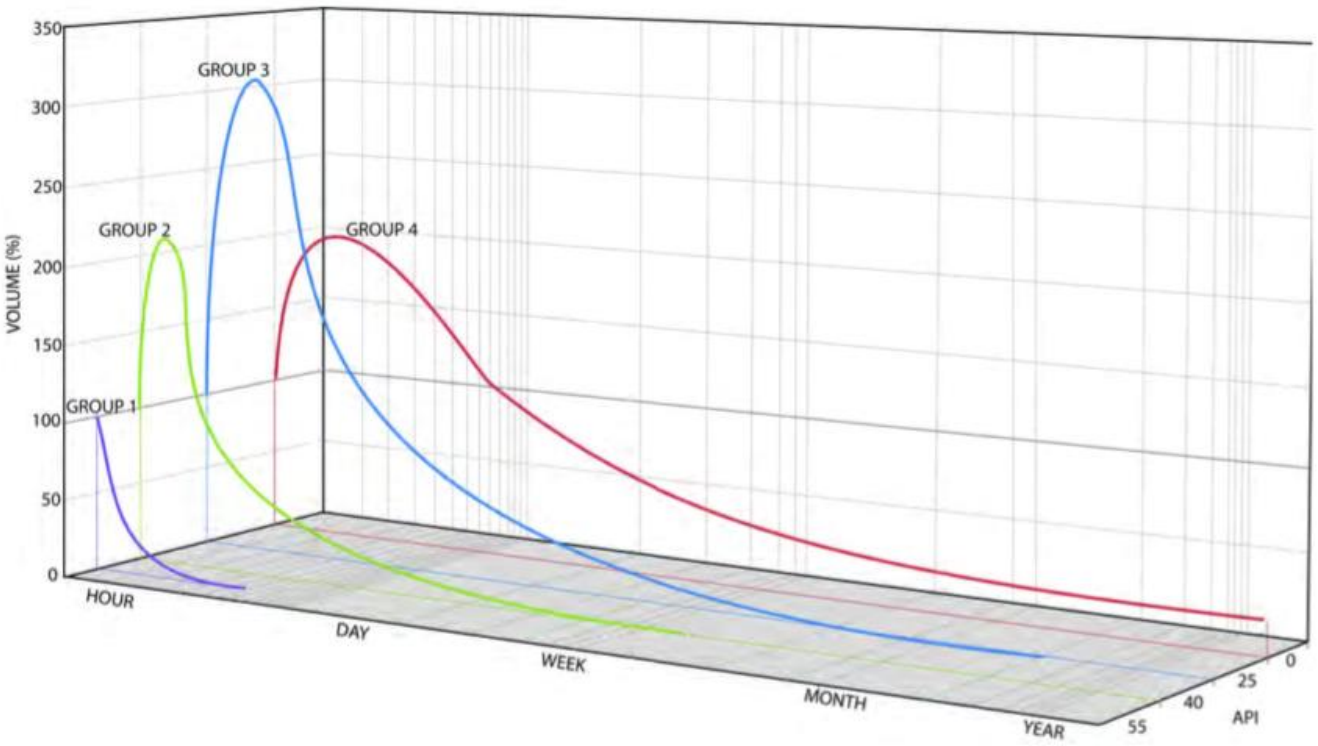


Figure 17. Volume of oil and water-in-oil emulsion remaining on the sea surface (Source: ITOPF 2016)

Table 11 summarizes the expected behaviour of refined products which could be spilled during the TEP Liban operations or encountered in the Block 4.

Table 11: Weathering of hydrocarbon products other than crude

Product	EVAPORATION	SOLUBILITY	NATURAL DISPERSION	SPREADING	ADHERENCE
JET-A1	Very high (>95% in 3-4 even if low wind)	High	Easy & fast	Very fast in thin slicks	Very low
Marine Gas Oil	High (>70-80% in 1 or 2 days)	High	Easy & fast (limited emulsion)	Very fast in thin slicks	Very low
Lubricating Oil (typical)	Low	Low	Low (emulsion likely)	Moderate to limited	Medium to high
Hydraulic Oil (typical)	Low	Low	Low	Limited	Medium

4.3 Oil fate at sea assumptions & modelling (ADIOS 2.0)

The behaviour of hydrocarbon products spilled at sea is studied, using Automated Data Inquiry for Oil Spills (ADIOS 2.0) software from the Office of Response and Restoration of the National Oceanic and Atmospheric Administration NOAA (U.S. Department of Commerce).

The software is freely available at http://response.restoration.noaa.gov/adios

ADIOS2 is an oil spill response tool which evaluates the mass balance of spilled oil at sea for the first 5 days: remaining at surface, evaporated, dispersed, viscosity, water intake, benzene airborne concentration etc.

Generic standard oils (library of +/-1000 documented oils) can be used e.g. Marine Gas Oil, Kerosene, Heavy Fuel Oil, Lubricating oil, etc. ADIOS 2 also allows creating custom oils.

The parameters influencing the oil behaviour in ADIOS are:

- The oil characteristics, chosen from the ADIOS database of standard oils or created as “Custom oil”;
- The wind conditions;
- The sea temperature and salinity;
- The type of release and amount spilled.

See Operational Support n°6: “ADIOS® 2 : Oil behaviour 5 days”.

Common modelling assumptions used here are:

- Wind:
  - 2 kts (Force 1 Beaufort),
  - 8 kts (Force 3 Beaufort),
  - 15 kts (Force 4 Beaufort)
- Sea surface temperature: 20°C (assumed as yearly average offshore)
- Salinity: 38 ppt (g/kg)
- Instantaneous release of 100 m3

4.4 Behaviour of condensate

HI 330/349 CONDENSATE, PHILLIPS condensate is selected from ADIOS 2.0 oil library.

HI 330/349 CONDENSATE, PHILLIPS
Location = none listed
Synonyms = none listed
Product Type = crude
API = 44.9
Pour Point = -65 deg C
Flash Point = 13 deg C
Density = 0.806 g/cc at 20 deg C
Viscosity = 4.9 cSt at 20 deg C

Model runs were carried out with the common parameters: water temperature & salinity, release volume and winds of 2, 8 and 15 kts.

Results are summarized below and displayed on the following pages for viscosity and budget.

Table 12:Summary of condensate behaviour split at sea on 5 days (ADIOS 2.0)

	Wind	Evaporation	Dispersion (natural)	Viscosity	Water content
All scenarios: **< 20-30% hydrocarbons remaining at surface after 2 days**	**2 kts**	> 50% in 12 hrs Maxi. 80% in 4-5 days	0 %	> 10 cSt in 6 hrs 100 cSt in 36 hrs 400 – 500 cSt in 4-5 days	10-15% in 1 day 25% in 2 days > 40% in 4 days
	8 kts	> 60% in 12 hrs Maxi. 70% in 4-5 days	Maxi. 7% in 4-5 days	> 10 cSt in 3 hrs > 100 cSt after 12 hrs > 1,000 cSt after 36 hrs Maxi > 10,000 after 4 days	30% in 6 hrs >50% in 12 hrs >80% in 2 days (probably over-estimated)
	15 kts & more	60% in 12 hrs Maxi. 65% in 4-5 days	Maxi. 16% in 4-5 days	> 10 cSt in 3 hrs 200-400 cSt in 6 hrs > 1,000 cSt after 12 hrs Maxi > 10,000 after 1 day	60% in 6 hrs Maxi 90% in 1 day (probably over-estimated)

/!\ Inflammation risk due to the initial evaporation.

Hydrocarbon spreading	Condensate freshly spilled will spread very rapidly at the sea surface in very large and thin slicks.
Slick appearance, thickness & break-up	Condensate appearance will be silver and rainbow (Bonn code 1 & 2, thinnest appearance of the Bonn Code), possibly Code 3 “Metallic” for the initial thicker accumulations. Slick will remain very thin in the first day (<5µm) and mainly evaporate. The slick will break-up rapidly with the currents and wind. Remaining Condensate at sea surface (not evaporated) may emulsify. Slick thickness will increase.
Hydrocarbon biodegradation	The biodegradation of dispersed condensate will be effective, occurring in days to week(s). Biodegradation of evaporated condensate is difficult to anticipate.

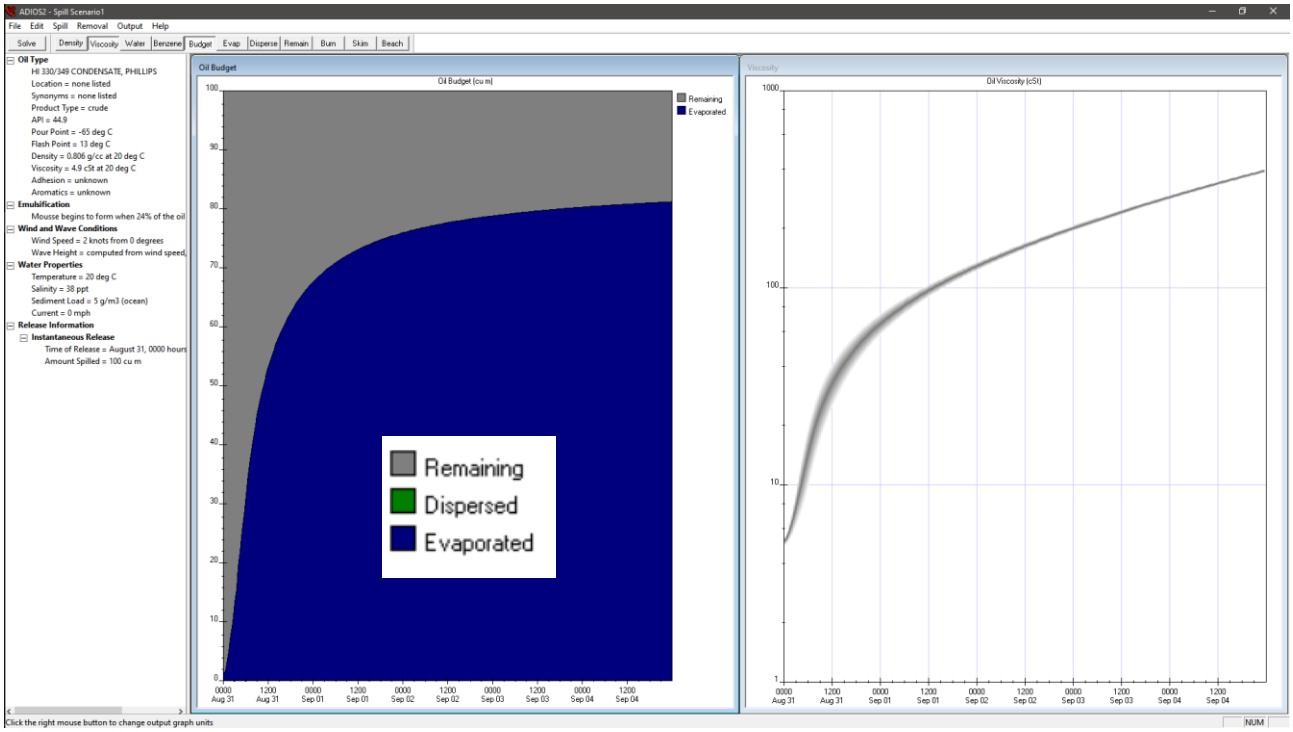


Figure 18 : ADIOS modelling of condensate behaviour on 5 days with 2 kts wind

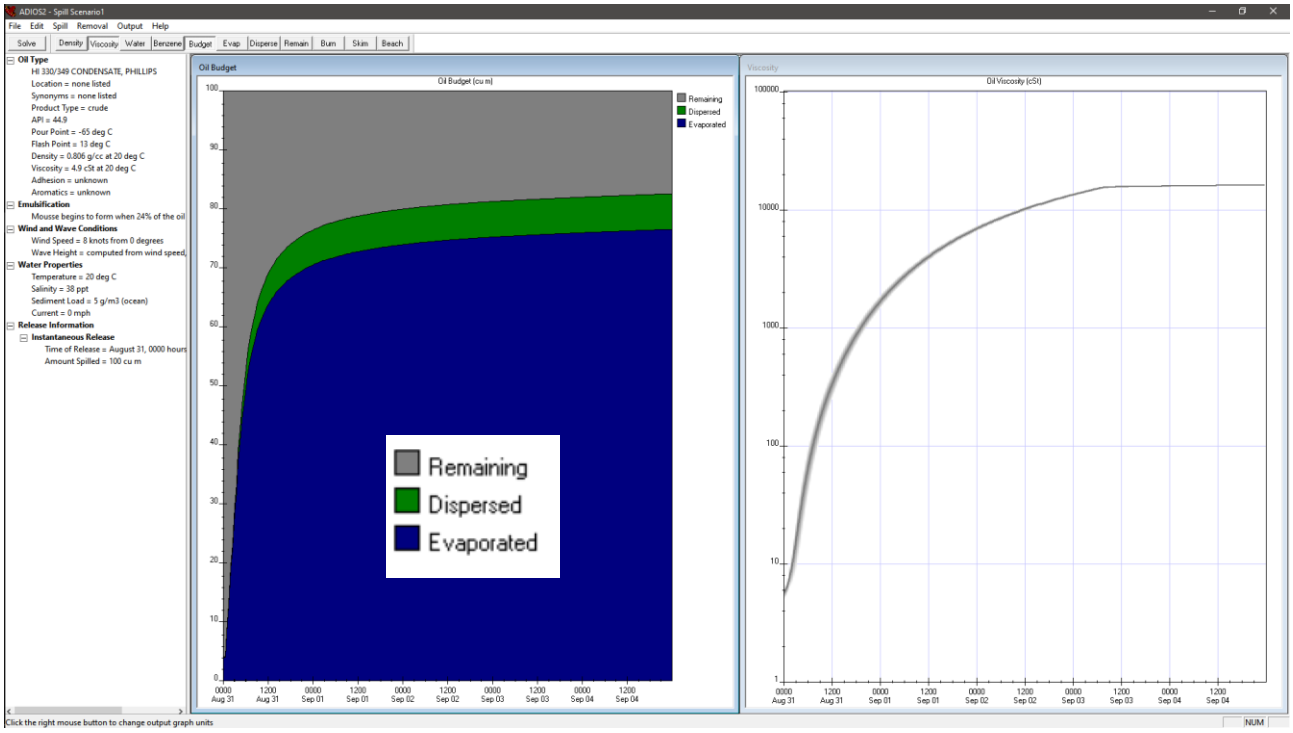


Figure 19 : ADIOS modelling of condensate behaviour on 5 days with 8 kts wind

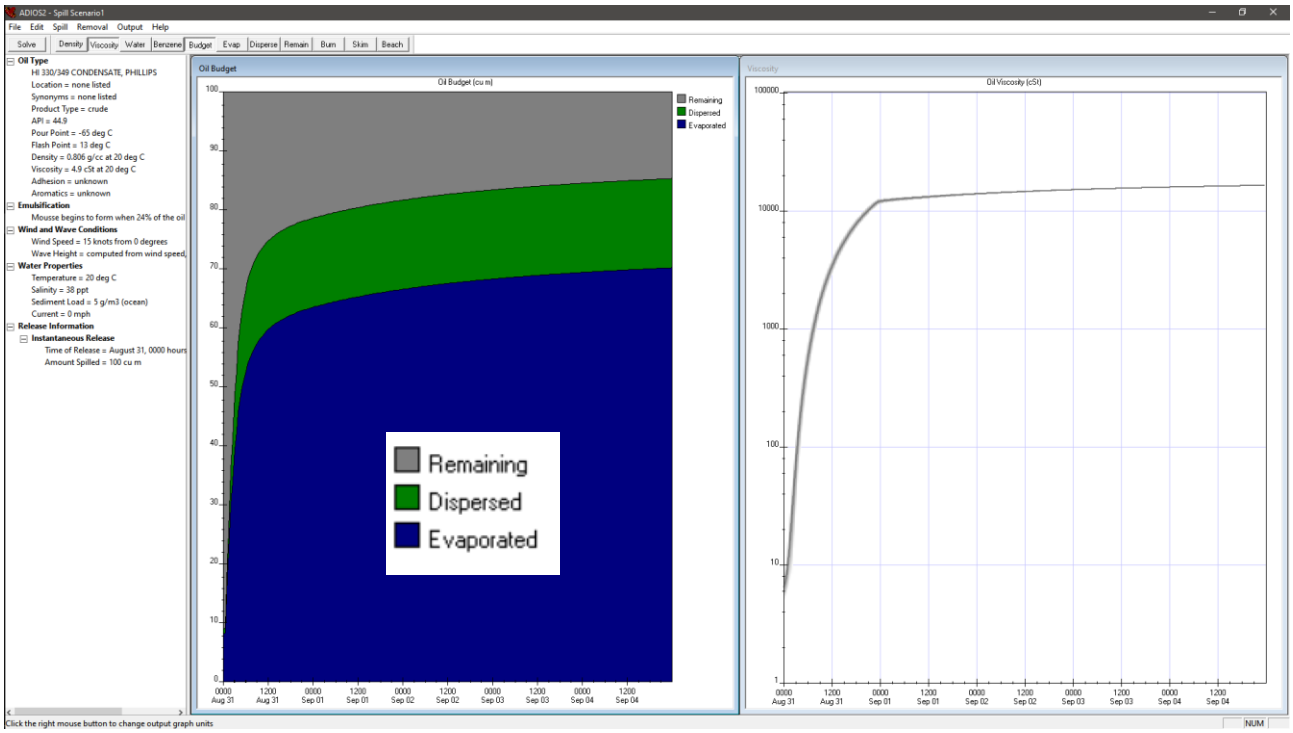


Figure 20 : ADIOS modelling of condensate behaviour on 5 days with 15 kts wind

4.5 Behaviour of Marine Gas Oil – MGO

DIESEL FUEL OIL (SOUTHERN USA 1994) is selected from ADIOS 2.0.

DIESEL FUEL OIL (SOUTHERN USA 1994)
Location = none listed
Synonyms = none listed
Product Type = refined
API = 37.2
Pour Point = -7 deg C
Flash Point = 70 deg C
Density = 0.850 g/cc at 0 deg C
Viscosity = 7.0 cP at 0 deg C
Adhesion = 0.09g/m2
Aromatics = 22 weight %

4 model runs were carried out with the common parameters: water temperature & salinity, release volume and winds of 2, 8 and 15 kts.

Results are summarized below and displayed on the following pages for viscosity and budget.

Table 13: Summary of Marine Gas Oil behaviour on 5 days (ADIOS 2.0)

	Evaporation	Dispersion (natural)	Viscosity	Water content
2 kts **50% at sea surface after 5 days**	20% in 12 hrs 30% in 24 hrs 50% in 4 days	0%	10 cSt in 2 days 10 – 20 cSt in 5 days	N/ A
8 kts **<5% oil at sea surface after 2 days**	30% in 12 hrs 35% in 4- 5 days	> 25% in 12 hrs > 50% in 24 hrs Maxi 65% in 5 days	10 cSt in 1 days Maxi 15-20 cSt in 4-5 days	N/ A
15 kts & more **No oil at sea surface after 12 hrs**	Maxi 20% after 6 hrs	Maxi 80% after 12 hrs	10 cSt in 12 hrs Maxi 10-15 cSt after 1 day	N/ A

/!\ Inflammation risk is not initially impossible with large spills and pooled oil due to the initial important evaporation and thick slicks.

Oil spreading	MGO freshly spilled will spread very rapidly at the sea surface in large and thin slicks.
Slick appearance, thickness & break-up	Oil appearance will mainly be rainbow and silver (appearance of the Bonn Colour Code). Some thicker patches (Metallic appearance) may be visible. Slick will remain very thin in the first day (<50µm) and evaporate. The slick will break-up rapidly with the currents and wind. Some oil may remain at the sea surface (wind <8 kts) and may emulsify. Slick thickness will increase.
Biodegradation	Biodegradation of dispersed MGO is effective, occurring in days to week(s). Biodegradation of evaporated MGO is difficult to measure.

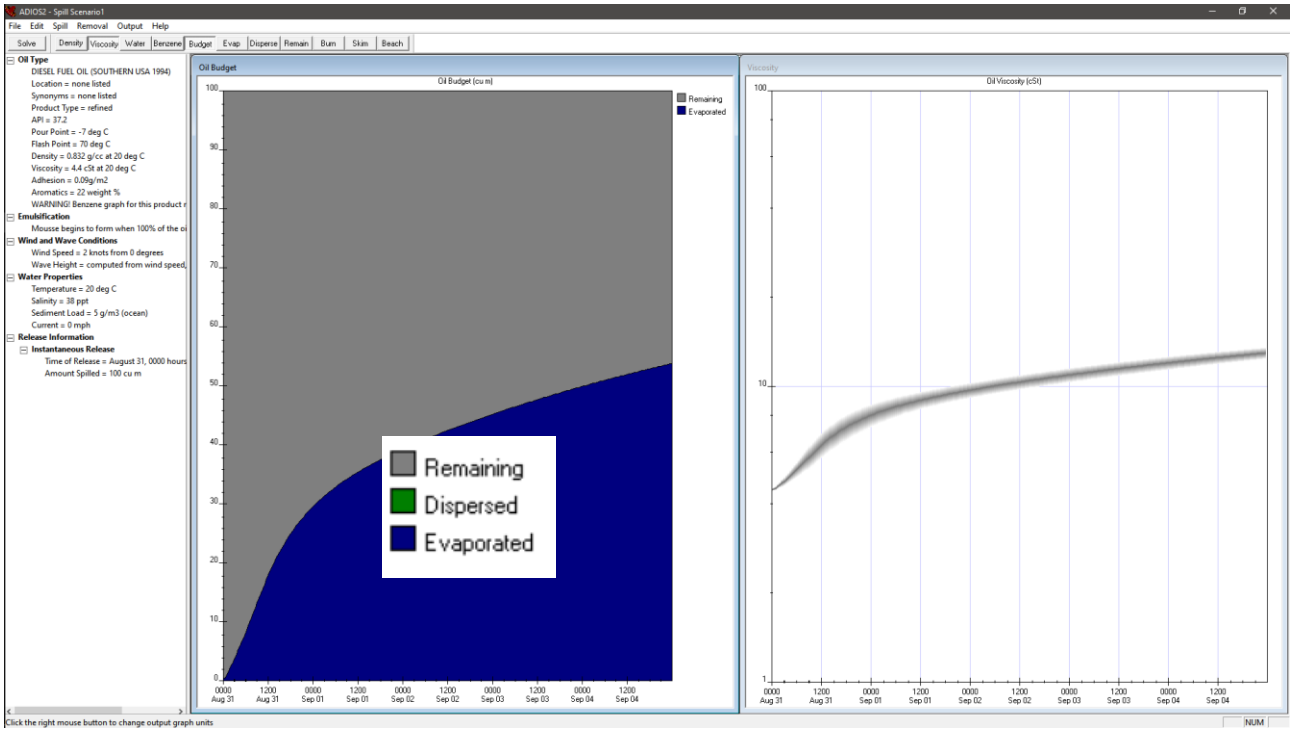


Figure 21 : ADIOS modelling of MGO behaviour on 5 days with 2 kts wind

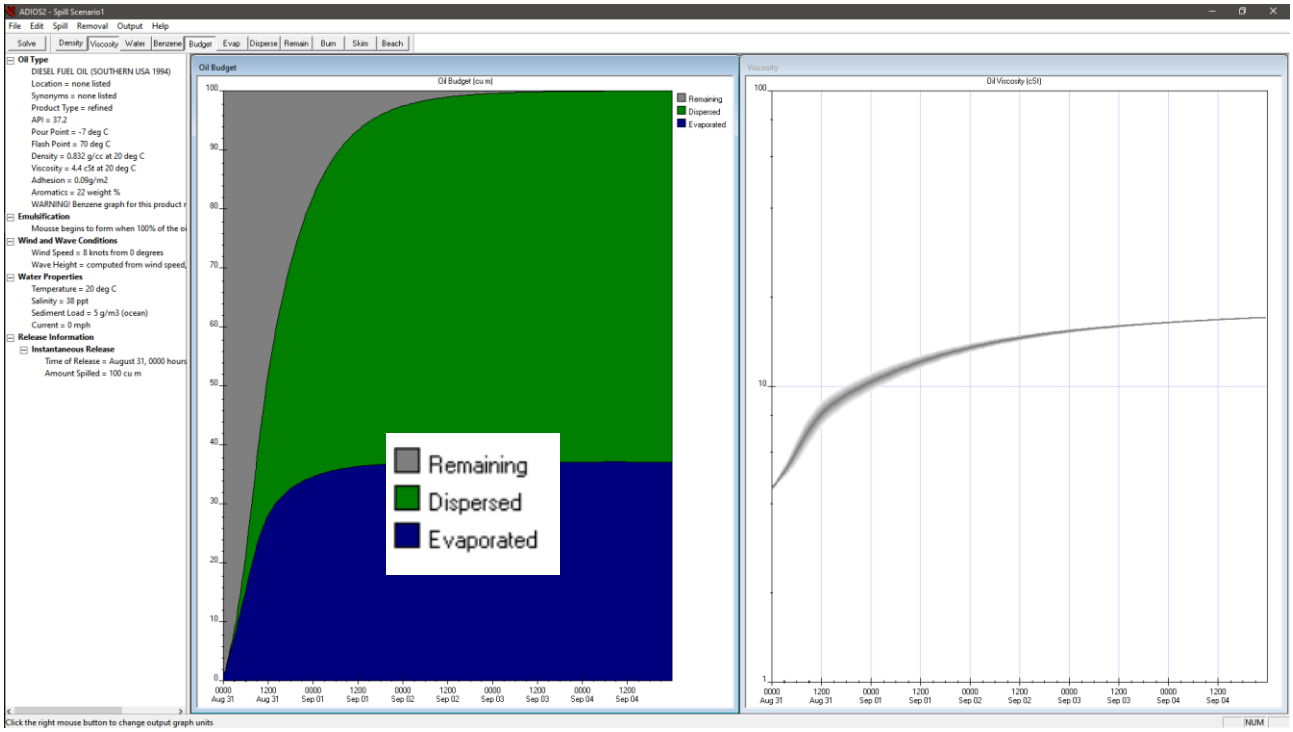


Figure 22 : ADIOS modelling of MGO behaviour on 5 days with 8 kts wind

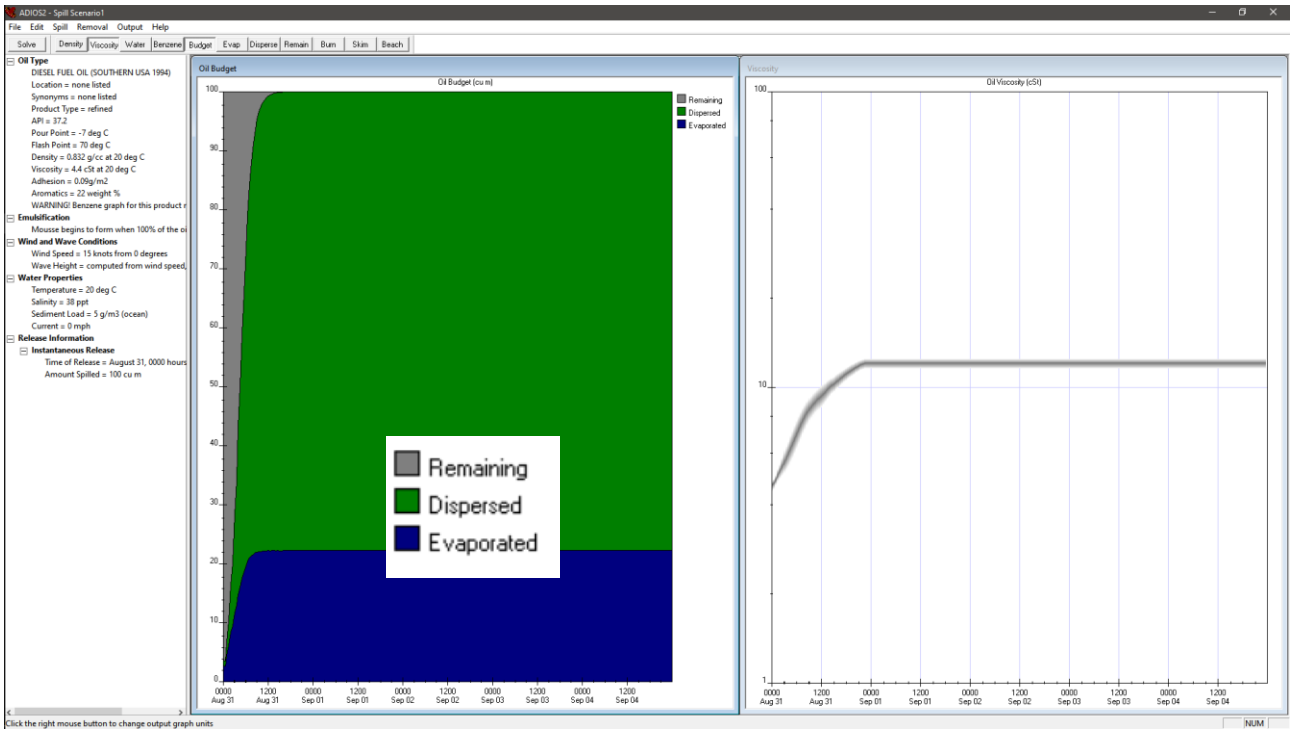


Figure 23 : ADIOS modelling of MGO behaviour on 5 days with 15 kts wind

Figure below (from other ADIOS modelling) demonstrates the key role of **winds above 8-10 kts** for the weathering of MGO (in 20°C sea water). MGO remains at the surface for more than 5 days in case of calm wind. In case of medium to strong winds, it mostly disperses and naturally evaporates within 12-24 hours.

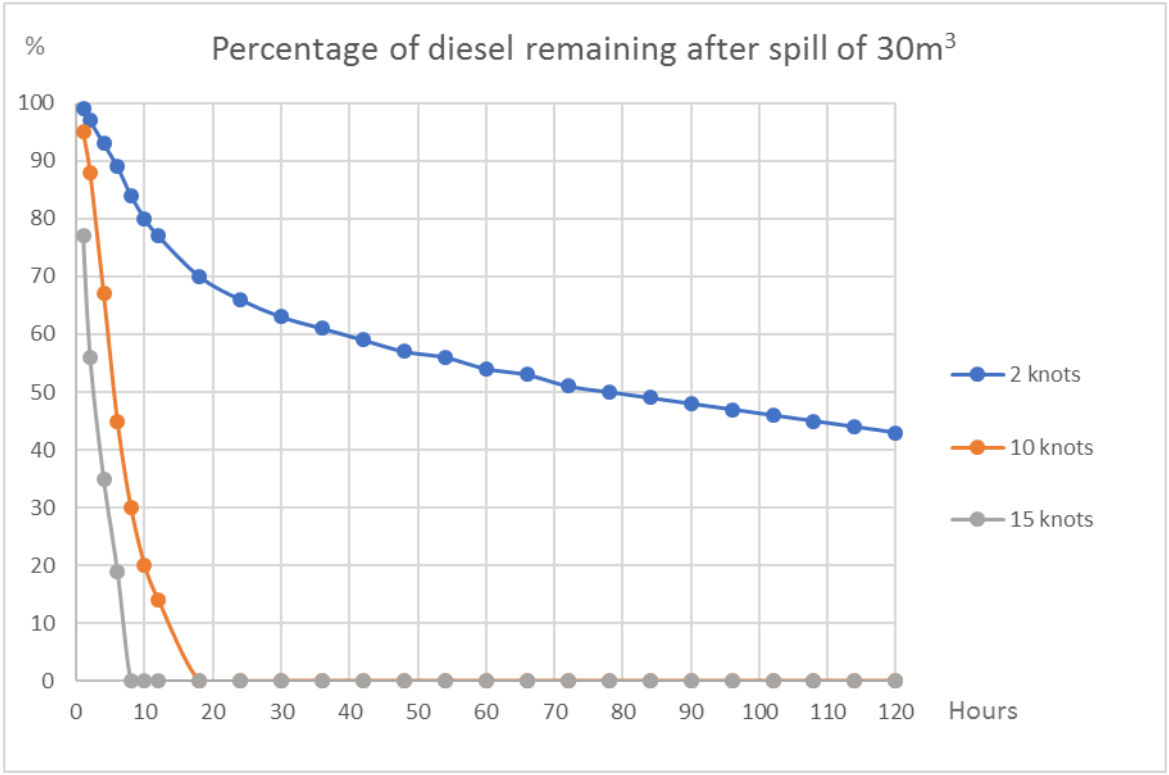


Figure 24 : Persistence of MGO at sea surface depending on the wind (from ADIOS results)

An experimental study in a wave tank[2], carried out by the BOEM (U.S.A.), also confirmed the rapid natural dispersion of MGO (and evaporation).

The weathering of MGO (Marine Gas Oil) from the Esso Slagen Refinery Norway was studied: density of 0.849 g/mL, corresponds to API° 35, flash point: 62°C, pour point: -36°C, viscosity: 7 mPas at 10°C

Experiment was carried out in a meso-scale flume basin:

- 4m diameter flume with 5 m3 water;
- Room temperature 10°;
- No artificial sun light simulated, so no photo oxidation;
- fans simulating an evaporation rate corresponding to a wind speed of 5-10 m/s at sea surface, and creating some water surface agitation;
- Oil sample of +/- 9 litres released;
- Weathering studied for three days.

Key results

"*During the meso-scale testing, most of the oil was easily naturally dispersed and diluted into the water column during the two days of weathering, and no dispersant agent was therefore applied onto the surface in the flume due to insignificant amount of available surface oil.*"

(…) *the MGO did not emulsify when mixed with seawater, where no water uptake during the testing in the rotational cylinders was measured*."

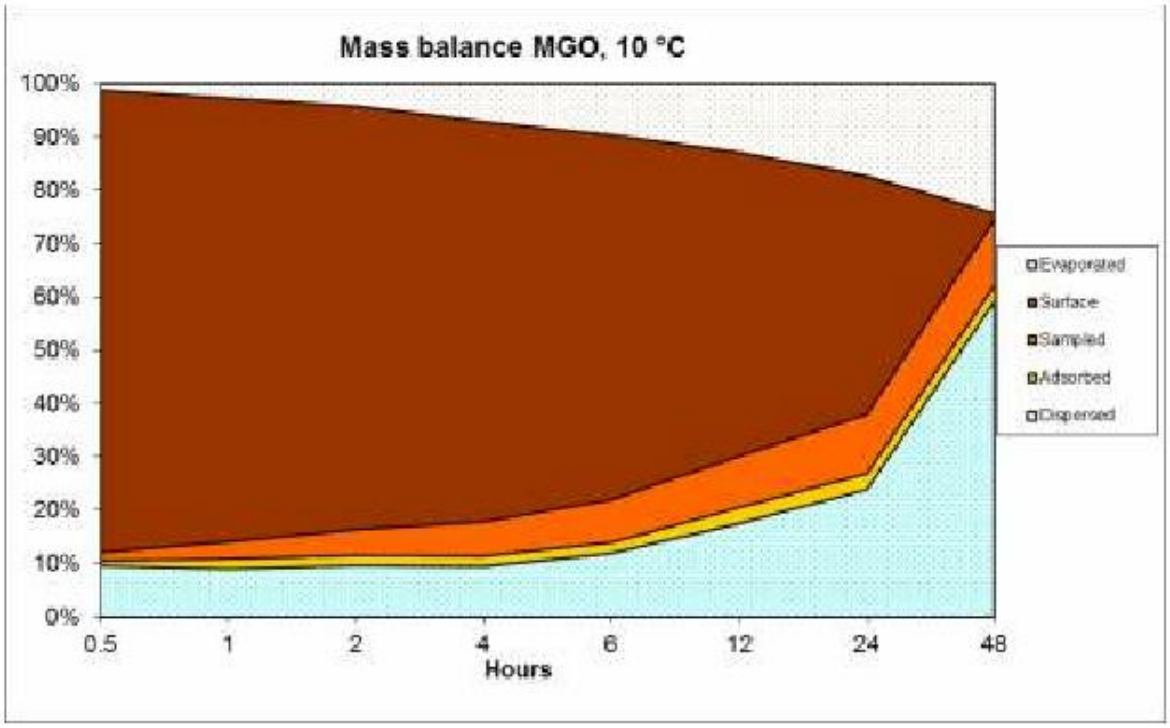


Figure 4.6. Estimated Mass balance for MGO in the meso-scale flume basin at 10°C.

[2] Sorheim, K.R. 2016. Physical and Chemical Analyses of Crude and Refined Oils: Laboratory and Mesoscale Oil Weathering. OCS Study BOEM 2016-062. Prepared by SINTEF Materials and Chemistryand SEA Consulting Group for USDOI, Bureau of Ocean Energy Management, Alaska OCS Region, Anchorage, AK. 106 pp. http://www.ntis.gov/products/publications.aspx

Visual observations of MGO

A selection of pictures taken during the flume experiment at 10 °C:

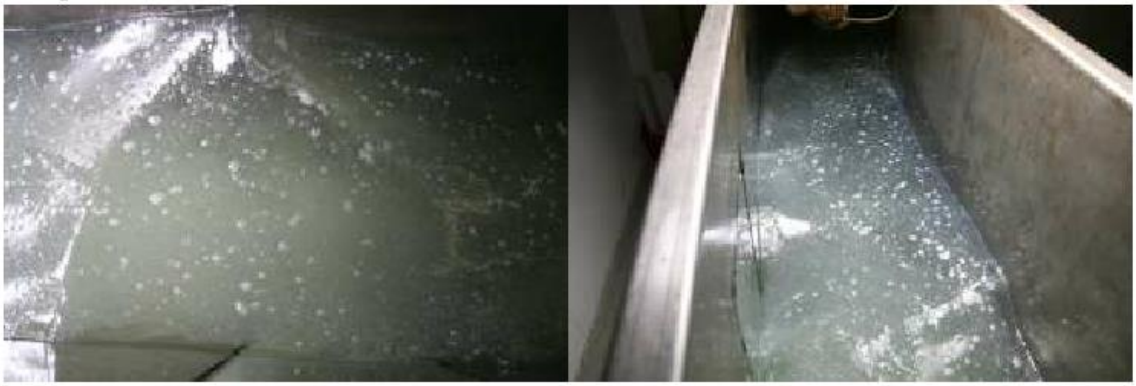
- Sample 0 (start): The MGO has a light yellow colour and spreads evenly on the surface in small "bubbles". MGO has a blue tint appearance/colour under the solar simulator.

Sample 0 - Application of MGO (note that the diesel appears blue with the solar simulator).

- Samples 1- 3 (0.5-2 hours): Light yellow colour. It was no emulsification and the MGO spread evenly on the surface. Some natural dispersion and some foam were observed.
- Sample 4 (4 hours): The yellow colouring becomes a little darker and more foam was observed. The oil sample has now formed a very loose "emulsion" that broke easily with very low viscosity.

Sample 3 – 2 hours

- Samples 5 - 6 (6-12 hours): Slightly darker yellow appearance/colour – some brown "bubbles".



Sample 5 – 6 hours

Sample 6 – 12 hours

- Sample 7 (24 hours): The water was now whiter /shady, and not much of the diesel remained on the surface and the "bubbles" of oil could visually be observed in the water column. The loose emulsion was a little harder to break, but still it breaks at the test temperature.

Sample 7 –24 hours

- Sample 8 (48 hours): No oil remained on the surface and no sampling was necessary.

Sample 8 –48h: no MGO left on the surface – no need for dispersant application.

4.6 Behaviour of drilling mud

Drilling muds have a density and composition adapted to drilling needs, especially to pressure and temperature of the substrate; and may change throughout the drilling process (Cedre).

Drilling mud

Cedre laboratory has illustrated the behaviour of common drilling mud (as shown in figure below).

- Drilling mud has (most of the time) a specific gravity above 1, and therefore sinks.
- In case of disturbance, a small portion of drilling fluid can be separated from the drilling mud and can re-float to form oily sheens at the sea surface.

Figure 25: Drilling muds behaviour tested in lab conditions (Source: Cedre)

Drilling fluid

Drilling fluid alone (EDC 170 SE for TEP Liban) has a behaviour comparable to MGO once spilled at sea; but is lighter, more biodegradable and less toxic.

4.7 Behaviour of Jet A1

JET A-1 (Maritime Safety Authority of New-Zealand[3]) is selected from ADIOS 2.0.

Oil Type
JET A-1, MARITIME SAFETY AUTHORITY OF NEW ZEALAND
Location = NEW ZEALAND
Synonyms = none listed
Product Type = refined
API = --
Pour Point = unknown
Flash Point = 39 to 45 deg C
Density = 0.792 g/cc at 27 deg C
Viscosity = 2.3 cSt at 27 deg C
Adhesion = unknown
Aromatics = unknown
WARNING! Benzene graph for this product may be unreliable.

4 model runs were carried out with the common parameters: water temperature & salinity, release and winds of 5, 10 and 20 kts.

Results are summarized below.

Table 14: Summary of Jet A1 on 5 days (ADIOS 2.0)

	Wind	Evaporation	Dispersion (natural)	Viscosity	Water content
All scenarios: No oil at surface after 2 days (15kts winds: no oil after 6 hrs)	**2 kts**	40% in 6 hrs 80% in 12 hrs >95% after 1 day 100% after 2 days	0%	10 cSt in 6 hrs Maxi 50 – 60 cSt after 1 day	N/ A
	8 kts	80% in 6 hrs Maxi 95% in 12 hrs	Maxi >5% in 12 hrs	Maxi 50 – 60 cSt in 12 hrs	N/ A
	15 kts & more	Maxi 80% in 6 hrs	Maxi 20% in 6 hrs	Maxi 60 cSt in 6 hrs	N/ A

/!\ High inflammation risk due to the initial evaporation.

[3] JET A-1 documented by the Maritime Safety Authority of New-Zealand is selected from the ADIOS 2.0 library of oil, as best match of r Jet A-1 fuel.

4.8 Airborne concentration of VOC & Benzene

Airborne concentration of VOC (particularly BTEX) is a health hazard for operators and responders.

Benzene (B of BTEX) is a human carcinogen. Occupational Exposure Limits (8 hours Time Weighted Average TWA[4]) for Benzene is < 1.0 ppm (< 3.25 mg/m3). No exposure is acceptable without protection below 1 ppm for oil spill response.

The odour threshold in air is estimated at 1-12 ppm (3.2 - 39 mg/m3) (Source: Recommendation from the Scientific Committee on Occupational Exposure - Limits for benzene, SCOEL/SUM/140, December 1991, European Commission).

ADIOS 2.0 can model airborne concentration of benzene at 1 m elevation above the slick for the first 5 days.

The following figure illustrates the results for an instantaneous spill of condensate with 5, 10 and 20 kts wind and 100 m3 released in open sea.

/!\ In all cases, initial airborne concentration is above 1ppm in the first 6 hrs and may reach 10 ppm in calm winds. Protection is required for responders in the slick area.

/!\ During a blow-out, levels may remain high around the hydrocarbons surfacing area.

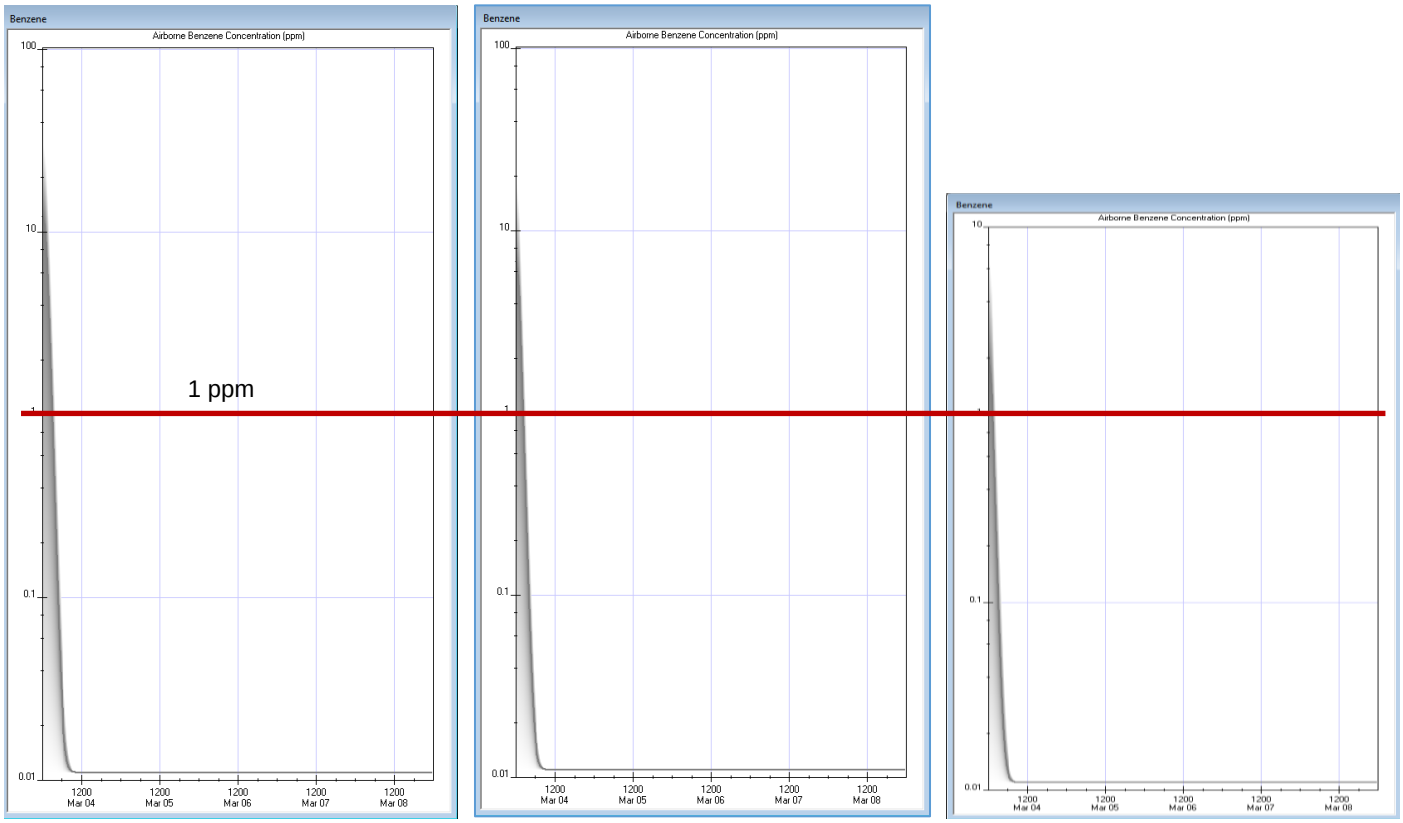


Figure 26 : Airborne concentration of Benzene for 100 m3 spill of condensate in winds of 5 kts (left), 10 kts (centre) and 20 kts (right)

Refined products contain less VOC and aromatics. Initial benzene concentration remains under 1 ppm with MGO and Jet-A1 (refined product) in open spaces; but may exceed 1 ppm in confined/ closed spaces.

[4] The TWA for the exposure to a chemical can be used when both the chemical concentration and time for exposure varies over time. It is thus used as the average exposure to a contaminant to which workers may be exposed without adverse effect over a period such as in an 8-hour day or 40-hour week (an average work shift). They are usually expressed in units of ppm (volume/volume) or mg/m3 (Source : European Commission)

4.9 Concentration of oil in water after dispersion according to slick thickness

The table below shows the concentration of hydrocarbons in the water column (in ppm) of different slick thickness (according to the Bonn Code) dispersed in 1m, 2m or 5m of water.

Table 15: Concentration of dispersed hydrocarbon in water according to water depth and slick thickness.

BONN COLOUR CODE	BONN APPEARANCE	CONCENTRATION AFTER DISPERSION (PPM)		
		In 1m depth	In 2m depth	In 5m depth
1	**Silver** Thickness: 0,04 to 0,3 µm Volume: 0,3 to 5 m^3/ km^2	0,04 to 0,3 ppm	0,02 to 0,15 ppm	0,008 to 0,06 ppm
2	**Rainbow** Thickness: 0,3 to 5 µm Volume: 0,3 to 5 m^3/ km^2	0,3 to 5 ppm	0,15 to 2,5 ppm	0,06 to 1 ppm
3	**Metallic** Thickness: 5 to 50 µm Volume: 5 to 50 m^3/ km^2	5 to 50 ppm	2,5 to 25 ppm	1 to 10 ppm
4	**True colour dis-continue** Thickness: 50 to 200 µm Volume: 50 to 200 m^3/ km^2	50 to 200 ppm	25 to 100 ppm	10 to 40 ppm
5	**True colour continue** Thickness: 50 to 200 µm Volume: 50 to 200 m^3/ km^2	200 ppm	100 ppm	40 ppm

5. BEHAVIOUR OF HYDROCARBONS DURING A BLOW-OUT

In case of a blow-out, a high-velocity jet of oil, gas, water, and sediment will be ejected through the well head. Figure below provides an illustration of general hydrocarbon pathways during a blow-out.

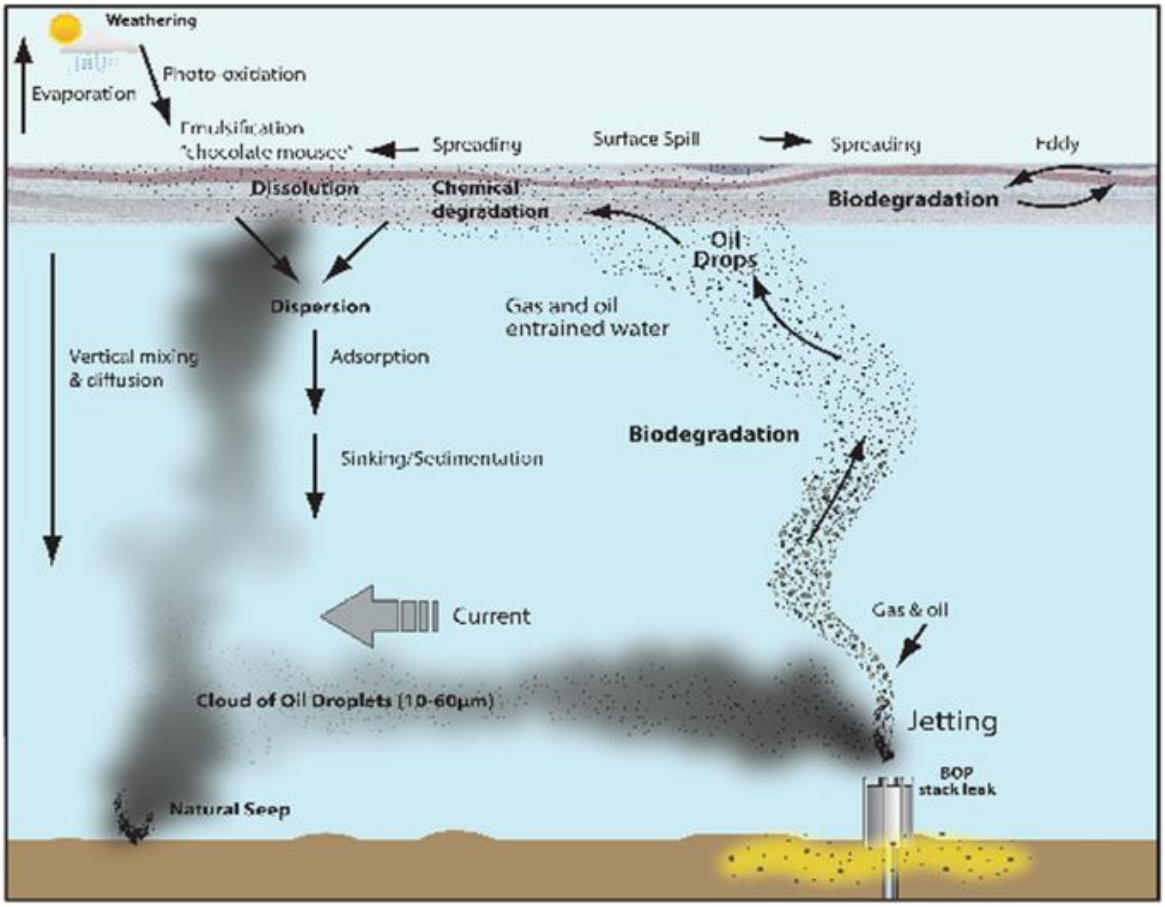


Figure 27 : Behaviour of oil during a deep-sea blow-out in oceanic waters (Source : Marine Oil Biodegradation, Environmental Science Technology, T. C. Hazen, R. C. Prince & N. Mahmoudi)

Potential hazards at the hydrocarbon surfacing area include:

- **Fire/ explosion hazard** with the surfacing of non-stabilized hydrocarbon. Risk is considered very low to nonsignificant once condensate has spread into a thin slick at the surface.
- **VOC & BTEX** evaporating. Risk is considered very low due to the small amount of condensate expected.
- **H2S.** Hydrocarbon may contain H2S. Considered non applicable for Block 4.

Air quality monitoring is always carried out immediately and continuously around the surfacing area.

For a gas/condensate deep blow-out, following assumptions are made based on modelling and studies.

- Gas naturally disperses in the water column and does not reach the surface.
- Some condensate naturally disperses in the water column (during the rise to the surface) with expected rates higher than for crude oil, e.g. 20-30% or more.
- First hydrocarbons surface approximately 2-3 hours after the start of the blow-out.
- Hydrocarbons surface with an offset of few 100's m to over 1 km from the well head depending on the currents in the water column.

6. OIL PROPERTIES & OFFSHORE SPILL RESPONSE TECHNIQUES

Possible response techniques at sea include:

- **Monitored Natural Attenuation – MNA;**
- **Chemical dispersion at sea surface and deep-sea (Sub-Sea Dispersant Injection SSDI);**
- **Mechanical dispersion;**
- **In-Situ burning**;
- **Mechanical recovery**.

Their applicability depends on the characteristics of the hydrocarbons. Monitored Natural Attenuation (i.e. natural dispersion and biodegradation of hydrocarbons at sea) is discussed in the next section.

6.1 Chemical dispersion at sea & subsea

Condensate and MGO are considered “non-persistent” oil:

- Condensate mainly evaporates.
- MGO evaporates and/or disperses depending on the speed of the wind and sea surface agitation. MGO spills are also of a limited volume (compared to blow-out situations).

An extract from the IPIECA good practice guide, 2016 “Dispersant: surface application” regarding the properties of oil and their dispersibility is provided as background information in Appendix:

”Oil density, pour point viscosity and effectiveness of response techniques”, p.53.

Surface spill

Surface dispersant spraying on condensates is not a valid option. Similar applies to MGO spills.

It is recognized that: “*Dispersants are ineffective on condensate spills as they will 'herd' the sheen rather than promote the formation of droplets in the water column*” (Source: ITOPF, 2018, http://www.itopf.org/knowledge-resources/documents-guides/condensates/). Dispersant spraying on condensate would also result in a massive over-dosage of product dispersant, waste of money, time and logistics support, and a useless release of chemical product in the environment.

Blow-out & SubSea Dispersant Injection SSDI

SSDI is not considered in the base case response in case of a blow-out situation; as condensate will partly disperse in the water column naturally, and the remaining will weather art the sea surface, assisted by response operations as needed[5].

Worst Credible Blow Out Rate for TEP Liban in Block 4 is 12.31 Million Sm3/day of gas and 1,562 bbl/day of condensate (approximately 250 m3).

6.2 Mechanical mixing by vessels

Mechanical mixing of hydrocarbons at the sea surface is efficient for (very) light products (Groups 1 and 2). The process naturally occurs in medium to strong winds with the waves. It can be enhanced by the vessels

[5] However, the mobilizaiton of the SSDI remains possible, as an option in case of unforeseen situation, to limit the surfacing oil.

when waves are insufficient (by the combined actions of bow waves and propellers, sometimes completed by the Fire Fighting system).

MGO spill

MGO evaporates, and mainly disperses with winds of 10-15 kts or more.

The natural dispersion of MGO can be enhanced by the vessels in low to medium winds (less than 10 kts) where natural dispersion is much less effective.

Condensate spill

Condensate evaporates very rapidly and releases VOC's.

Mechanical dispersion is not considered initially (and may not be safe). It may be a complementary technique to increase the dispersion of condensate after the initial evaporation.

6.3 Recovery of weathered hydrocarbons at sea

Group 3 & 4 (and some Group 2) oils can be recovered at sea using floating booms to concentrate the oil, increase its thickness, and skimmers to pump the contained oil. Fluid oils and slightly weathered oils (not too viscous) are easily pumped.

The containment of weathered, very viscous oil with offshore boom is not considered more difficult compared to fresh/ fluid oil. However, they are more difficult to pump.

Condensates evaporate very rapidly (90% or more in 12 hrs). Natural evaporation is more effective than any spill response technique, and safer. After 12-24 hrs, some heavier compounds may remain at the surface (and possibly emulsify). Recovery operations may be needed.

Recovery of weathered remaining condensate may be considered; and should be comparable to weathered light/ medium oil from an operational point of view.

MGO does not usually need recovery when spilled offshore, as the product disperses naturally and evaporates, or is mechanically mixed and dispersed by vessels (in low winds conditions).

6.4 Burnability of hydrocarbons at sea

Burning of crude oil at sea is a possible option.

"*…Fuel, oxygen, and heat are required for oil to ignite. In the event of an oil spill, the oil vapours provide the fuel to support combustion. Fresh oil will typically ignite once an ignition source is applied. As oil vapour burns, the heat causes more vapours to be released, known as vaporization. The vaporization process of oil must be sufficient to yield steady-state burning, in which vaporization and burn rates are relatively the same…*"[6]

However, burning of condensate would require the containment of fresh condensate (which is a hazardous operation due to the volatile nature of condensate and most probably an ineffective operation due to the fast spreading of condensates); and would be very difficult to control.

Therefore, burning of condensate is not a valid option.

[6] Controlled in-situ burning of spilled oil. Good practice guidelines for incident management and emergency response personnel, IPIECA IOGP, 2016, 52 p.

7. BIODEGRADABILITY OF HYDROCARBONS AT SEA

Based on previous Total E&P studies[7], the biodegradability of light/ medium crude oil totally dispersed in warm open sea environment is estimated as “good”, i.e. superior to 50% (but also rarely considered superior to 60-70%).

Biodegradability of condensates spilled at the sea surface and dispersed in the water column, is inferior (potentially “poor”, i.e. less than 20%) compared to crude (although condensates are lighter hydrocarbon products). This is due to the rapid evaporation of the lighter condensate compounds (the most easily biodegraded) which leaves only the heavier/ more complex compounds in the marine environment, also more resistant to biodegradation, hence the limited biodegradation.

During a blow-out, dispersed condensates rise in the water column; and biodegradation rates may be increased.

Biodegradability of MGO is considered “very good” (superior to 80-90%), being a refined product with very limited heavier/ complex hydrocarbon compounds.

Biodegradation of hydrocarbons at sea is briefly presented in the Appendices:

“Error! Reference source not found.”, p.Error! Bookmark not defined.

[7] Example : WEATHERING STUDY OF THE N’KOSSA & DJENO CRUDE OILS IN SIMULATED CONGOLESE WEATHER CONDITIONS Cedre final report. R.09.35.C / 5219 JG/KD October 2010

8. KEY RESULTS OF MODELLING STUDY

A modelling study has been carried out by Total in order to better understand the fate and behavior of spilled oil at sea. The technical report showing the results is available Ref. HSE/EP/ES/ENV–2019_45.

Three scenarios were considered in this study, two presenting a continuous release of 1562 bbl/day of condensate, for different release durations (i.e. Scenario 1 with a release duration of 90 days, and Scenario 2 with a release duration of 21 days), and a third scenario presenting an instantaneous release of 6,000 m3 of MGO at the well location (i.e. Scenario 3).

9. APPENDIX

9.1 API oil groups and their characteristics for response

Table 16 : API oil groups and their characteristics for response (Source: American Petroleum Institute, September 2013 - Report 1146)

Group 1: Gasoline products • Specific gravity is less than 0.80; API gravity >45 • Very volatile and highly flammable • Evaporate and dissolve rapidly (in a matter of hours) • Narrow cut fraction with no residues • Low viscosity; spread rapidly into thin sheens • Will penetrate substrates but are not sticky • High acute toxicity to animals and plants
Group 2: Diesel-like Products and Light Crude Oils • Specific gravity is 0.80-0.85; API gravity 35-45 • Moderately volatile and soluble • Refined products can evaporate to no residue • Crude oils can have residue after evaporation is complete • Low to moderate viscosity; spreads rapidly into thin slicks; not likely to form stable emulsions • Are more bioavailable than lighter oils (in part because they persist longer), so are more likely to affect animals in water and sediments
Group 3: Medium Crude Oils and Intermediate Products • Specific gravity of 0.85-0.95; API gravity 17.5-35 • Moderately volatile • For crude oils, up to one-third will evaporate in the first 24 hours • Moderate to high viscosity; will spread into thick slicks • Are more bioavailable than lighter oils (because they persist longer), so are more likely to affect animals and plants in water and sediments • Can form stable emulsions and cause long-term effects via smothering or coating
Group 4: Heavy Crude Oils and Residual Products • Specific gravity of 0.95-1.00; API gravity of 10-17.5 • Very little product loss by evaporation or dissolution • Very viscous to semi-solid; may be heated during transport • Can form stable emulsions and become even more viscous • Tend to break into tarballs quickly • Low acute toxicity to biota • Penetration into substrates will be limited at first, but can increase over time • Can cause long-term effects via smothering or coating, or as residues on or in sediments
Group 5: Sinking Oils • Specific gravity of >1.00; API gravity <10 • Very little product loss by evaporation or dissolution • Very viscous to semi-solid; may be heated during transport or blended with a diluent that can evaporate once spilled • Low acute toxicity to biota (though may have some toxicity if blended with a lighter, more - toxic diluent) • Penetration into substrates will be limited at first, but can increase over time • Can cause long-term effects via smothering or coating, and as residues on or in sediments

9.2 Oil density, pour point viscosity and effectiveness of response techniques

Present section is an extract from the IPIECA Good Practice Guide, 2016 “Dispersant: surface application”.

The physical properties of the oil that have a major influence on the effectiveness of all response techniques are density, pour point and viscosity.

Density

The density of an oil, measured as specific gravity (the weight in relation to fresh water) or degrees API, provides an overall categorization of oil type. Oils are commonly placed into four groups by their density. Group 1 oils are described as very light and are largely non-persistent. Group 4 oils are very heavy, with 2 and 3 being the intermediaries. In some classifications a fifth group of extremely heavy oils, with a propensity to sink, are defined. Knowledge of the oil density provides responders with a broad indication of how an oil may behave and which response techniques may be effective.

Pour point

Oil that is at a temperature significantly (10 to 15°C) below its pour point will be semi-solid and will not flow. This has implications for mechanical recovery devices and shoreline clean-up methods but also indicates that dispersant use is unlikely to be successful, as it cannot penetrate into a semi-solid oil and will be washed off.

Viscosity

This is an important property with implications for all response techniques. Very high viscosity oils can be corralled in booms, but some types of skimmer require that the oil flows towards them, and their effectiveness and efficiency can be low with high viscosity oils and emulsions. High viscosity oils can also be difficult to pump. Igniting oils that have lost their lighter fractions through evaporation may be challenging, particularly if the oil is emulsified (i.e. high water content), limiting the effectiveness of controlled in-situ burning.

The viscosity of spilled oil changes with time as it ‘weathers’, influencing the effectiveness of dispersants on floating oil. As the viscosity of a floating oil increases with time, the probable effectiveness of dispersant use will decline. This is often known as the ‘window of opportunity’ for dispersant use. This window is temperature dependent.

There is no universally-accepted oil viscosity limit beyond which dispersants are deemed to be ineffective; this will depend on many factors such as the dispersant used, the nature of the oil and the prevailing conditions. General guidelines on the probable effectiveness of dispersant and oil viscosity are shown in Table below.

Oil type/viscosity	Dispersant effectiveness
Light distillate fuels (petrol, kerosene, diesel oil)	Dispersant use not advised These oils will evaporate and naturally disperse quite rapidly in most conditions.
Oils with viscosity up to 5,000 cSt	Dispersant use is likely to be effective
Oils with viscosity between 5,000 and 10,000 cSt	Dispersant use might be effective
Oils with viscosity above 10,000 cSt	Dispersant use is likely to be ineffective (though success is reported on oils with viscosity greater than 20,000 cP)

Table 17: The impact of oil viscosity on dispersant effectiveness (IPIECA, 2016). Efficiency will decrease from 5000 to 10000 cSt.

Effect of water salinity on dispersant effectiveness

Most commercially available dispersants have been formulated to be most effective in seawater with a salt content (salinity) of 30 to 35 psu (practical salinity units). The effectiveness of these dispersants will be decreased in brackish waters (salinity of 5 to 10 psu) and can be very low in fresh water. See Figure below.

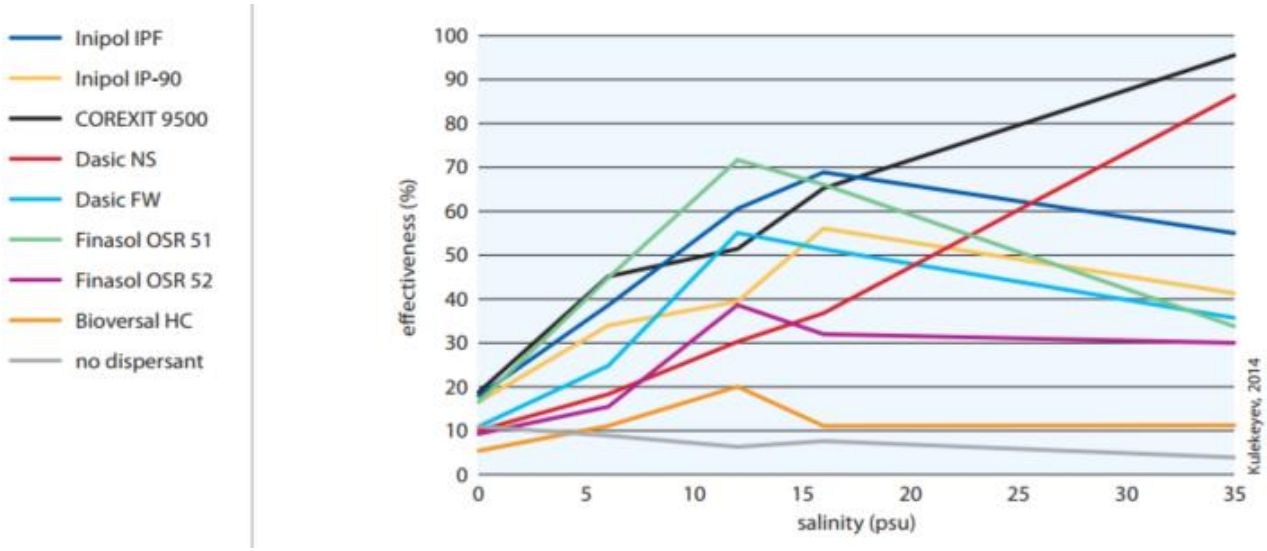


Figure 28 : Figure 7 Effect of salinity on dispersant effectiveness in a laboratory test using eight products(IPIECA, 2016)

9.3 Sea breeze and land breeze

Source: https://climate.ncsu.edu/edu/Breezes

"…

A sea breeze describes a wind that blows from the ocean inland towards land. This breeze occurs most often in the spring and summer months because of the greater temperature differences between the ocean and nearby land, particularly in the afternoon when the land is at maximum heating from the sun.

During the day, the sun heats up both the ocean surface and the land. Water is a good absorber of the energy from the sun. The land absorbs much of the sun's energy as well. However, water heats up much more slowly than land and so the air above the land will be warmer compared to the air over the ocean. The warm air over the land will rise throughout the day, causing low pressure at the surface. Over the water, high surface pressure will form because of the colder air. To compensate, the air will sink over the ocean. The wind will blow from the higher pressure over the water to lower pressure over the land causing the sea breeze. The sea breeze strength will vary depending on the temperature difference between the land and the ocean.

At night, the roles reverse. The air over the ocean is now warmer than the air over the land. The land loses heat quickly after the sun goes down and the air above it cools too. This can be compared to a blacktop road. During the day, the blacktop road heats up and becomes very hot to walk on. At night, however, the blacktop has given up the added heat and is cool to the touch. The ocean, however, is able to hold onto this heat after the sun sets and not lose it as easily. This causes the low surface pressure to shift to over the ocean during the night and the high surface pressure to move over the land. This causes a small temperature gradient between the ocean surface and the nearby land at night and the wind will blow from the land to the ocean creating the land breeze…."

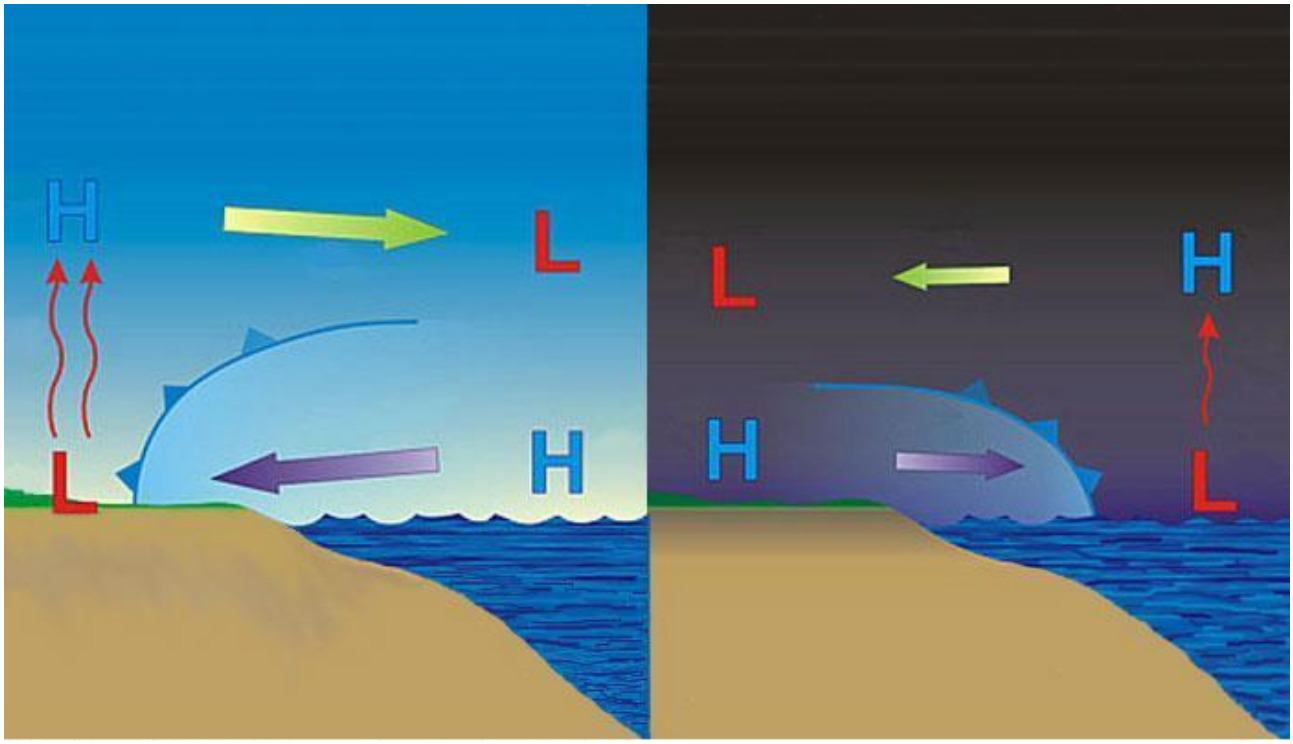


Figure 29 : Model of a day sea breeze cell (left) and night land breeze (right)

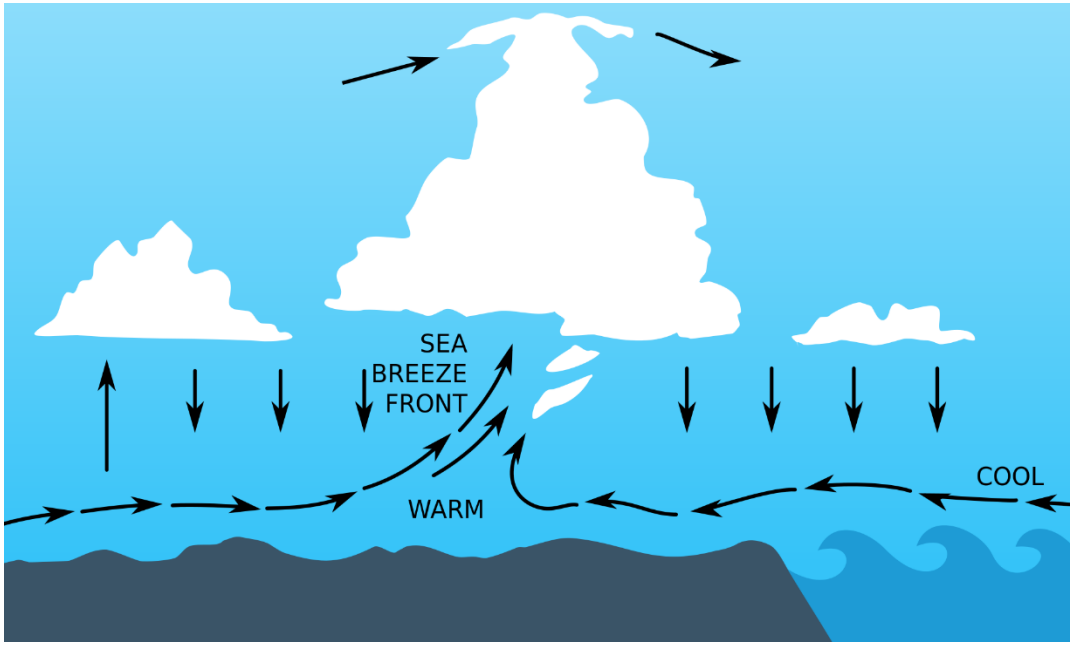


Figure 30 : Schematic cross section through a sea-breeze front. If the air inland is moist, cumulus often marks the front (https://en.wikipedia.org/wiki/Sea_breeze)

OIL SPILL CONTINGENCY PLAN

OPERATIONAL SUPPORT N°4:

OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES & COORDINATION

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	**Date**	**Description**
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

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Markings:

/!\ Warning

🗎 *Link to other documents of the TEP Liban OSCP*

ⓘ *Link to external document or information, not part of the TEP Liban OSCP*

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1. OFFSHORE RESPONSE – PROCESS OVERVIEW

Steps to develop and implement an Incident Action Plan for offshore spill are outlined, based on:

Vol 1.1 "Action Plan for TEP Liban Tier 2 & 3 spills", section 4: "Management of oil spill response"

Logical steps	*Corresponding sections, next pages*
COLLECTION OF FACTS ON SITUATION	"Situation & facts, Assessment & Predictions"
ASSESSMENT OF SITUATION & PREDICTIONS	
IDENTIFICATION OF IMMEDIATE & POTENTIAL IMPACTS ACCORDING TO P.E.A.R.L.	"Identification of immediate & potential impacts – PEARL"
STAKEHOLDER MAPPING & EMERGENCY ORGANIZATION	"Stakeholder mapping"
DEFINITION OF RESPONSE OBJECTIVES TO ADDRESS THE IMPACTS	"Definition of response objectives and strategy"
DEFINITION OF RESPONSE STRATEGY TO ACHIEVE THE OBJECTIVES	
DEFINITION OF TACTICS TO IMPLEMENT THE STRATEGY	"Summary of applicable OSR techniques" "Definition of offshore response tactics"
VALIDATION OF INCIDENT ACTION PLAN	"Writing and validation of the Incident Action Plan"
IMPLEMENTATION OF INCIDENT ACTION PLAN & MOBILIZATION OF EXTERNAL ASSISTANCE	"Implementation of IAP & Mobilization of external assistance"

1.1 Situation & facts, Assessment & Predictions

IMT/ Planning section collects facts to establish a shared image of the incident; proposes an assessment of the situation and issues predictions. **Information (facts) on the incident, site conditions and on-going operations** are used to issue **predictions** (modelling); but are clearly differentiated one from the others.

Tableau 1 : Facts and predictions to develop an offshore spill response Incident Action Plan

FACTS ON SITUATION	▶	ASSESSMENT & PREDICTIONS
1 – **POLLUTANT**		
Nature of hydrocarbon product	▶	Hydrocarbon (Gas? Condensate? crude? other?).
	▶	MSDS? Risks? Toxicity? Flammability?
Source of spill	▶	Location of source? Status: on-going / stopped?
2 – **SLICK, VOC & OBSERVED DRIFT**		
Location of slick at time "t" after incident. Observed wind & current.	▶	Observed drift speed & direction from the source? Consistent with wind and current observed on site?
Dimension and shape of slick. Oil appearance in slick.	▶	Relation between wind/current and shape/appearance of slick.
Gas &/ or VOC cloud extent & location. Observed wind.	▶	Observed cloud drift & atmospheric dispersion. Need for exclusion area &/ or protection.
Location of other assets, vessels, limits of blocs, coast…	▶	Immediate risks?
Location of thick slicks.	▶	Response targets for vessels and aircrafts.
3 – **VOLUME & BEHAVIOUR**		
Volume spilled estimated with onboard instrumentation. If not, facts on slick dimensions + oil appearance.	▶	Evaluation of Min. & Max. volume of oil spilled: - Directly from on board instrumentation, - &/ or from visual observations (Bonn Colour Code).
Observed appearance & behaviour of hydrocarbons. Observed wind & current.	▶	Weather forecast. Behaviour & mass-balance for next day(s). Window of opportunity for Mixing? recovery operations? Other
4 – **DRIFT PREDICTION**		
Slick position. Drifting buoy positions. Observed wind & current.	▶	Weather forecast. Drift for next 12-24 hrs using OSRA tool. Risks for other assets, activities and vessels etc.?
	▶	MetOcean wind & current modelling at +5 & more days. Drift + Mass balance for next 5+ days using OSCAR model. Risk for further assets, activities, coast etc. on pathway?
5 – **DIRECT CAUSE AND RISK OF ESCALATION**		
Direct cause of incident and status of spill. Situation: under control/ Downgraded/ out of control?	▶	Spillage stopped and controlled? Risk of escalation, increase of volume spilled and need to plan response for worst case?
*6 – **TIMELINE OF EVENTS***		
Timeline of slick position, events and response etc.	▶	*Event log and reporting.*
*7 – **CAUSE ANALYSIS***		
To carry out ASAP.	▶	*Risks? Review of strategy?*

For detailed information, see:

Section "MONITORING & MODELLING OF HYDROCARBONS SPILL AT SEA", p.14.

1.2 Identification of immediate & potential impacts – PEARL

Based on the facts & predictions, the impacts are identified using the PEARL approach, i.e. impacts on:

- **P**eople;
- **E**nvironment & general activities and human use;
- **A**ssets & Activities of TEP Liban;
- **R**eputation and
- **L**iability.

Immediate impacts are identified based on observations.

Potential impacts are identified based on predictions, often for a +12 to +24 hrs period and then for +2-4 days.

Generally, for spills occurring in Block 4, and considering MGO and condensates:

- Tier 1 spill will not affect the coast of Lebanon or other country.
- Tier 2 spill may affect the coast of Lebanon (larger Tier 2 spills and unfavourable winds) in limited area and with minor to none-significant overall consequences.
- Tier 3 spill and blow-outs may affect the coast of Lebanon to varying degree.

MGO spills from PSV close to the coast or in Beirut port may also affect the coast.

1.3 Stakeholder mapping

IMT/ Planning (Resources unit) establishes the organization chart of the IMT, of the teams on site (drilling rig, logistics base, vessels, helicopters & other as needed).

Positions, names and contact details are added on the organization chart, as well as links and main contacts with Total H.Q. and key external organizations (authorities, OSRL, etc.).

1.4 Definition of response objectives and strategy

Incident Commander defines the **offshore response objectives** (what should be achieved to address the spill impacts?), based on proposals from the IMT/ Planning section.

Operation & Planning sections define the **strategies** to achieve the objectives, i.e. the **general plan to accomplish the incident objectives**. Strategy usually focuses on pollutant monitoring, reduction of impacts on people, environment (including usage and activities) and assets and activities of TEP Liban.

Actions to maintain reputation and limit the liability of TEP Liban are managed by the CMC.

Following table proposes some objectives and strategies, for Tier 2 to 3 spills, to adapt for each incident.

	OBJECTIVES	STRATEGY
People: health & safety	- Avoid the contact of personnel with the pollutant. - Ensure the health and safety of responders and close crew/ operators immediately at risk during the response.	- No contact with pollutant. Limit VOC inhalation (first 24-48 hours mainly). - Simplified Job Risk Analysis for specific operations if new risks are considered (ex. night operations).
Monitoring of pollutant	- Maintain an up-to-date knowledge of pollutant across all environmental compartments. - Update all forecast and predictions (drift, behaviour of oil etc.). - Update identified probable/ potential impacts.	- Monitoring (aerial & surface) + sampling. - Drift & behaviour modelling. - Overall oil mass balance.
Environment, Human-use and economic activities	- Reduce the volume of pollutant at sea, threatening the coast, as soon as and as effectively as possible. - Limit volume of oil groundings. - Limit the perturbation of maritime and coastal activities.	**OFFSHORE RESPONSE** - Enhance natural degradation/ dispersion of pollutant at sea - if possible. - If needed, recover weathered oil at sea, and/ or close to the shore (before groundings).
	- Limit the impact on/ allow rapid restoration of fishing activities.	
	- Avoid oil groundings on sensitive sites/ resources, parks, protected areas, ports, coastal cities, etc. - Avoid oil impacts on vulnerable species.	**PROTECTION** *Operational Support n°7*.
	- Limit impacts on shoreline, habitats & fauna. - Facilitate restoration of habitats & ensure a rapid recovery of biodiversity & biomass.	**SHORELINE CLEANUP** *Operational Support n°7*.
	- Limiter impacts/ allow rapid return to normal human-use of the shore and nearshore (frequentation, leisure, artisanal fishing etc.). - Limiter impacts/ allow a rapid return to normal socio-economic activities.	
	- Manage all oily waste (from offshore and shoreline response).	**OILY WASTE MANAGEMENT** *Operational Support n°7.*
	- Monitor & document the restoration of species, habitats & ecosystems.	**ENVIRONMENTAL IMLPACT MONITORING**
TEP Liban assets & activities	- Ensure TEP Liban business continuity, and limit business perturbations.	- Implement actions to ensure business continuity.
TEP Liban reputation	- Maintain the reputation of TEP Liban with: - Authorities and partners. - public in–country and affected communities. - national media.	- Identify all involved stakeholders that are/ may be involved through a comprehensive mapping. - Ensure a continuous, transparent communication with the key national and local stake holders and partners. - Set-up mechanisms to be able to listen to the concerns of the public and those affected. - Set-up a media/ communication strategy to demonstrate the fast and effective response set-up by TEP Liban.
	- Maintain the reputation of TEP Liban with neighbouring countries. - Limit the volume of oil drifting out of Lebanese waters, to limit transboundary operations.	- Develop relations with national authorities of neighbouring countries (through Lebanese authorities). - Re-enforce at sea response before oil drifts out of Lebanese waters.
TEP Liban liability	- Limit the financial/legal exposure of the affiliate. - Ensure a reasonable compensation of affected communities and activities.	- Assess the financial/ legal exposure of TEP Liban. - Set-up mechanisms to collect and assess claims and ensure a reasonable compensation of affected parties. - Investigate insurance coverage accordingly to the incident.

1.5 Summary of applicable OSR techniques

IMT/ Planning advises IMT/ Operation on applicable response techniques, depending on the type of oil.

Table below presents indicative guidelines on applicable techniques for condensate and MGO.

Table 2 : Summary of applicable OSR techniques for crude oil and condensate

CHARACTERISTICS	**CONDENSATE** (HI 330/349 CONDENSATE, PHILLIPS)	**MARINE GAS OIL**
API°	44.9	35-37
Oil Group	2	2
Pour point	-65°C	-6° to 0°C
FATE & BEHAVIOUR	**CONDENSATE**	**MARINE GAS OIL**
Oil spreading	Very fast	Very fast
Slick appearance, thickness & break-up	Very thin slicks, mainly silver (maybe some rainbow) easily breaking up Fresh oil: initially <0.005 mm Can increase with emulsification	Very thin slicks, mainly rainbow and silver easily breaking up Fresh oil: initially <0.005 mm
OSR TECHNIQUES	**CONDENSATE**	**MARINE GAS OIL**
Containment & recovery of hydrocarbons at sea	**Initially not applicable** for fresh condensate (hazardous and ineffective: evaporation is significantly more effective). **Possible and efficient later** if remaining weathered/ emulsified condensates (>12-24hrs).	**Initially not applicable** (ineffective: natural dispersion – mainly – and evaporation are significantly more effective, possible increased by mechanical mixing). Option (very unlikely) for remaining weathered MGO (if needed).
Mechanical mixing	**Not applicable** for fresh condensate (evaporation is significantly more effective). Option later for weathered condensate.	**Possible and efficient** to increase natural dispersion if medium/ low winds (<10 kts).
Chemical dispersion with surface spraying	**Ineffective & inappropriate** (will 'herd' the sheen rather than disperse hydrocarbons into the water, over-dosage etc.). Prefer mechanical mixing.	
Chemical dispersion deep-sea with SSDI	**Initially not considered**. Option (very unlikely in blow-out situations (if significant volume of condensates surface).	N/ A
In-Situ Burning	**Not applicable** (hazardous and difficult to achieve in a controlled manner).	

Applicable response techniques for other refined hydrocarbon products are in:

"Tactics: instantaneous spills of other refined products", p. 41

1.6 Definition of offshore response tactics

IMT/ Operations defines the tactics, i.e. daily specific measurable actions with defined resources (personnel, equipment and support) carried out in precise locations to implement the strategy.

- Instantaneous oil spills:

"PROPOSALS OF TACTICS FOR INSTANTANEOUS SPILLS", p.34.

- Blow-out:

"PROPOSALS OF TACTICS FOR BLOW-OUT", p.42.

1.7 Writing and validation of the Incident Action Plan

IMT/ Planning (Documentation unit if mobilized) writes the Incident Action Plan IAP document and submits it for approval to the Incident Commander, after a technical review by IMT/ Planning and Operations.

See Vol 1.1 TEP Liban OSCP Action Plan for an example of oil spill Incident Action Plan.

1.8 Implementation of IAP & Mobilization of external assistance

IMT/ Operation:

- prepares the implementation of the approved IAP;
- coordinates the response operations accordingly to the approved IAP.

"PREPARATION, IMPLEMENTATION, COORDINATION & FOLLOW-UP", p.57.

IMT/ Logistics section mobilizes needed external resources, and transfers them to the Operations section and/ or directly to the Local IC's:

"MOBILIZATION OF ASSISTANCE", p.64.

2. MONITORING & MODELLING OF HYDROCARBONS SPILL AT SEA

When an oil spill occurs at sea, it is necessary to evaluate the incident, locate the slicks to guide responders; and to estimate the likely movements of oil to assess the risks for others and predict whether/ when the slicks are likely to move out of the Block, EEZ and/ or head towards the coastline.

IMT/ Planning section:

- Plans and oversees spill monitoring and modelling/ prediction activities.
- Collects all available information about the incident (observations from the units and vessels, helicopters etc.) and on-going operations (feedback from the site).
- Validates, consolidates and displays the information to establish a shared picture and understanding of the situation ("Common Operating Picture").
- Assesses the incident and predicts its evolution, based on forecasts (wind and current, temperature etc.), oil characteristics etc. for the next 24hrs to 4-5 days.

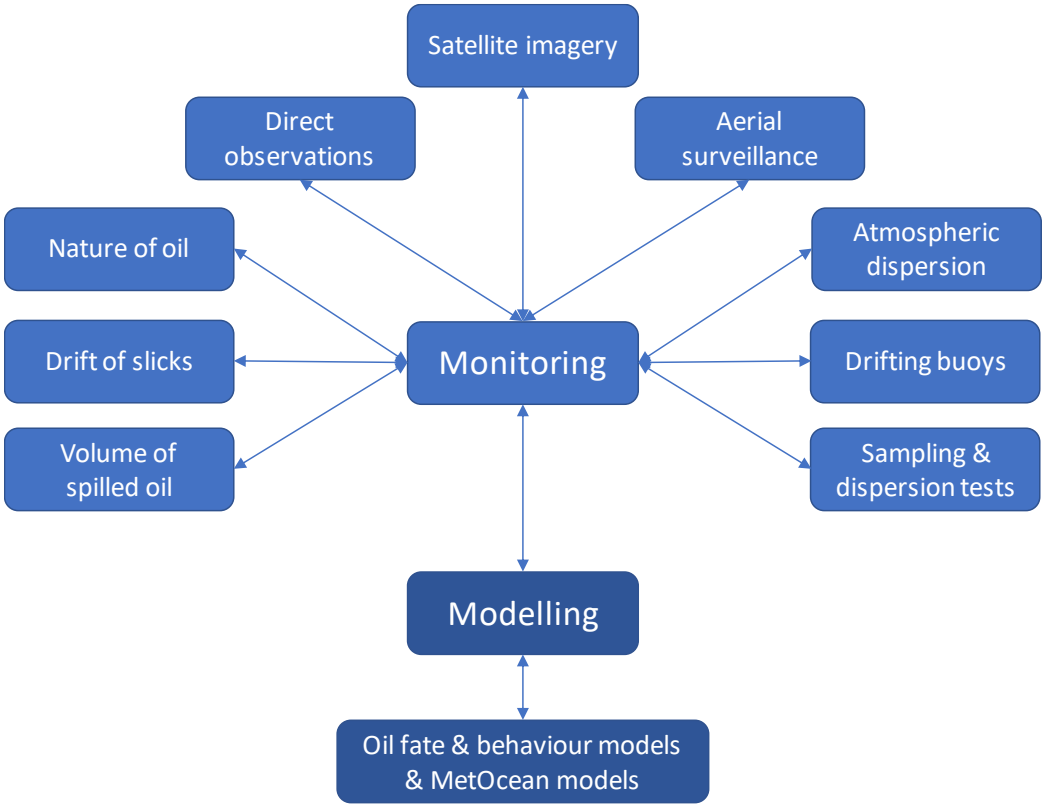


Figure 1: Key offshore oil spill monitoring & modelling items

2.1 Summary of monitoring & modelling for instantaneous spills

It is essential to:

- **Monitor** the spilled hydrocarbons to:
  - Identify any risks for the personnel,
  - Locate the slicks and guide the response vessels/ aircrafts,
  - Evaluate the volume of hydrocarbons spilled,
  - Identify the nature of the spilled hydrocarbons (MGO? Condensate? Other?),
  - Evaluate the immediate dispersibility (mechanical/ chemical) and behaviour of spilled hydrocarbons,
- **Predict/ Model** the drifting of slicks and behaviour of hydrocarbons to:
  - Anticipate the risks of groundings and damage for sensitive sites,
  - Plan the response for the next days (Natural Attenuation? Dispersion? Recovery? Etc.).

IMT/ Planning/ Situation unit plans monitoring and modelling activities, receives and consolidates the results (for Tier 2 or 3 spill).

IMT/ Planning/ Environment offshore unit develops a re-enforced monitoring/ modelling program if needed for large Tier 3 instantaneous spill incidents.

The table next page proposes indicative guidelines on surface monitoring techniques for offshore instantaneous spills, and their level of implementation depending on the Tier level.

Table 3 : Summary of monitoring and modelling techniques for instantaneous spills (indicative)

	SURFACE MONITORING (FACTS)									**SURFACE MODELLING** (PREDICTIONS)					
TIER LEVEL	**Direct observations**	**Air quality:** VOC, BTEX, H2S, O2, explosivity	**Drifting buoy** (ARGOS, AIS)	**Aerial surveillance helicopter** (short range)	**Sampling** (by vessels)	**Aerial surveillance plane** (mid- to long range)	**RADAR satellite image**	**Tethered balloon, drones**	**Dispersed oil detection in-situ** (b)	**Based on drift observations**	**Quick drift prediction** (wind & current forecast)	**Quick behaviour prediction** (on site condition & weather forecast)	**Full drift & behaviour modelling** (+ few days)	**Dispersed oil modelling**	**Atmospheric dispersion modelling**
			Available on site.	*Available at head office*		*Spot charter*	*SPILL WATCH, OSRL, CleanSea Net EMSA*	*TEPA observation balloon. Drones.*	*Fluorometer surface (TEPA, OSRL).*	*N/A*	*OSRA tool*	*Model ADIOS 2.0 + Lab studies.*	*Full model combining MetOcean modelling results*	*Model DREAM (Total, Pau).*	*Model ALOHA (NOAA).*
Tier I < 1 bbl	✓				✓ (a)					✓	*Option*	*Option*			
1 to 10 m3	✓	✓	*Option*	*Option*	✓ (a)					✓	✓	✓			
10 to 50 m3	✓	✓	**1**	**1**	✓ (a)		*Option*			✓	✓	✓	Option: SpillWatch		
Tier II 50 to 300-400 m3	✓	✓	**2**	**2/ day**	**1+/ day** (a')	**1/ day**	**1/ day**	*If needed*	*If needed*	✓	✓	✓	**SPILL WATCH + others** (c)	*If needed*	*If needed*
Tier III 400 to 5000 m3	✓	✓	**2**	**2/ day**	**2/ day** (a')	**1/ day**	**1/ day**	*If needed*	✓	✓	✓	✓	**SPILL WATCH + others** (c)	*If needed*	✓
5,000 m3 & more	✓	✓	**3+**	**2+/ day**	**2+/ day** (a')	**1/ day**	**2+/ day**	*If needed*	✓	✓	✓	✓	**SPILL WATCH + others** (c)	*If needed*	✓

(a) Always for hydrocarbons from reservoir. (a') With Representative of Authorities. (b) In case of mechanical dispersion. (c) Examples: CleanSeaNet (EMSA), OilMap (OSRL), Mothy (Météo-France), SpillTrack (CLS).

The monitoring and modelling tools are mobilized as quickly as possible for a large Tier 3, some being immediately available, others requiring more time:

FIRST 2 TO 6 HOURS AFTER INCIDENT

Implement immediately:

- Direction observation by the vessels close to the slick;
- Drift prediction with OSRA tool: TRAJECTORY.

ARGOS buoy to be launched at sea. First feedback can be expected within 1 or 2 hours.

Organization of aerial surveillance (by helicopter).
Feedback can vary from:

- 1 to 2 hours if the helicopter is on site.
- 4 to 6 hours if the helicopter has to be mobilized
- In the order of 6-12 hours if the incident occurs at night.

WITHIN 12 HOURS

Receipt of the first predictions from SPILL WATCH can be expected (usually medium to low precision at this time).

WITHIN 24 HOURS

Receipt of updated predictions and first satellite images from SPILL WATCH are expected.

To compare with aerial surveillance results and positions of ARGOS buoys.

The findings are consolidated and then made available to all.

FOLLOWING DAYS

RADAR satellite imagery, aerial observations and ARGOS buoy locations are compared.

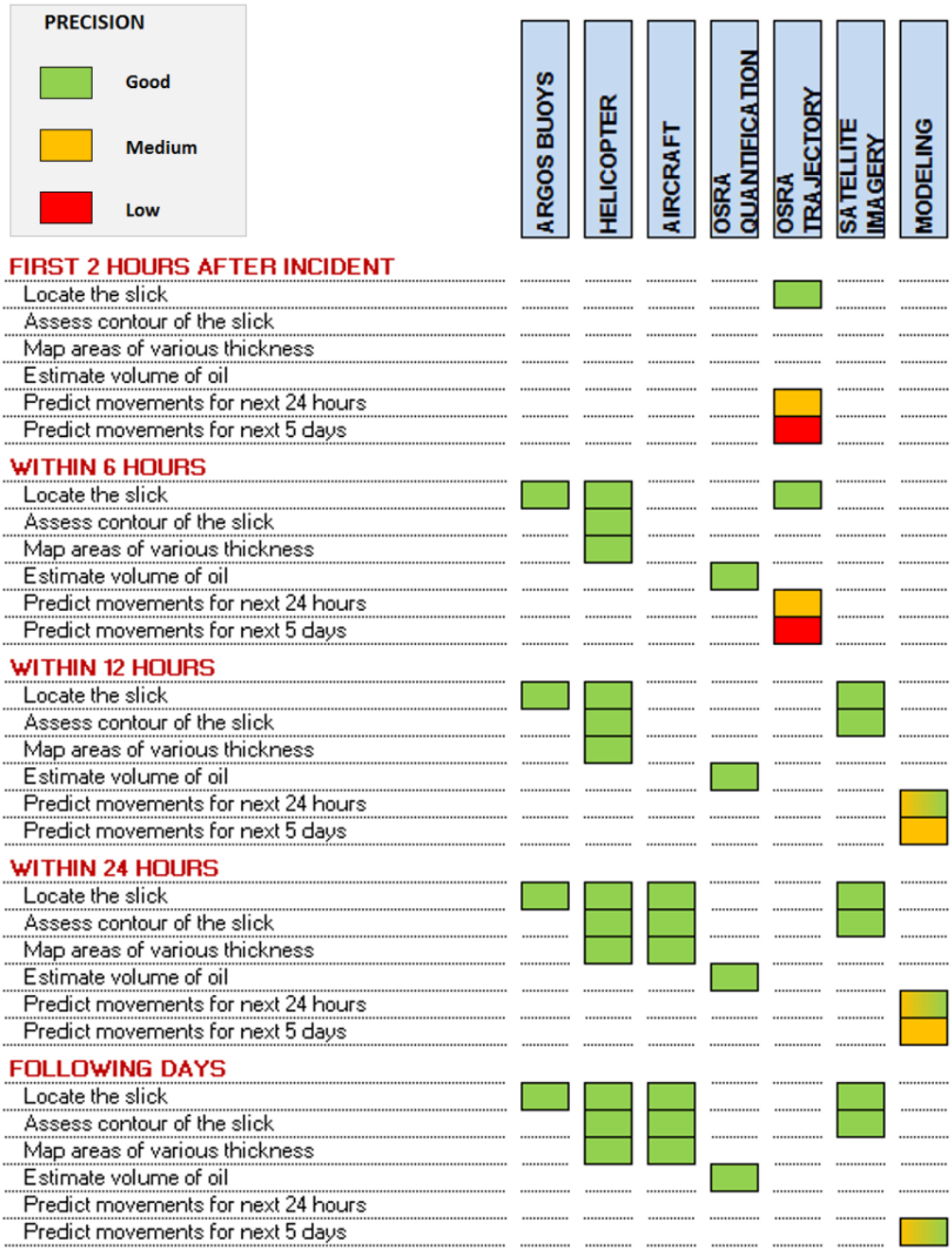


Figure 2: Field of application of monitoring techniques for the first days

/!\ Results from aerial surveillance are systematically preferred in case of doubt/ difference.

/!\ Always differentiate facts (observation, monitoring data) from predictions.

2.2 Summary of extended monitoring & modelling for deep-sea blow-out

A deep-sea blow-out requires an extensive monitoring program due to the continuous flow of hydrocarbons.

All monitoring and modelling techniques applicable for large instantaneous spills are mobilized and re-enforced.

Additional techniques are implemented for deep-sea monitoring, with two key objectives:

- Evaluate the flow rate of gas and liquid hydrocarbons at the well head (and SSDI efficiency if implemented);
- Monitor the drift and dispersion of hydrocarbons in the water column (chemically dispersed or not).

Results are centralized, analysed and provided to the response organisation (use of database and GIS).

The next table outlines all monitoring techniques applicable during a deep-sea blow-out, area of application, objectives and indicative mobilization time.

Technics (mainly targeted at liquid hydrocarbons) will be adapted to track gas.

The figure after illustrates the tools, their level of engagement being defined on a case-by-case basis.

Use the EXCEL file to develop a daily monitoring plan adapted to the incident:

File "OS-Monitoring-Plan_20190831.xlsx" in …\Vol Ops Support\Op Sup 4 OSR Integ Resp Plan

Table 4 : Summary (indicative) of blow-out monitoring offshore actions & timeline – First 10 days ("OS-Monitoring-Plan_exBlowOut_20181116.xlsx" in …\Vol Ops Support\Op Sup 4 OSR Integ Resp Plan - OTRA)

	Technique	Objective. **Priority objectvies in RED**.	- Personnel/ Specialist ? - Equipment ? - Support vessel, aircraft, other ?	*Day* 1	2	3	4	5	6	7	8	9	10	11
SUBSEA MONITORING AT WELL HEAD	ROV video imagery analysis ROV	**Oil flowrate estimation**	- Specialist ? - ROV on rig.		Identify	Contract (back office work)	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
	Acoustic Doppler current profiler measurements (ADCP) & other tools	**Oil flowrate estimation**	- Specialist ? - Equipment ? - Vessel ?		Identify	Contract	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
	Deepsea fluorometer #1 close to well head	Detect hydrocarbon deep sea (before & after SSDI)	- Specialist ? - Equipment: e.g. AQUATRACKA 6000 (TEP Angola) - Vessel with ROV close to well head ?		Identify	Contract	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
SUBSEA MONITORING IN WATER COLUMN	Deepsea fluorometer #2	Detect dispersed hydrocarbon deep sea ("oil plume") few km's away from well head	- Specialist ? - Equipment ? - Vessel with ROV ?		Identify	Contract	Mobilization	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
	Water column environmental monitoring tool kit	– Pressure – Dissolved oxygen – Altimeter – HD video – Temperature – Particle size – Fluorescence – Sample bottles – Turbidity – Conductivity	- Specialist ? - Equipment: e.g. BP -OSRL tool kit (in DNV container) - Vessel ?		Identify	Contract	Mobilization	Mobilization	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
	Autonomous Unmanned Vehicule AUV + oil detectors + spectrometer/ fluorometer	Presence of hydrocarbon in the water	- Specialist ? - AUV ? - Vessel for launching & recovery ?		Identify	Contract	Mobilization	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
	Sampling of deepsea water/ sediment/ fauna	Environmental impact	- Specialist ? - Sampling tools ? - Vessel ?		Identify	Contract	Mobilization	Mobilization	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?

AIR MONITORING	Explosivity VOC (BTEX)/ H2S H2S	**Air quality for safety of responders**	- Persons in charge - Detectors on vessels - Vessels on site	Yes	Yes	Yes reinforced	Yes reinforced	Yes reinforced	Yes reinforced	Yes reinforced	Yes reinforced	Yes reinforced	Yes reinforced	Yes reinforced
SEA SURFACE MONITORING	Helicopter surveillance	**Locate slick, estimate volume & guide vessels**	- Specialist observer ? - Aerial observation toolkit (GPS + camera) - Helico	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Helicopter vessel guidance	**Locate slick, estimate volume & guide vessels**	- Specialist observer ? - Aerial observation toolkit ? - Helico ?		Identify	Contract	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
	Surveillance plane (mid- long-range)	**Locate slick, estimate volume & guide vessels**	- Specialist observer ? - Aerial observation toolkit ? - Helico ?		Identify	Contract	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
	Drifting buoy	**Day & night tracking of slicks**	- Personnel: N/A - Drifting buoys - Vessel: available on site	Yes (2)	Yes (2)	Mobilization	Mobilization	Yes ?			Yes ?			
	Observation balloon + drones	Guidance of response vessels on thick slicks	- Specialist personnel ? - Observation balloon (Total, external companies) - Response vessels on site.		Mobilization	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?
	Satellite RADAR imagery	**"Big picture" of slicks in all area affected**	- SPILLWATCH (Total) - Option: service from OSRL		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Sampling of oil & water	Fingerprinting. Oil characteristics. Water quality analysis	- Specialist ? - Sampling toolkits ? - Vessel ?	Yes	Yes	Yes reinforced ?	Yes reinforced ?	Yes reinforced ?	Yes reinforced ?	Yes reinforced ?	Yes reinforced ?	Yes reinforced ?	Yes reinforced ?	Yes reinforced ?
	Surface fluorometer	Detect hydrocarbon under the surface (if dispersant spraying)	- Specialist ? - Equipment: e.g. C3 (TEP Angola, OSRL) - Response vessel available on site		Identify	Contract	Mobilization	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?	Yes ?

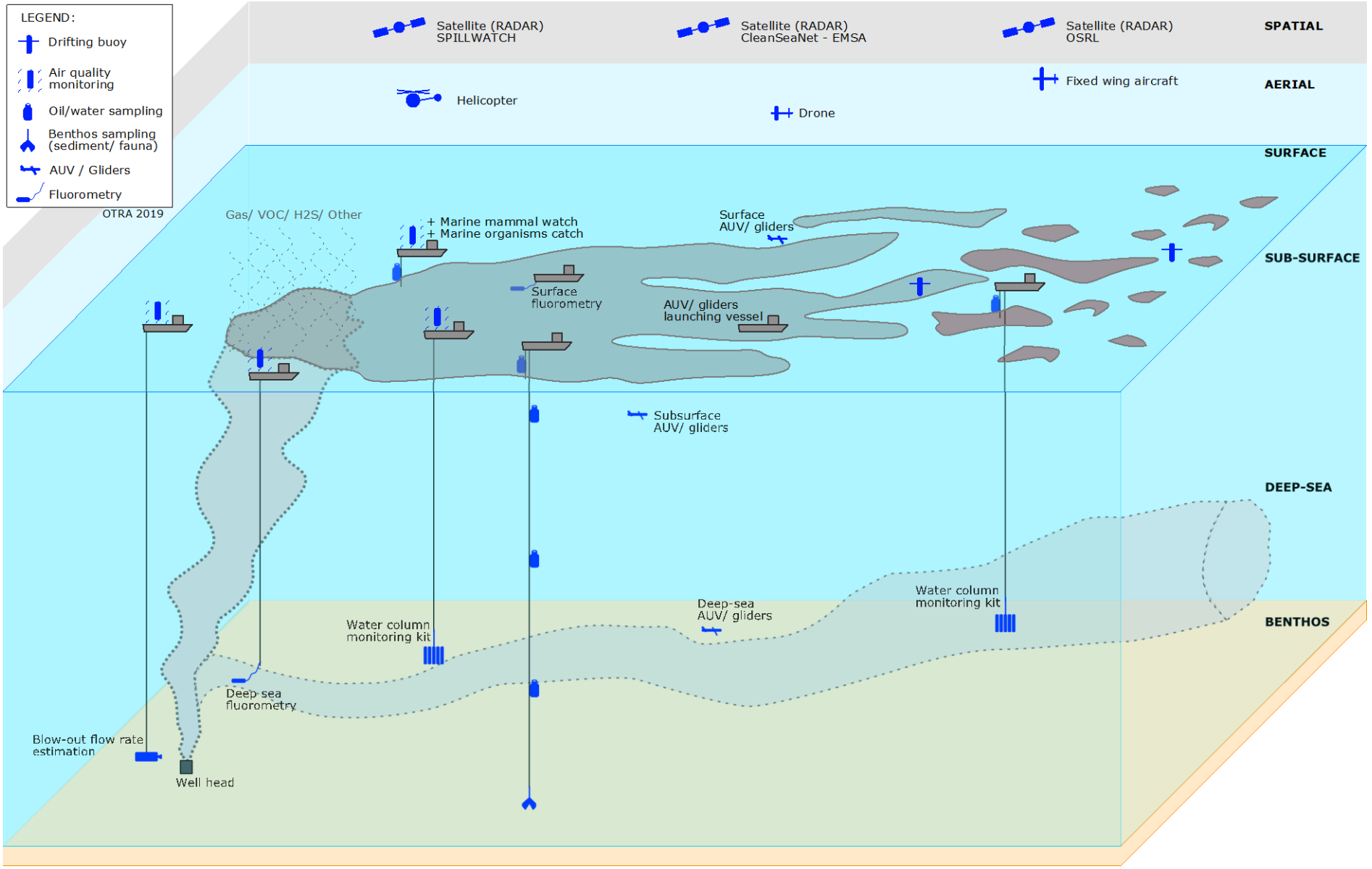


Figure 3 : Offshore monitoring techniques for a blow-out situation - indicative for TEP Liban (OTRA)

2.3 Direct observations from vessels and drilling unit

The crew (drilling unit and close vessels) carries out direct observations of the spill, locates the slick, evaluates its dimensions, initial drift and oil appearance.

Observations are performed from a high point for a greater field of view and sub-vertical observations.

Total uses the Bonn Agreement Oil Appearance Code BAOAC [1] to describe oil at sea.

See Operational Support n°6 « Instructions for Aerial Observer ».

2.4 Monitoring of atmospheric dispersion of hydrocarbons & air quality

Air quality monitoring is implemented immediately to guarantee health & safety of personnel and responders.

/!\ Spill of condensate: approach up wind (with breathing protection if needed, Tier 2 & 3).

Following parameters are at least monitored:

- Flammability & explosivity;
- VOC/ BTEX;
- O^2
- (H2S is monitored but not expected).

The initial air quality monitoring is implemented by the crew of the drilling unit and/ or vessels immediately:

- and at least for the first day for Tier 2 spills (option for Tier 1 spill);
- and during at least two days for Tier 3 spill;
- around the oil surfacing area and around the fresh oil slicks during the whole incident for a blow-out.

Air quality monitoring devices are available on the drilling unit and support vessels. Examples:

Example of handheld VOC/ Benzene monitoring device (ULTRA RAE 3000 with Benzene tubes)	Example of VOC monitoring device TIGER (www.ionscience.com)
	

See Operational Support n°5 « Air monitoring for health and safety».

Atmospheric dispersion and downwind travel of gas can be modelled, e.g. using ALOHA software.

https://response.restoration.noaa.gov/oil-and-chemical-spills/chemical-spills/response-tools/aloha.html

See Operational Support n°6 « Instructions for ALOHA ».

[1] Full documentation on http://www.bonnagreement.org/manuals

2.5 Assessing the nature of oil & immediate dispersibility

Key priority is to confirm the nature of the hydrocarbon products spilled at sea and their initial behaviour :

- Refined product (MGO, lube/ hydraulic oil etc.)? HFO / IFO?
- Condensate? Crude oil? Others (third party spills)?

Condensate are left to evaporate naturally the first day while MGO can be mixed by vessels to enhance the natural dispersion. To test rapidly the efficiency of the mechanical dispersion, a vessel navigates through the slick and observes the quality of the dispersion in the wake of the vessel:

- If the slick re-closes and re-covers rapidly the wake of the vessel, mechanical dispersion is not efficient. Vessel must increase surface agitation (i.e. increase speed, sail with sharp turns, use FiFi etc.).
- If the water remains clear in the wake of the vessel, mechanical dispersion is efficient.

2.6 Assessing the immediate drift of slicks

The initial drifting direction is evaluated immediately by direct observations of the slick movements.

Based on wind forecast and current observations, the drift direction and speed for the next hours is evaluated. Wind data is provided by the vessels/ drilling unit (anemometer) and expected winds by weather forecasts. Current is estimated by the vessels/ drilling unit on site or measured (best case).

See Operational Support 3: "Spreading and drift of oil spilled at sea"

The drift is evaluated on a marine chart or using the OSRA tool "Trajectory" module.

See Operational Support 6: Instructions "OIL SLICK TRAJECTORY" software

Figure 4 : Oil Spill Responder Application (OSRA) – TRAJECTORY module

2.7 Assessing the volume of spilled oil

Overall volume spilled is estimated based on the size(s) and appearance(s) of the slick(s) using the Bonn Agreement Oil Appearance Code, which provides an estimate of the thickness and corresponding volume per km², allowing to estimate the volume knowing the dimension of the slick.

To calculate rapidly the volume spilled, "Quantification" module from the OSRA tool is used.

See Operational Support 6: Instructions "QUANTIFICATION OF OIL ON THE WATER" software

Figure 5: Oil Spill Responder Application (OSRA) – QUANTIFICATION module

Notes:

- Bonn Agreement Oil Appearance Code provides an estimated **range** of volumes (minimum and maximum).
- Countries parties to the Bonn Agreement have agreed that **the sum of the lower values of each colour code** is reported to the authorities. TEP Liban applies the same.
- Minimum and maximum are considered to plan the response.

2.8 Sampling of oil

Sampling is systematically carried out for hydrocarbons from reservoir and for Tier 2 & 3 to:

Immediately
- have a sample of the spilled oil;
- evaluate its dispersibility (mechanical and chemical if applicable);

Later
- identify the origin of hydrocarbons from third-party spills (or unknown origin);
- provide evidence of the origin of the oil for claims to avoid confusion with other spills.

Sampling is **critical** as the hydrocarbon characteristics from the reservoir are unknown.

Sampling is carried out with air monitoring and breathing protection if needed.

Sampling team (initially a crew of a vessel on site) is equipped with VOC/BTEX measurement devices (H2S is not expected but should is checked to confirm absence).

All samples are dated, geo-referenced (GPS), identified and labelled; and conditions of sampling recorded.

TEP Liban maintains on site some sampling kits.

See Operational Support n°6: Instructions for sampling

For legal purposes, it is recommended to take 3 samples (1st: lab testing, 2nd: counter evaluation and 3rd: back-up) with an official witness if possible.

Samples required for legal or administrative purposes must be analysed by a qualified laboratory with GC/MS to characterize the oil sample (high resolution Gas phase Chromatography and Mass Spectrometry) compared with a reference sample when available.

In case of blow-out, a daily and geographically extended sampling program is developed by the IMT/ Planning/ Offshore Environment unit and implemented by IMT/ Operations with the Local IC's on site. This sampling program covers surface, sub-surface and deep-sea waters.

Sampling is also used to evaluate the possible environmental effects of the spill, e.g.:

- Evaluate the effects on commercial fishery to support decisions regarding possible fishing restrictions;
- Verify if observed environmental effects are directly attributable to oil from the incident;
- Measure concentrations of hydrocarbons in sediment or water to aid decision making over the continuation or termination of the response;
- Evaluate the decrease of concentrations of hydrocarbons in the environment etc.

See "ENVIRONMENTAL IMPACT MONITORING", p.79

2.9 Tracking buoys

Tracking buoys (e.g. MAR-GE/T buoys with ARGOS satellite technology) are launched into the slick for any Tier 2 or 3 spills and for large Tier 1 spills (>10m3) to track continuously the slicks day and night, to complement aerial surveillance or when aircrafts are not available.

Buoys drift approximately at the same speed and direction as the slick. They are usually set to transmit their position every 30 min for MAR/GE-T (best compromise between battery lifetime and frequency of information) and therefore provide the probable location of the slicks.

Once activated, MAR-GE/T buoy emits for at least 3 weeks to a month (battery life may be reduced in cold waters), via satellites, to processing centres in France and USA.

Tracking data is available via a secured website: www.argos-system.org (once the service fee is paid).

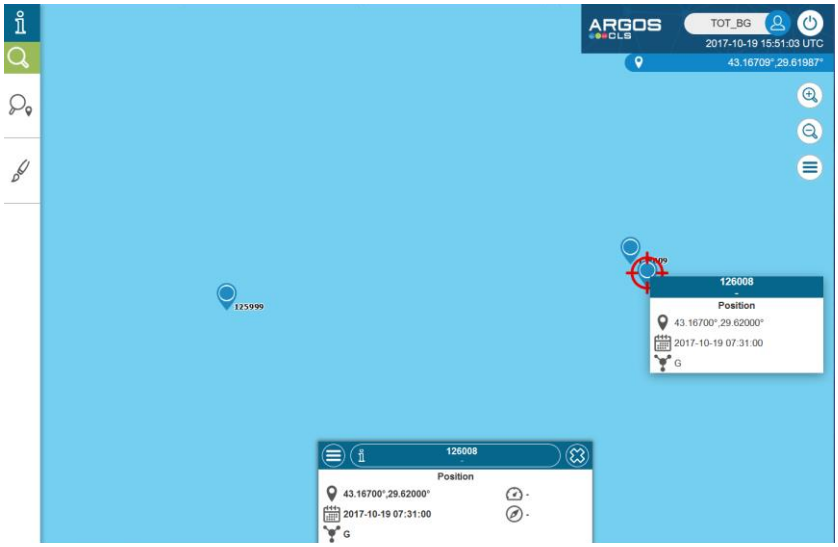
TEP Liban maintains at all-time at least two ARGOS buoys on site (standby vessel &/or drilling unit), and additional units at offices.

TEP Liban informs the JMOC of the launching of the buoys, and provides the tracking data to the authorities.

See Operational Support n°6, section "Instructions for buoy MAR/GE-T"

Drifting buoy Argos

Example of buoy track log in Google Earth



Example of buoy tracking on the website www.argos-system.org

2.10 Aerial surveillance

Daily aerial surveillance is critical to:

- **Locate** the oil slicks and estimate their **dimensions**.
- **Guide** the vessels and planes on the thickest slick(s);
- **Ensure** that the response focuses on the thickest slick(s) and **assess** the response efficiency.
- **Describe the appearance and coverage** of the various appearances of the oil slicks.
- **Estimate the volume of oil** remaining at sea (based on dimensions and appearances).
- **Confirm the drift** of the slicks (since last known position).

Bonn Agreement Oil Appearance Code is used to describe oil appearance and estimate the volume.

Short-range aerial surveillance is carried out with helicopters, and mid- to long-range aerial surveillance with fixed-wings aircrafts.

2.10.1 Planning & preparing aerial surveillance

PLAN AERIAL SURVEILLANCE

☐ Incident Commander request IMT/ Operation to mobilize a helicopter (or IMT/ Logistics section if no helicopters are chartered &/ or available).

☐ IMT/ Operation ensures that the helicopter company and pilots are briefed on the requirements for aerial surveillance:

- Early morning flight to guide oil spill response,
- Afternoon flight to plan tactics for next day.
- If possible, ensure the continuity of pilots.
- Communications between observers and pilots (mic & headphone set).

☐ In case of large spills, IMT/ Operation secures the full availability of a helicopter and crew for the next days.

ORGANIZE AERIAL SURVEILLANCE MISSION

☐ IMT/ Planning discusses flight plan and slick search instructions with aerial observer.

☐ Aerial observer mobilizes to the airport with aerial observation bag e.g.:

- Handheld GPS
- Camera (DSLR with polarizing filter)
- Miscellaneous (chargers, batteries, USB connections, etc.)

☐ Aerial observer prepares with the pilots the flight plan and search pattern:

- usually 1,500 to 2,000 feet to search and locate slicks;
- 500 to 1,000 feet to precisely evaluate dimensions, appearance and locate the thickest slicks.

☐ Aerial observer to have a good communication with the pilots during the flight.

☐ Aerial observer to use a GPS, digital camera and the reporting form.

See Operational Support 6, section "Guidelines for Aerial Observer"
See Operational Support 6, section "Using GPS and digital camera for aerial Surveillance reporting"

2.10.2 Coordinating aerial surveillance & reporting

CARRY OUT THE MISSION

☐ IMT/ Operations warns the offshore sites and Local IC's of the planned aerial surveillance missions.

☐ IMT/ Operations informs in real-time the offshore sites and Local IC's of ETD, ETA, and real times of the aerial surveillance missions.

REPORT AS SOON AS POSSIBLE TO IMT.

☐ Observer reports observations as soon as possible and first to the offshore Local IC (to provide guidance to response vessels) and then to the IMT:

- location of slick(s) and of thick slick(s) where response should focus;
- general drift direction and speed;
- description of the dimension and shape of the slick(s); and
- appearance of oil in the slick(s) and estimated volume of oil.

☐ Observer provides a full report to the IMT as soon as possible (position of the slicks, maps, track of helicopter and way-points of remarkable features of the slick(s), photos etc.).

See Operational Support 6, section "Guidelines for Aerial Observer"

TEP Liban personnel have received training for aerial observation and are equipped with adequate equipment.

2.10.3 Recommendations for aerial surveillance

RECOMMENDATIONS FOR CHOICE OF AIRCRAFTS

Fixed Wing Aircraft	• Faster transit times than helicopter; • Longer range and less expensive than helicopter; • More readily available; • Dependent upon position in aircraft and design, view can be obstructed.
Helicopter	• More manoeuvrable than fixed wing but shorter range; • Fly slower than fixed wing and able to hover; • Ability to land "off airport" (for helicopters with skid); • Unobstructed visibility.

RECOMMENDATIONS FOR OFFSHORE AERIAL SURVEILLANCE

- Condensate and MGO are difficult to observe at sea (compared to crude oil and heavier oils).
- In case of waves, oil can be temporarily submerged and may not be visible. However, oil will resurface when the weather calms down. Aerial mission will have to be repeated during calm weather periods.
- As oil weathers and emulsifies, its density increases, reaching values close to that of the sea water. Consequently, weathered oil can remain just below the sea surface and not be visible. Aerial surveillance may have to be repeated during a few days during calm weather after the last oil has last been observed to ascertain that there is no more oil remaining at the sea surface.
- In case of submarine incident, with a risk of leakage:
  - Aerial surveillance should be carried out as soon as possible in order to detect possible oil as soon as it surfaces and direct the response resources to the slicks.
  - Aerial surveillance should be repeated if the sea state is not calm. The slick, formed when oil droplets surface in rough seas, can be completely broken up and not visible from the aircraft.

USE OF POLARIZING FILTERS TO LOCATE THICK SLICKS – IF & WHEN APLICABLE

A polarizing filter fitted on the lens of the camera and tuned properly allows to see only the thick slicks (Bonn Code 4 and 5) through the viewfinder of the camera.

The parts classified Code 1, Code 2 and Code 3 are “screened out” and do not appear. It therefore provides a useful tool, to locate thick slicks, more accurately estimate the volume spilled, and facilitate the guidance of the response vessels.

The following pictures illustrate the benefit of using polarised lenses.

Photograph using normal lens

Same photograph with polarized filter fitted.

Normal picture (left) provides a full view of the slick, while the polarizing filter allows viewing nearly only the thicker and narrower slicks, Code 4 and 5 (right). This helps responders to differentiate the Code 4 and 5 from the Code 3, which is difficult for crude oil.

Note:

- Best polarization is achieved with sub-vertical views, and a perpendicular angle compared to the sun.
- Windows of aircraft can affect the polarization: “rainbow” artefacts can appear through the viewfinder and on the pictures.

RECOMMENDATIONS FOR AERIAL SHORE SURVEY

- Condensate and MGO will probably be very difficult to locate and observe if stranded onto the shore (compared to crude oil and heavier oils, appearing brown/ black).
- If large volumes of oil impact the shore, aerial surveillance missions are recommended to assess the extent of the pollution and locate the largest accumulation of oil. Assessment teams will survey the polluted sites on the ground.
- Some coastal features can be confused with oil (bed rocks, seaweeds etc.). **Extra caution** should be taken in interpreting aerial observations close to the coastline and validation should be sought by sending a team on site.

2.11 Vessel-based aerial surveillance & guidance

Tethered observation balloon (Helium inflated) can be deployed and operated from a vessel offshore at an altitude of +/-100m. Balloon provides normal (and potentially) IR images of the sea surface.

The tethered observation balloon is very efficient to maintain response vessels in the slicks during the day by combining normal and IR image (and replaces the guidance by helicopters) and can also track slicks during the night with the IR camera (with however more limited efficiency compared to daytime).

See Operational Support n°6: « Instructions for the Total tethered observation balloon – 05/07/2015 »

2.12 Interpreted RADAR satellite imagery – SPILLWATCH service

RADAR satellite imagery (accessible immediately with SPILLWATCH – compulsory for any Tier 2 or 3 spill) allows to capture images of the whole area with slicks (which may be vast in case of large spill/ blow-out) and map the slicks in favourable weather conditions.

RADAR imagery is a complementary tool to aerial surveillance, essential to have a complete picture of the extension of the spill, confirm observations and plan mid-term strategy.

RADAR imagery comes with some operational constraints and limitations:

- Imagery acquisition is not immediate (satellite has to be programmed). 1st image is usually available within 24 hrs or more.
- RADAR images are interpreted to show oil slicks and usually display:
  - Oil slicks above 3-5µm thickness (i.e. Metallic, true colour slicks and possibly some rainbow). Slicks have to be thick enough to dampen capillary waves, the effect captured by RADAR satellites. Consequently, silver sheens do not appear on RADAR imagery and rainbow sheens only partially.
  - /!\ Condensate slicks will not appear completely on RADAR imagery, as well as MGO spills.
  - Oil slicks in light to medium wind conditions (between 5 to 20 kts).
- RADAR images do not display oil slicks:
  - in very calm conditions (less than 2-3 kts of winds), where sea surface is flat and there are no capillary waves to be dampened by oil.
  - in windy conditions (>20-25 kts of wind) where the sea surface is too rough.
- Acquisition by satellite, process and interpretation takes a few hours. Consequently, RADAR satellite imagery cannot be used to guide the vessels and cannot replace aerial surveillance.

IMT/ Planning/ Situation activates SPILLWATCH.

DGEP/EXPLO/TE/MTG/TTP manages RADAR satellite acquisition.

Results are:

- Provided daily as RADAR image with interpreted slick position and extent of slicks in GIS format;
- Collected, checked (vs. aerial surveillance) and disseminated by the IMT/ Planning/ Situation;
- Integrated in the GIS of the incident (if available).

See Appendices: "Remote sensing systems – Comparison".

See Operational Support n°6: "Instructions for SPILLWATCH Activation"

2.13 Subsea monitoring of oil – Blow-out

Subsea tool kits to monitor water/ environment quality and track dispersed oil are mobilized during a blow-out (in addition to surface monitoring), requiring vessels and specialized personnel to deploy and operate.

A Water Column Monitoring Toolkit (managed by OSRL, formerly property of BP for DWH incident) provides various measurements of environmental parameters at precise locations. System is deployed and operated from a vessel.

Information is provided in:

Operational Support n°6: "INSTRUCTIONS FOR SUBSEA MONITORING".

AUV and gliders can also be deployed from vessels. They operate independently to provide more limited information but continuously measured on potentially large geographic area.

Underwater gliders and AUV's that can be equipped with various sensors:

- Conductivity, Temperature, Pressure
- Dissolved Oxygen
- Optical Sensors (Turbidity, Crude Oil, etc.)
- Sea Level
- Passive Acoustic
- Currents and Waves

For further information, see:

ⓘ *Capabilities and Uses of Sensor and Video Equipped Waterborne Surveillance-ROVs for Subsea Detection and Tracking of Oil Spills. IOGP-IPIECA Oil Spill Response Joint Industry Project Surveillance, Modelling & Visualization. Work Package 1: In Water Surveillance (OCEANEERING)*

ⓘ *Report: Capabilities and Uses of Sensor-Equipped Ocean Vehicles for Subsea and Surface Detection and Tracking of Oil Spills. OGP-IPIECA Oil Spill Response Joint Industry Project. Surveillance, Modelling & Visualization. Work Package 1: In Water Surveillance November 2014 (Battelle)*

2.14 Modelling

2.14.1 Modelling behaviour of spilled oil

Spilled hydrocarbons weather: evaporation, dispersion, emulsification, resulting mainly in an increase of viscosity, which reduces its dispersibility.

The initial prediction:

- is based on existing weathering & dispersibility studies;
- can be quickly updated with the specific conditions of the spill (wind, water temperature, etc.) using ADIOS 2.0 software, enabling the modelling of oil fate spilled at sea on 5 days (evaporation, natural dispersion, remaining at surface, viscosity, water intake and airborne benzene).

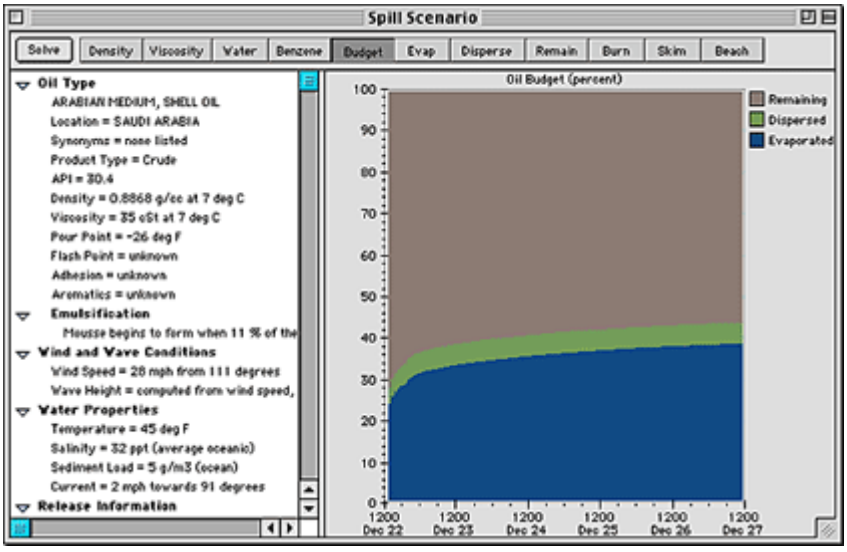


Figure 6 : ADIOS 2.0 5-days mass balance

Software is freely available at:

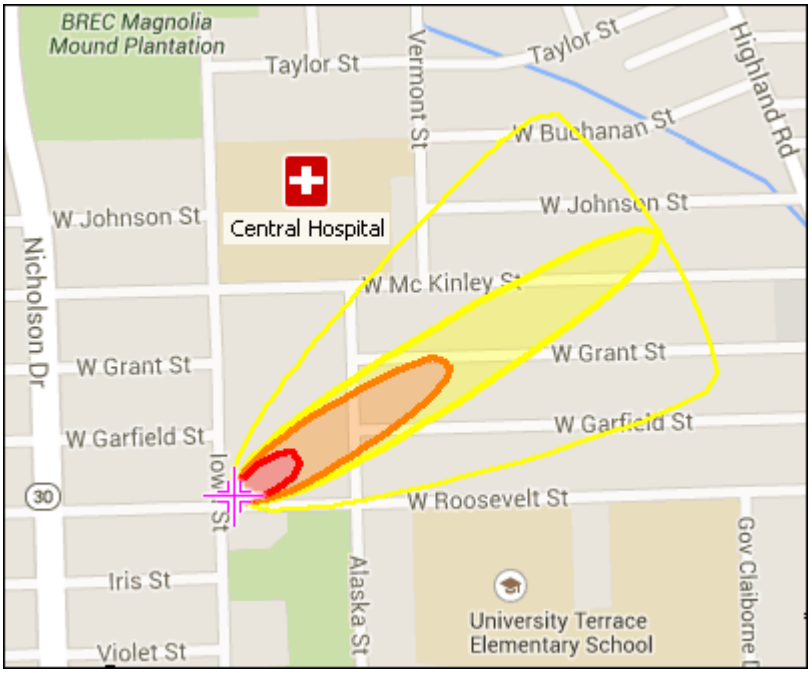
https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/adios.html

See Operational Support 6, section "Instructions for initial assessment of spilled oil behaviour with ADIOS"

2.14.2 Modelling atmospheric dispersion of VOC/BTEX

Modelling atmospheric dispersion of VOC/ BTEX can be carried out with ALOHA software from the Office of Reposes and Restoration (NOAA, U.S.A.).

Figure 7 : An ALOHA threat zone estimate displayed on a MARPLOT map. The red, orange, and yellow zones indicate areas where specific Level of Concern thresholds were exceeded.



Software is freely available at:

https://response.restoration.noaa.gov/oil-and-chemical-spills/chemical-spills/response-tools/aloha.html

See Operational Support 6, section "Instructions for ALOHA : atmospheric gas dispersion"

2.14.3 Full MetOcean and fate & behaviour model – SPILLWATCH

Full models (combining oil fate & behaviour and wind & current forecasts) allow to model the drift and mass-balance of oil over few days to weeks (depending on forecasts data available) and thus anticipate:

- the dissemination of hydrocarbons at sea for coming days to plan surveillance and response;
- the risk of oil groundings to plan protection and clean-up.

SPILLWATCH is an emergency service from Total combining:

- MetOcean forecast over 5 days (winds + 3D currents, calibrated with historical satellite observations and updated daily with satellite imagery of the ocean surface),
- Oil drift & behaviour modelling module: OSCAR, https://www.sintef.no/en/software/oscar/
- Deep-sea oil behaviour and drift: OSCAR DeepBlow module;
- RADAR satellite pictures used as recalibration data for the model (see previous section).

SPILLWATCH is compulsory for Tier 2 & 3 spills (Company rule).

- IMT/ Planning section requests the activation to Total PSR/HSE/GCA.
- DGEP/DEV/TEC/GEO manages MetOcean forecast.
- DGEP/HSE/ENV manages the modelling, using OSCAR.

Operational Support 6: "Instructions for SPILLWATCH Activation"

File "150401_SPILL_WATCH_mobilization_by_Affiliate.pdf" in …\Vol Ops Support\Op Sup 4 Doc

Expected outcomes from SPILL WATCH:

- Initial model drift from SPILL WATCH within 6 to 9 hours (with MetOcean data model).
- RADAR imagery within 24 hrs;

- Forecast updated daily.
- GIS Website set-up by Total H.Q. showing:
  - 3D forecast of currents in NetCDF (format compatible with OSCAR oil spill model),
  - Wind forecasts in GRIB (format compatible with OSCAR oil spill model),
  - Drift results
  - MetOcean report in *.PDF format.

> "*It is important to appreciate the assumptions upon which such models are based and not to place too much reliance on the results. However, they can serve as a useful guide to understand how a particular oil is likely to behave and help in assessing the scale of the problem which a spill might generate.*"
>
> Source: ITOPF HANDBOOK, 2010

In case of a large spill/ blow-out, best practice is to have 2 or 3 different models activated and cross-compare results (and not rely on predictions from a unique model). Example of other models are:

- OILMAP (by OSRL);
- MOTHY (by Météo-France);
- SPILLTRACK (from CLS company);
- Gnome (freely available from the Office of Response & Restoration, N.O.A.A., U.S.A.)

EMSA can also activate the CleanSeaNet system. ⓘ http://emsa.europa.eu/csn-menu.html

See 🗎 *"Other oil fate & behaviour model", p.82*

3. PROPOSALS OF TACTICS FOR INSTANTANEOUS SPILLS

This section proposes tactics for offshore instantaneous oil spills. Blow-outs are covered in the section 4. Tactics proposed **are guidelines to adapt with incident specifics.** Efficiency can be limited by many factors.

3.1 Tactical approach & level of engagement for offshore instantaneous spills

The "Table 1 : Indicative offshore response techniques & resources for instantaneous MGO & Condensate spills", p.36, proposes a summary of **indicative** response techniques and levels of resources for instantaneous offshore spills of MGO or gas with possible condensates – detailed after.

Key drivers to define the initial offshore tactics (i.e. daily implementation of the response actions) are:

- Weather conditions on site;
- Location and extent of the spill;
- Type of hydrocarbons and behaviour with the local MetOcean conditions (evaporate/ disperse naturally);
- Need for initial mechanical dispersion, and for recovery after a day or more.

/!\ Dispersant spraying is **never** implemented on freshly spilled MGO or condensates.

Condensates

Initially. Evaporation is fast.	▶ "**Monitored Natural Attenuation - MNA**" (mainly evaporation).
After few to 24 hrs. Some condensates may remain, possibly emulsified.	▶ **Mechanical mixing** on non-emulsified oil & if no risk of VOC. ▶ **Mechanical recovery** of weathered, maybe emulsified, condensates.

Condensates typically break up naturally in wind and waves with the majority evaporating within a matter of days. Traditional containment and recovery operations are not typically recommended. Any attempt to concentrate the condensate would reduce the rate of evaporation and, if the concentration of vapour becomes high, could cause the oil to ignite. In-situ burning is potentially an option, but may be difficult to achieve in a controlled manner unless in ice-infested waters. Dispersants are ineffective on condensate spills as they will 'herd' the sheen rather than promote the formation of droplets in the water column.
Spills of condensate in the marine environment are best left to evaporate and dissipate at sea.

Source: ITOPF, 2018, http://www.itopf.org/knowledge-resources/documents-guides/condensates/

Marine Gas Oil MGO

Wind < 10 kts. Evaporation is limited & natural dispersion slow. Some MGO remains at surface up to 5 days (and more if winds < 2-3 kts).	▶ "**Monitored Natural Attenuation - MNA**" (mainly evaporation). ▶ **Mechanical mixing** to enhance natural dispersion. To carry out as soon as possible, when slicks are not scattered.
Wind > 10-15 kts. Natural dispersion (mainly) & evaporation are fast and efficient. In < 24-48 hrs, MGO is removed from sea surface.	▶ "**Monitored Natural Attenuation - MNA**" (evaporation+ dispersion). Option: mechanical mixing for larger spills and medium winds.

Note. Option (very unlikely): mechanical recovery for larger spills if some weathered MGO remains.

Planning assumptions for instantaneous spills are based on fate & behaviour of MGO and condensate described in:

Operational Support n°3 "FATE & BEHAVIOUR OF OIL AT SEA".

Following parameters can be used to estimate the number of vessels to engage for mechanical mixing.

"Mechanical mixing (« Propeller wash »)", p.87

Treatment rates estimated for the response capabilities are conservative and detailed in:

"Oil spill response techniques treatment rates for TEP Liban", p.86

Table 1 : Indicative offshore response techniques & resources for instantaneous MGO & Condensate spills

OFFSHORE INSTANTANEOUS SPILLS OF MGO & CONDENSATES : TECHNIQUES & RESOURCES						
	TECHNIQUES				**RESOURCES (indicative)**	
VOLUME	**Monitored Natural Attenuation MNA**	**Mechanical mixing (*) –** MGO (option for condensates)	**Dispersant spraying**	**Option. Recovery (**) –** Weathered condensates	**TEP Liban**	**External**
< 1 bbl	✓					N/ A
< 1 to 2 m3	✓	*Option*			If needed (low winds): - 1 “mixing” vessel	N/ A
5 to 10 m3	✓	✓ if low winds				
10 to 50 m3	✓	✓ if low winds		*Option*		
50 to 300-400 m3	✓	✓ if low winds		*Highly unlikely scenario*	If needed (low winds): - 1 to 2 “mixing” vessels (if 50 to 100 m3) - 2 “mixing” vessels (if >100 m3)	- 1 to 2 additional “mixing” vessels (>200 m3) - 1 offshore recovery team (if needed) + Offloading & treatment of recovered oil
>400 m3	✓	✓ if low winds		*Spill of >400m3 condensate not considered realistic*	- 2 “mixing” vessels if possible	- 2+ additional “mixing” vessels (>300-400 m3) - 1 offshore recovery team (if needed) + Offloading & treatment of recovered oil
>2,000 m3	✓	✓ if low winds		*Spill of >2,000m3 condensate not considered realistic*	- 2 “mixing” vessels if possible	- 3+ additional “mixing” vessels (>100 m3) - 2 offshore recovery team (if needed) + Offloading & treatment of recovered oil

(*) Mechanical mixing is carried out immediately in low winds for MGO spills, not required for winds over 10-15 knots. Mixing may be implemented for condensate spills after initial evaporation.

(**) Recovery is an option for heavier possibly emulsified condensates, remaining at sea surface after evaporation.

Note. A recovery team includes a main vessel with boom and skimmer, and an assistance vessel to tow the boom. Specific boom can be deployed with only one vessel.

3.2 Tactics: Tier 1 very minor spill – <1 to 2 m3

Persistence of hydrocarbons at sea surface

- MGO & Condensate: Few hours to one or more day (without response)

Incident Action Plan - example

Day	1	2	3
MONITORING			
Direct observation	Vessel/ rig	Option	None
MARINE GAS OIL			
Mechanical mixing vessel n°1	Option if wind <10-15 kts	None	None
CONDENSATE			
Sample	Yes	None	None
Mechanical mixing vessel n°1	Option after initial evaporation	None	None

3.3 Tactics: Tier 1 minor spill – 5 to 10 m3

Persistence of hydrocarbons at sea surface

- MGO: Approximately few days to >one week (if low winds)
- Condensate: few days to >one week (for heavier fraction)

Incident Action Plan - example

Day	1	2	3	4
MONITORING				
Direct observation	**Vessel/ rig**	Option	Option	Option
Air quality monitoring	**Yes**	Option	None	None
Sample	**Yes**	Option	None	None
Aerial surveillance	**1**	**1**	Option	Option
MARINE GAS OIL				
Mechanical mixing vessel n°1	**if wind <10-15 kts**	Option	None	None
CONDENSATE				
Mechanical mixing vessel n°1	**If needed after initial evaporation & if wind <10-15 kts**	Option	None	None
Recovery vessels team n°1	No	Option	Option	None

3.4 Tactics: Tier 2 intermediate spill – 100 to 200 m3

Persistence of hydrocarbons at sea surface

- MGO: Approximately few days to >one week (if low winds)
- Condensate: few days to >one week (for heavier fraction)

Incident Action Plan – example

Day	1	2	3	4	5	6	7
MONITORING							
Direct observation	**Vessel/ rig**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	Option	Option
Air quality monitoring	**Yes**	**Yes**	Option	Option	None	None	None
Sampling	**Yes**	**Yes**	**Yes**	Option	None	None	None
Aerial surveillance	**1**	**1**	**1**	**1**	**1**	Option	Option
ARGOS buoys	**N°1 + N°2**						
SPILLWATCH	**Activated**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	Option
MARINE GAS OIL							
Mechanical mixing vessel n°1	**if wind <10-15 kts**			Option	Option	None	None
vessel n°2	N/ A	**Same as above**		Option	Option	None	None
CONDENSATE							
Mechanical mixing vessel n°1	**If needed <u>after</u> initial evaporation & if wind <10-15 kts**			Option	Option	None	None
vessel n°2	N/ A	**Same as above**		Option	Option	None	None
Recovery vessel team n°1	N/ A	Option	Option	Option	Option	None	None

N/ A: Not applicable, or non-available to account for mobilisation time.

Note. Option (unlikely): mechanical recovery if some weathered MGO remains and is not dispersible.

3.5 Tactics: Tier 3 spill – 500 m3

Persistence of hydrocarbons at sea surface

- MGO: Approximately one week or more (if low winds)
- Condensate: not considered a realistic scenario.

Incident Action Plan – example

Day	1	2	3	4	5	6	7	8	9	10
MONITORING										
Direct observation	**Vessel/ rig**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	Option	Option
Air quality monitoring	**Re-enforced**	**Yes**	**Yes**	Option	Option	None	None	None	None	None
Sampling	**Yes**	**Yes**	Option	Option	None	None	None	None	None	None
Aerial surveillance	**1**	**1**	**1**	**1**	**1**	Option	Option	Option	Option	Option
ARGOS buoys	**N°1 + 2**	**N°3**								
SPILLWATCH	**Activated**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	Option	Option	Option
MARINE GAS OIL										
Mechanical mixing vessel n°1	**In all cases first 2-3 days, after if wind <10-15 kts**					Option	None	None	None	None
vessel n°2	N/ A	**In all cases first 2-3 days, after if wind <10-15 kts & oil still in Lebanese waters**				Option	None	None	None	None
vessel n°3	N/ A					None	None	None	None	None
vessel n°4	N/ A	Option			None	None	None	None	None	None
CONDENSATE										
	Note. An instantaneous release of 500 m3 condensate is not a realistic scenario.									

N/ A: Not applicable, or non-available to account for mobilisation time.

Note. Option: mechanical recovery if some weathered MGO remains and is not dispersible.

3.6 Tactics: Tier 3 very large spill – 5,000 to 6,000 m3

Persistence of hydrocarbons at sea surface

- MGO: Approximately weeks or more (if low winds)
- Condensate: not considered a realistic scenario.

Incident Action Plan - example

Day	1	2	3	4	5	6	7	8	9	10
MONITORING										
Direct observation	**Vessel/ rig**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	**Vessel**	**Vessel**
Air quality monitoring	**Re-enforced**	**Re-enforced**	**Yes**	**Yes**	Option	Option	None	None	None	None
Sampling	**Yes**	**Yes**	**Yes**	**Yes**	Option	Option	None	None	None	None
Aerial surveillance	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
ARGOS buoys	**N°1 + 2**	**N°3**	**N°4**							
SPILLWATCH	**Activated**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**1 image/ day**	**Option1 image/ day**
MARINE GAS OIL										
Mechanical mixing vessel n°1	**In all cases first days, after if wind <10-15 kts**						Option	Option	Option	None
vessel n°2	N/ A	**In all cases first days, after if wind <10-15 kts & oil still in Lebanese waters**					Option	Option	None	None
vessel n°3	N/ A						Option	Option	None	None
vessel n°4	N/ A						Option	Option	None	None
vessel n°5	N/ A	N/ A	**if wind <10-15 kts & oil still in Lebanese waters**				Option	None	None	None
vessel n°6	N/ A	N/ A					Option	None	None	None
Recovery vessels team n°1	N/ A	N/ A	N/ A	Option (unlikely) depending on remaining MGO after evaporation and natural dispersion						
team n°2	N/ A	N/ A	N/ A	N/ A	Option (unlikely) depending on remaining MGO after evaporation and natural dispersion					
Coastal recovery vessels team n°1	N/ A	N/ A	N/ A	Option (unlikely)						
team n°2	N/ A	N/ A	N/ A	N/ A	Option (unlikely)					
CONDENSATE										
	Note. An instantaneous release of 5,000 m3 or more condensate is not a realistic scenario.									

N/ A: Not applicable, or non-available to account for mobilisation time.

Note. Option: mechanical recovery if some weathered MGO remains and is not dispersible.

3.7 Tactics: instantaneous spills of other refined products

A summary of tactics guidance for spills of other hydrocarbon products is provided below.

Table 2: Initial offshore response tactics for refined hydrocarbon products

PRODUCT	SPECIFIC GRAVITY 15°C/ 4°C	FLASH POINT (°C)	BEHAVIOUR	RESPONSE TACTIC
JET-A1	0,8 or less	40-45°C	Fast evaporation. Natural dispersion if medium/ strong winds.	**/!\ High inflammation risk.** ▶ **Monitor** when spilled at sea. ▶ **Rinse & dilute** on installations &/ or **cover with foam** (to limit vapours).
Lubricating Oil (typical)	0.85 to 0,95	> 60°C	Minimal loss through evaporation and natural dispersion. Note. Some subsea hydraulic oil have a specific gravity>1 and sink e.g. HW525.	▶ **Monitor.** ▶ **Mechanical dispersion** for large volumes (>few bbl's).
Hydraulic Oil (typical)	0.88			
Intermediate Fuel Oil – IFO	0,85 to 0,95	> 50°C	Limited natural dispersion & evaporation. Significant emulsification with waves.	▶ **Mechanical recovery** (boom & skimmer). *Note. Dispersant spraying may be efficient in favourable conditions & warm waters.*
Heavy Fuel Oil – HFO	>0,95	>60° to 90°C	Very limited natural dispersion & evaporation. Limited emulsification with waves.	▶ **Mechanical recovery** (boom & skimmer).

4. PROPOSALS OF TACTICS FOR BLOW-OUT

This section proposes **indicative tactics**[2] for the offshore surface response to a blow-out situation. The Worst-Case Discharge scenario for the exploration well in Block 4 leads to a large flow of gas (12.31 Million Sm3/day) and a condensate flow rate of 1,562 bopd (248 m3/day).

/!\ Proposed tactics are:

- **indicative only and to be adapted to the incident**. Response efficiency may be limited by many factors (MetOcean, logistics, etc.).
- **in line with the condensate response technics** proposed in the NOSCP (2017, Vol B, section 3.2.1):
  - "*Dispersant use on condensate: is no net environmental benefit (NEB) in treating with dispersants.*
  - *Containment and recovery: Condensate is largely unsuitable for containment and recovery due to safety issues. It has low viscosity, which means it makes a very thin layer on the surface, and easy fragmentation of the slick is expected*."
- **in line with the blow-out response tactics** proposed in the NOSCP (2017, Vol A, section 3.2.1):
  - "*Offshore well blowout of condensate: An offshore well blowout of condensate shows only a small probability of shoreline impact. In addition, the condensate is a light product and so therefore rapid evaporation of close to 100% in 24 hours would be expected.* ***Consequently, the only likely response action would be source control and monitoring and surveillance***. *In the unlikely event of the oil threatening the shoreline, further actions may be required for some sensitive shoreline protection and shoreline clean-up*."

Note from TEP Liban. Weathered condensates remaining at sea may require recovery.

For sketching legend of offshore tactics, refer to :

"Offshore spill response tactical sketching ", p.85

4.1 Blow-out situation and scenarios

The scenarios considered are derived from the worst-case discharge study of the 2019 drilling campaign.

	CONDENSATE BLOW-OUT
Product	**Gas with condensate API° 42° - 46°**
Condensate flow rate	**1,562 bopd**
Situation	Uncontrolled blow-out situation
Modelling scenario	Worst-Case Discharge
Depletion	No
H2S risk	Not expected (but considered for initial air monitoring – conservative approach)
Surface response	Monitoring, mechanical mixing after initial evaporation + possible recovery
Capping	20 days to cap & shut the well (well architecture resistant to sustain the shut - Communication TEP Liban 25/10/2019):
Relief well	90 days
SSDI	*Not considered in the base case.*

Behaviour of condensate during a blow-out is discussed in:

Operational Support n°3, section "BEHAVIOUR OF HYDROCARBONS DURING BLOW-OUT".

[2] Amongst other parameters, nature of condensate is unknown. Volume of surfacing condensate cannot be anticipated exactly.

4.2 Health & Safety, initial exclusion zone and No-Go zone (for spill response)

The initial Local Incident Commander ensures safety for offshore surface response (RSES on the drilling unit).

During a deep-sea blow-out (>1,000m depth), the gas-water mix and possible condensates (from the reservoir) rise to the surface through the water column. Studies and modelling shows that gas dissolves into the water column and does not reach the water surface. Some condensates will disperse and remain “trapped” subsea, drifting with subsea currents. The volume of condensates surfacing is difficult to anticipate as the characteristics of the condensates are not known.

A risk for health may appear close to the hydrocarbons surfacing area due to VOC, including BTEX, and possible H2S (though considered 0% in Block 4). Risk of uncontrolled inflammation is considered very low to non-significant.

The **Initial Exclusion Zone** above the well head is dedicated to subsea well control (no oil spill response in this area). This area is defined on a case by case basis, as per the:

ⓘ *TEP Liban Blow-Out Contingency Plan, 2019.*

A **Hot Zone or No-Go Zone,** without specific PPE and breathing apparatus, may be enforced at the hydrocarbons surfacing location (depending on the results of the air quality monitoring).

The horizontal offset (between the well head location and the surfacing point) estimated by the OSCAR modelling studies for Block 4 varies from 600m to 1.2 km, always to the NE of the well head.

IMT/ Operation/ Blow-out branch:

- Confirms as soon as possible the dimension of the **Initial Exclusion Zone**, around the well head.
- Deploys on site (with the Local IC) the monitoring teams in charge of:
  - monitoring air quality in the Initial Exclusion Zone;
  - estimating the blow-out flow rate at the well head.

At the same time, IMT/ Operation/ Surface branch:

- Confirms the need for a **Hot Zone** around the hydrocarbons surfacing area, based on the daily and continuous air quality measurements;
- Defines the area where oil spill response can take place safely without risk for health.

The limits of the No-Go Zone and oil spill response area are re-defined every day with local winds and currents.

/! As natural dispersion of condensates in the water column is anticipated to be higher than that of crude, the No-Go zone may not be required.

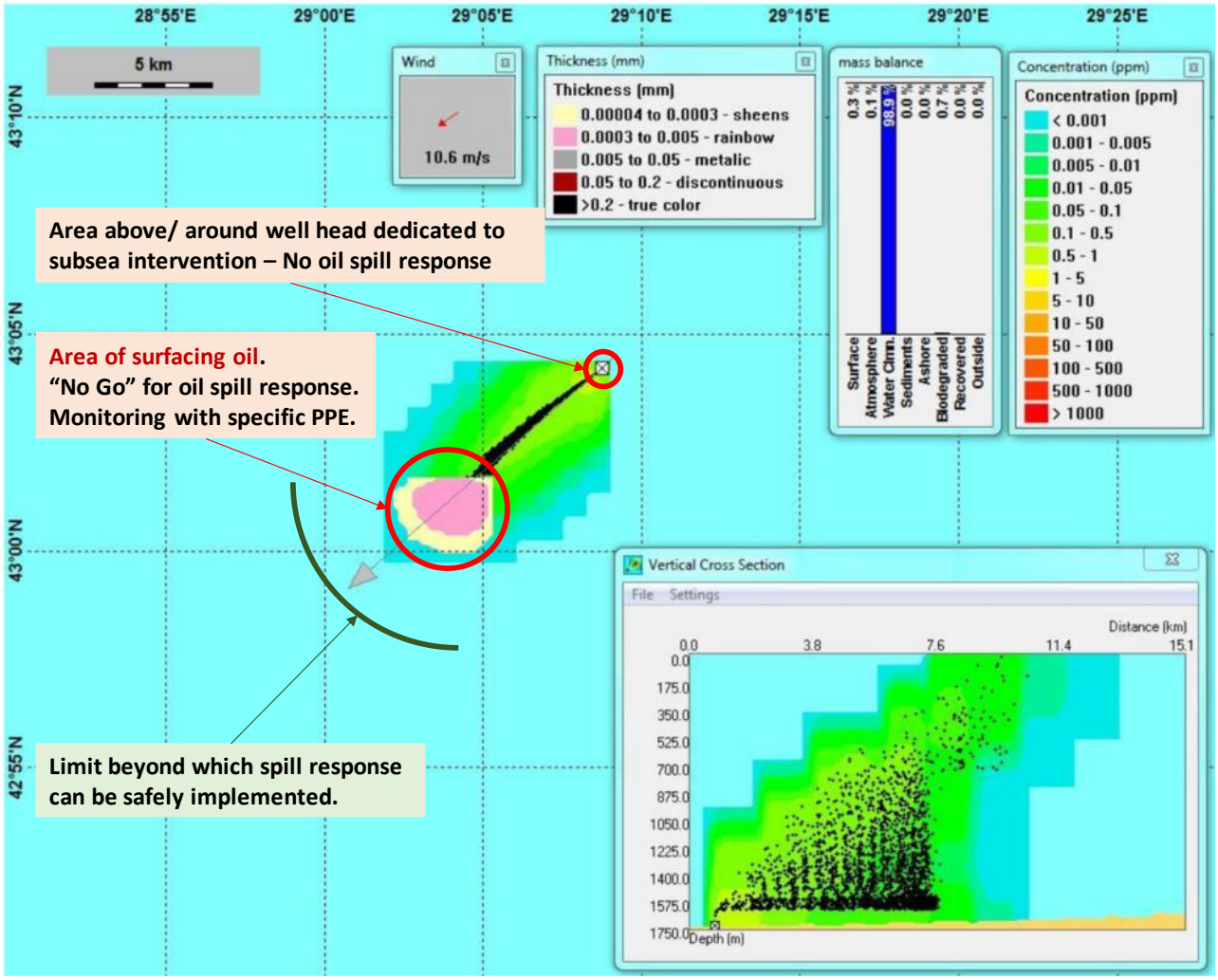


Figure 8 : Examples of oil surfacing offset and surface limits for oil spill response during a blow-out (background picture from : Total exploration well Oil Spill Modelling – OSCAR INTERNAL REPORT 2018)

4.3 Impacts, objectives and strategy

Impacts will be similar to those of a large Tier 3; but potentially expanded and include impacts on the water column (quality of water, impact on marine fauna etc.).

Objectives and strategy consider the continuous flow of oil. Table below presents the additional response objectives for a blow-out (in addition to the objectives for a large spill).

During a blow-out, hydrocarbons may affect the Lebanese coast (demonstrated by drift & behaviour studies for Block 4).

However, overall effects will be limited compared to a crude oil blow-out due to the non-persistent nature of condensate.

Type of objective (PEARL)	Objectives (examples)	Strategy
People: health & safety	**HEALTH & SAFETY** - Avoid the contact of people with the pollutant. - Ensure the health and safety of responders and close crew/ operators immediately at risk during the response.	- Continuous knowledge of surfacing oil area, slick and VOC in the atmosphere. - No contact with pollutant. - Limit VOC inhalation. - Job Risk Analysis for specific operations if new risks are considered (ex. night operations).
Monitoring of pollutant subsea	- Estimation of oil released in the environmental (per hour / day). - Maintain an up-to-date knowledge of pollutant across in the water column.	**MONITORING & MODELLING** - Oil flow rate measurement at the well head. - Monitoring subsea + sampling. - Subsea drift & behaviour modeling.
Environment & Human-use and economic activities	- Stop oil flow. - Reduce oil at sea surface. - Reduce VOC at the surface.	**SOURCE CONTROL** - Capping. - Well killing. **SUBSEA RESPONSE** - Disperse oil at the source, into the deep sea water.

4.4 Zoning principles for blow-out surface response

Surface response is organized in zones or “cones of response” adapted to the flow of drifting hydrocarbons and its level of weathering.

IMT/ Operations/ Surface branch defines the daily zoning (with support of IMT/ Planning), i.e. which response techniques is to take place in which area, to ensure the best and safe use of response resources.

Tactics consider that:

- vessels remain in their respective zones (i.e. they do not follow the drifting hydrocarbons as it would be the case for an instantaneous release).
- response techniques are adapted to the weathering of hydrocarbons in each area.

Zoning is reviewed every day (or more frequently if very changing MetOcean conditions) depending on observations and forecasts. General principle is illustrated in the figure below.

The response is usually most efficient close to the oil surfacing area, but vessels are engaged only after the effective initial natural dispersion &/ or evaporation and if air quality is confirmed and safety ensured.

Further away from the well area, limited number of vessels will be required due to the mainly non-persistent nature of condensates (for monitoring purposes and maybe recovery of remaining hydrocarbons).

The main operational risk is the simultaneous maritime, subsea and aerial (monitoring) activities in a small area in the well area.

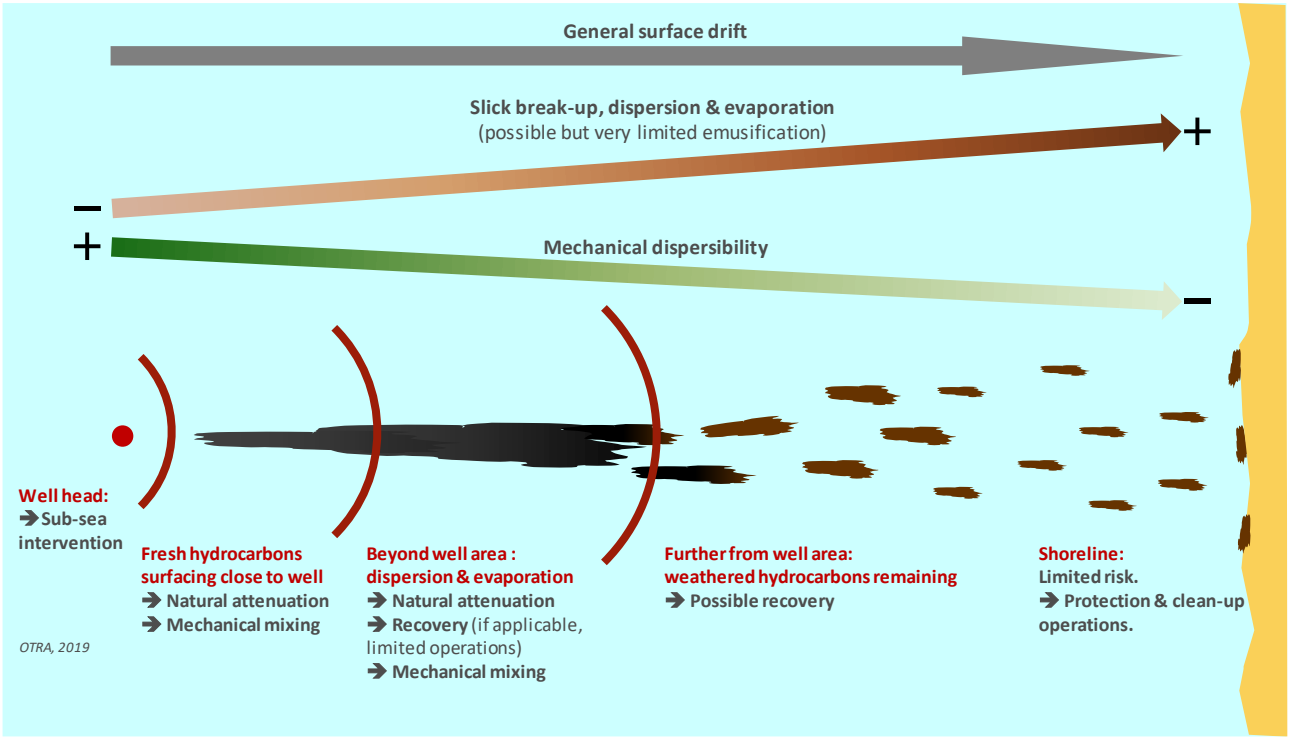


Figure 9 : Schematic hydrocarbon drift & behaviour for blow-out situation & response techniques for TEP Liban condensate blow-out situation (OTRA)

4.5 Strategy for blow-out Condensate 1,562 bopd + Capping day 20

The limited condensate flow-rate (1,562 bopd) will not require large surface response operations. Surface activity will focus on mechanical mixing and possible recovery operations; and monitoring of hydrocarbons and possible environmental effects.

/!\ The tool used in this section “INTEGRATED SPILL RESPONSE PLANNING FOR BLOW-OUT” (OTRA) is not a comprehensive fate & behaviour model including spill response, but a practical EXCEL tool used to estimate the type of response and dimension resources for a specific blow-out situation.

/!\ Assumptions used for the weathering of hydrocarbons are conservative (based on findings of Operational Support n°3). No biodegradation is considered.

/!\ Results in the present section are given as a conservative example of response to a worst-case blow-out. It is reminded that is impossible to anticipate MetOcean conditions and condensate characteristics.

4.5.1 Blow-out condensate 1,562 bopd – General zoning

For a condensate blow-out, following approach is proposed:

- **Well head zone.** Sub-Sea well intervention area (refer to TEP Liban BOCP – 2019).
- **Zone 1 – Very close to hydrocarbons surfacing area.** Monitored Natural Attenuation & monitoring.
- **Zone 1 – Drifting “fresh” condensates.** Mechanical mixing.
- **Zone 2.** Option: Containment and recovery of remaining weathered condensates.

The next figure outlines a possible zoning of spill response operations at peak.

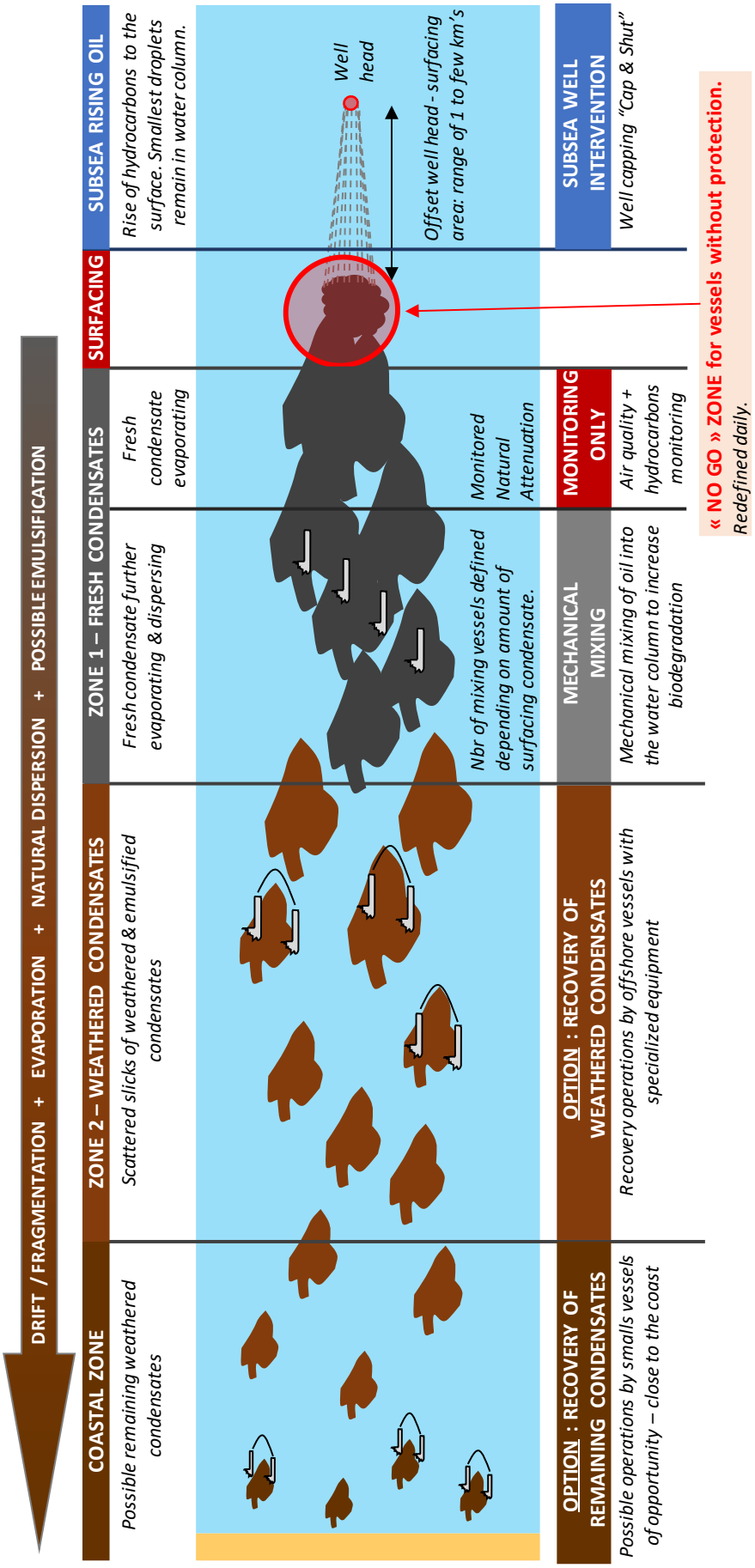


Figure 10 : Proposal of zoning for surface response operations, TEP Liban Block 4 – 1,562 bopd condensate blow-out situation before SSDI implementation (OTRA)

4.5.2 Blow-out condensate 1,562 bopd – Oil weathering & response assumptions

The **assumptions for the weathering of condensates during a blow-out** are summarized below.

Natural dispersion of oil in water column and at surface	30%
Evaporation	50%
Within first hours of reaching the surface	50%
During the first 2-3 days after drifting on the water	0%
Emulsification (Max. water content in %)	50%

Weathering assumptions are all estimated and conservative:

- 30% natural dispersion in the water column during the rise from the seabed is larger than for surface oil spills but appears reasonable for a light product such as condensate rising over 1,000m depth).
- 50% evaporation is a minimum (50-60% evaporation is reached in ADIOS 2.0 simulations in 12-24 hrs). Further evaporation is not considered to be conservative.
- 50% emulsification of remaining hydrocarbons (i.e. water intake) is chosen, even if 70%-90% is reached with ADIOS 2.0 simulations (which often over-estimates emulsification compared to real cases).

Information is detailed in:

Operational Support n°3, section "SUMMARY OF FATE & BEHAVIOUR ASSUMPTIONS"

Considering the above with a flow rate of 1,562 bopd (248 m3), daily and approximately:

- 75 m3 condensates disperse naturally in the water column during the rise.
- 174 m3 condensates surface after natural dispersion in the water column.
- 87 m3 condensates remain after dispersion and evaporation.
- 154 m3 emulsified condensates remain after dispersion, evaporation and emulsification.

The **assumptions for surface response efficiency for blow-out** are summarized below.

MECHANICAL DISPERSION BY VESSELS	
Oil dispersed/ Vessel/ day (m3)	10
CONTAINEMENT & RECOVERY BY VESSELS	
1st area: Recovered oil/ vessel/ day (m3)	0
2nd area: Recovered oil & water/ vessel/ day (m3)	10

See detail in (includes some baseline information on SSDI):

Appendices "Oil spill response techniques treatment rates for TEP Liban", p.86

The **assumptions for the mobilization of surface response resources** are as follow. They are indicative, considering a rapid yet realistic increase of response capabilities, but remain subject to availability of vessels and logistical constraints.

SUBSEA	Flow stops on day 20 (with "Cap & Shut").
VESSEL / AERIAL SPRAYING	*None (not appropriate).*
MECHANICAL MIXING	1st mixing vessel is active on day 1 (e.g. PSV of TEP Liban).

	2nd, 3rd and 4th mixing vessels are active on 2nd, 3rd and 4th day respectively (e.g. external vessels mobilized by TEP Liban). 🗎 *"Mechanical mixing operations", p.57*
RECOVERY	1st offshore recovery team is active (from assistance) on day 2. 2nd and 3rd offshore recovery teams are active on 4th and 6th day respectively. 🗎 *"Containment and recovery operations", p.59* *Note. An offshore recovery team is usually composed of two vessels (some recovery systems can be deployed with one vessel).* *Note. Response will also include recovery close to the coast with small vessels of opportunity (not considered here).*

4.5.3 Blow-out condensate 1,562 bopd – Spill Integrated Response Plan

The next tables details the escalating engagement of resources for the first days of a 1,562 bpod condensate blow-out, with hydrocarbons flow stopped at day 20.

Results are developed with the tool "INTEGRATED SPILL RESPONSE PLANNING FOR BLOW-OUT", and above assumptions and limitations.

- Each column is one day of operations.
- Each line represents a response resource (vessel, plane etc.).

🗎 *See file: "TEPLib BOut OSR Plan Cond 1562bopd_10d-SSDI_20d-Cap_20191104.xlsx" in …\Vol Ops Support\Op Sup 4 OSR Integ Resp Plan*

The "INTEGRATED SPILL RESPONSE PLANNING FOR BLOW-OUT" EXCEL tool is presented in:

🗎 *"Oil spill response planning EXCEL tool", p.90*

					Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ZONE 1 - FRESH CONDENSATES	MECH. MIXING VESSELS CLOSE TO SOURCE	days				1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0	0	0	0	0	0
	MECHANICAL MIXING VESSEL #1	19,0				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	MECHANICAL MIXING VESSEL #2	18,0					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	MECHANICAL MIXING VESSEL #3	17,0						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	MECHANICAL MIXING VESSEL #4	16,0							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	MECHANICAL MIXING VESSEL #5	15,0								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	DISPERSANT NEED FOR VESSELS (m3)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OIL DISPERSED BY VESSELS (m3)				850	10	20	30	40	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0
	RECOVERY VESSELS CLOSE TO SOURCE	days				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1ST AREA. OIL ONLY RECOVERED - NO EMULSIFICATION (M3)	-	-		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1ST AREA - OIL TREATED				850	10	20	30	40	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0

					Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ZONE 2 - WEATHERED HC	RECOVERY FAR AWAY FROM SOURCE	days				0	1	1	2	2	3	3	3	4	3	4	3	4	3	3	4	3	4	3	4	3	3	4	3	4	3	4	3	2	3	2
	RECOVERY VESSELS #1	30,0					1	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1		1	1
	RECOVERY VESSELS #2	24,0							1	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1	
	RECOVERY VESSELS #3	24,0									1	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1
	RECOVERY VESSELS #4	18,0											1	1	1	1	1		1	1	1	1	1	1	1		1	1	1	1	1	1				
	2ND AREA. EMULSIFIED OIL RECOVERED (M3)				960	0	10	10	20	20	30	30	30	40	30	40	30	40	30	30	40	30	40	30	40	30	30	40	30	40	30	40	30	20	30	20
	2ND AREA - OIL TREATED				960	0	5	5	10	10	15	15	15	20	15	20	15	20	15	15	20	15	20	15	20	15	15	20	15	20	15	20	15	10	15	10

*Figure 11 : TEP Liban Block 4 well 2019 Condensate blow-out 1,562 bopd indicative spill offshore integrated response planning – initial 31 days. Recovery in Zone 2 is optional (*EXCEL tool*)*

					Days	1	2	3	4	5	6	7	8	9	10
ZONE 1 - FRESH CONDENSATES	**MECH. MIXING VESSELS CLOSE TO SOURCE**	**days**				**1**	**2**	**3**	**4**	**5**	**5**	**5**	**5**	**5**	**5**
	MECHANICAL MIXING VESSEL #1	19,0				1	1	1	1	1	1	1	1	1	1
	MECHANICAL MIXING VESSEL #2	18,0					1	1	1	1	1	1	1	1	1
	MECHANICAL MIXING VESSEL #3	17,0						1	1	1	1	1	1	1	1
	MECHANICAL MIXING VESSEL #4	16,0							1	1	1	1	1	1	1
	MECHANICAL MIXING VESSEL #5	15,0								1	1	1	1	1	1
	DISPERSANT NEED FOR VESSELS (m3)				**0**	0	0	0	0	0	0	0	0	0	0
	OIL DISPERSED BY VESSELS (m3)				**850**	10	20	30	40	50	50	50	50	50	50
	RECOVERY VESSELS CLOSE TO SOURCE	**days**				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1ST AREA. OIL ONLY RECOVERED - NO EMULSIFICATION (M3)	-	-		**0**	0	0	0	0	0	0	0	0	0	0
	1ST AREA - OIL TREATED				**850**	10	20	30	40	50	50	50	50	50	50

					Days	1	2	3	4	5	6	7	8	9	10
ZONE 2 - WEATHERED HC	**RECOVERY FAR AWAY FROM SOURCE**	**days**				0	1	1	2	2	3	3	3	4	3
	RECOVERY VESSELS #1	30,0					1	1	1	1	1	1		1	1
	RECOVERY VESSELS #2	24,0							1	1	1	1	1	1	
	RECOVERY VESSELS #3	24,0									1	1	1	1	1
	RECOVERY VESSELS #4	18,0											1	1	1
	2ND AREA. EMULSIFIED OIL RECOVERED (M3)				**960**	0	10	10	20	20	30	30	30	40	30
	2ND AREA - OIL TREATED				**960**	0	5	5	10	10	15	15	15	20	15

*Figure 12 : TEP Liban Block 4 well 2019 Condensate blow-out 1,562 bopd indicative spill offshore integrated response planning – initial 10 days . Recovery in Zone 2 is optional (*EXCEL tool*)*

/!\ Following results are indicative based on the Integrated Response Plan (EXCEL tool) for the first 31 days.

- **Total condensate** released in the environment until flow is stopped on day 20: 4,720 m3 (approximately 29,700 bbl).
- **Maximum number** (on one day) of
  - spraying aircrafts: 0
  - spraying vessels: 0
  - mixing vessels: 5
  - recovery vessels teams: 4
- **Total volume of dispersant used**: 0 m3

Figure below presents an estimation of the mass balance on day 40 (after the end of response operations) based on the above tactics.

- Remaining condensates will partly evaporate and disperse naturally, assisted by mechanical mixing.
- Heavier fraction of the condensates persisting at sea will require mechanical recovery.
- Some hydrocarbons not dispersed/ evaporated or treated at sea may ground or drift further North out of the Lebanese waters and EEZ.

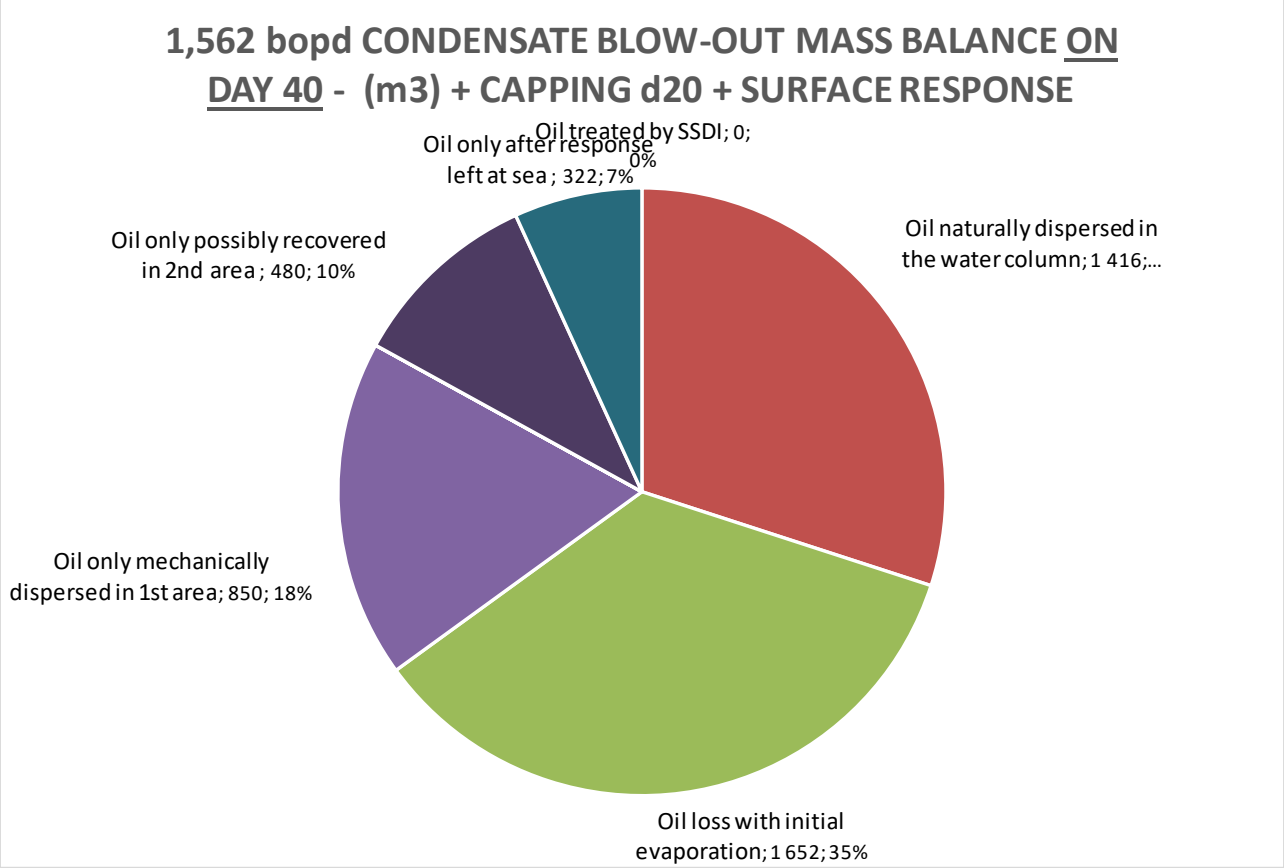


Figure 13 : TEP Liban Block 4 well 2019 - Condensate blow-out 1,562 bopd indicative mass balance on day 40 (OTRA EXCEL tool)

/!\ Figures show a treatment of >90% oil at sea. However, response at sea is rarely so efficient due to various limiting factors (weather, operational, mechanical failure, logistics, available of guidance aircrafts etc.).

Figure below presents a summary of condensate coming out of well, evaporated & dispersed, treated and remaining for the first 60 days.

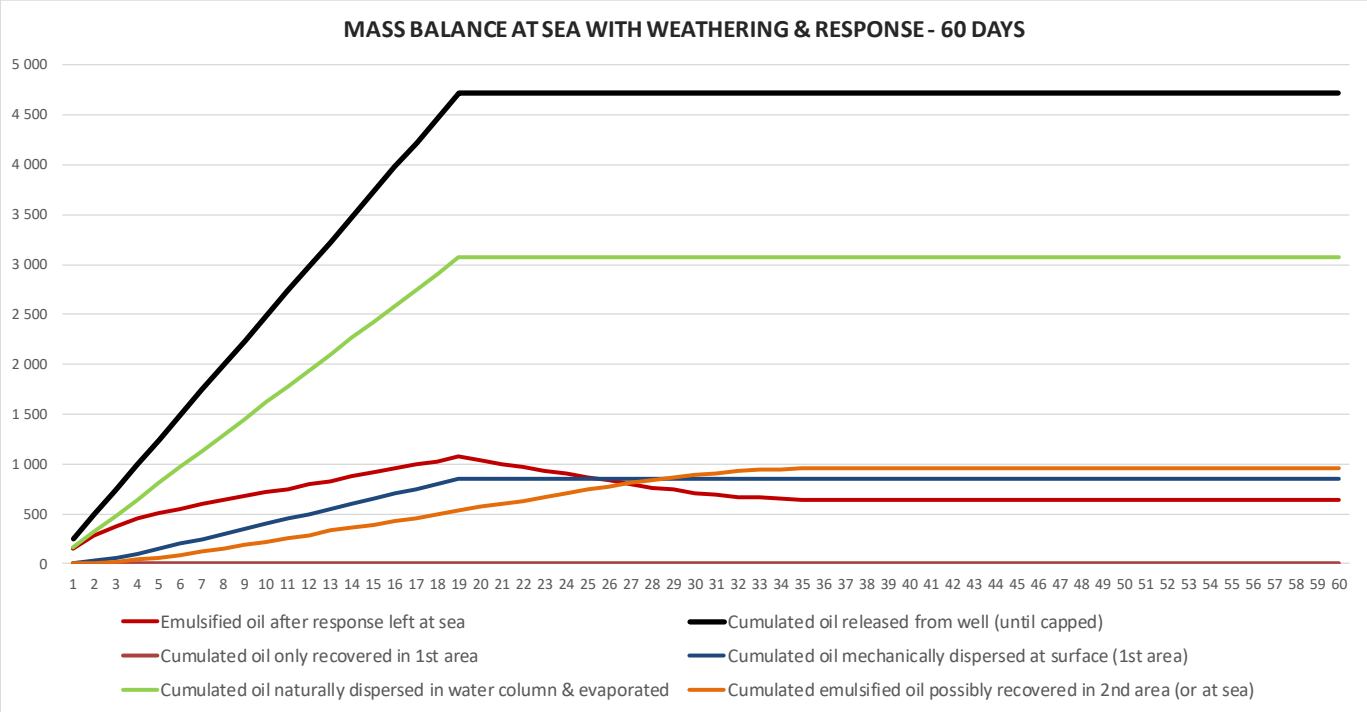


Figure 14 : TEP Liban Block 4 well 2019 - Condensate blow-out 1,562 bopd indicative daily mass balance – First 60 days (EXCEL tool)

4.5.4 Blow-out condensate 1,562 bopd – Offshore resources mobilization

Figure below presents a summary of oil coming out of 1st response area per day (chart bars) and cumulating in the 2nd area (solid black curve for emulsified hydrocarbons and brown curve for hydrocarbons only), as well as the response resources engaged for the first 31 days.

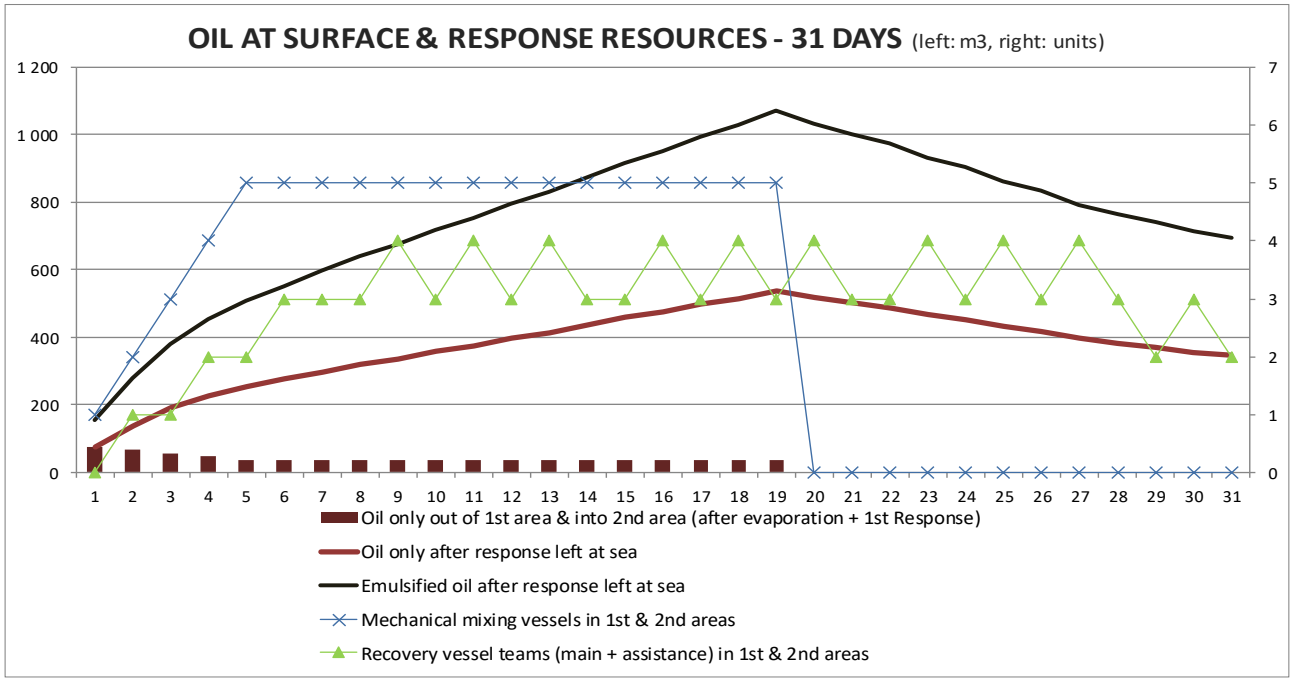


Figure 15 : TEP Liban Block 4 well 2019 - Condensate blow-out 1,562 bopd Response vessels indicative mobilization for 31 days excluding monitoring (Note: recovery teams stop 1 day every 7 days. OTRA tool)

No dispersant is required in Lebanon in the base case response. If any should be needed, it is mobilized by cargo aircraft. Mobilization of the SSDI and dispersant product is covered by the BOCP.

Dispersant can be delivered by cargo planes in Beirut between day 3 & 4 (note. B747 carries 42 m3, liquid cargo capacity limited by Aviation Advisory note).

/!\ Memo "Urgent Dispatch of Dispersant to EP Affiliates, 120 January 2018, Chrono # LSO 18-03 & GCA 18-01 sets-up a procedure for the "*shipping of the first delivery approximately **72 hours** after receiving the affiliate's request (subject to aircraft availability)*".

4.5.5 Blow-out condensate 1,562 bopd – Tactical zoning

The figures below provide guidelines for offshore blow-out zoning considering:

- Proposed response plan above;
- Indicative drift to the North-North-East.

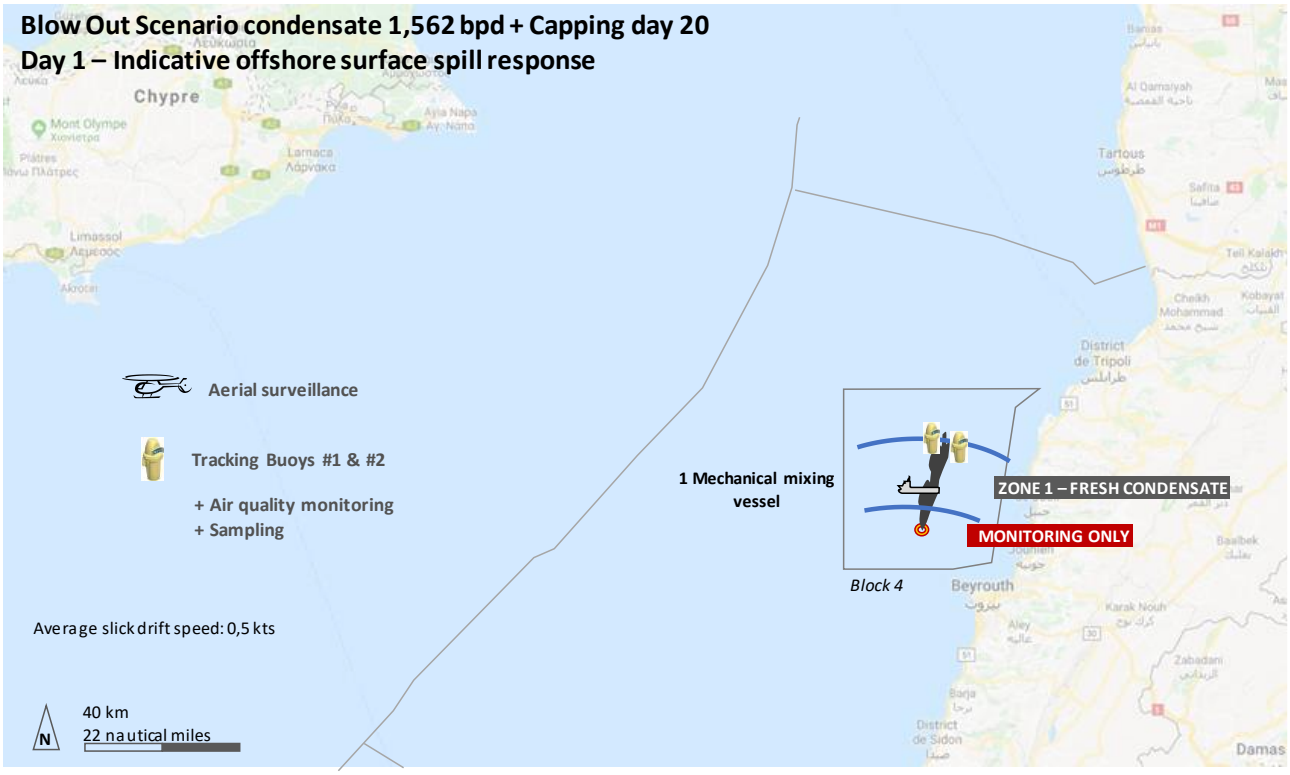


Figure 16 : TEP Liban Block 4 well 2019 - Condensate blow-out 1,562 bopd - Indicative zoning of surface response on day 1

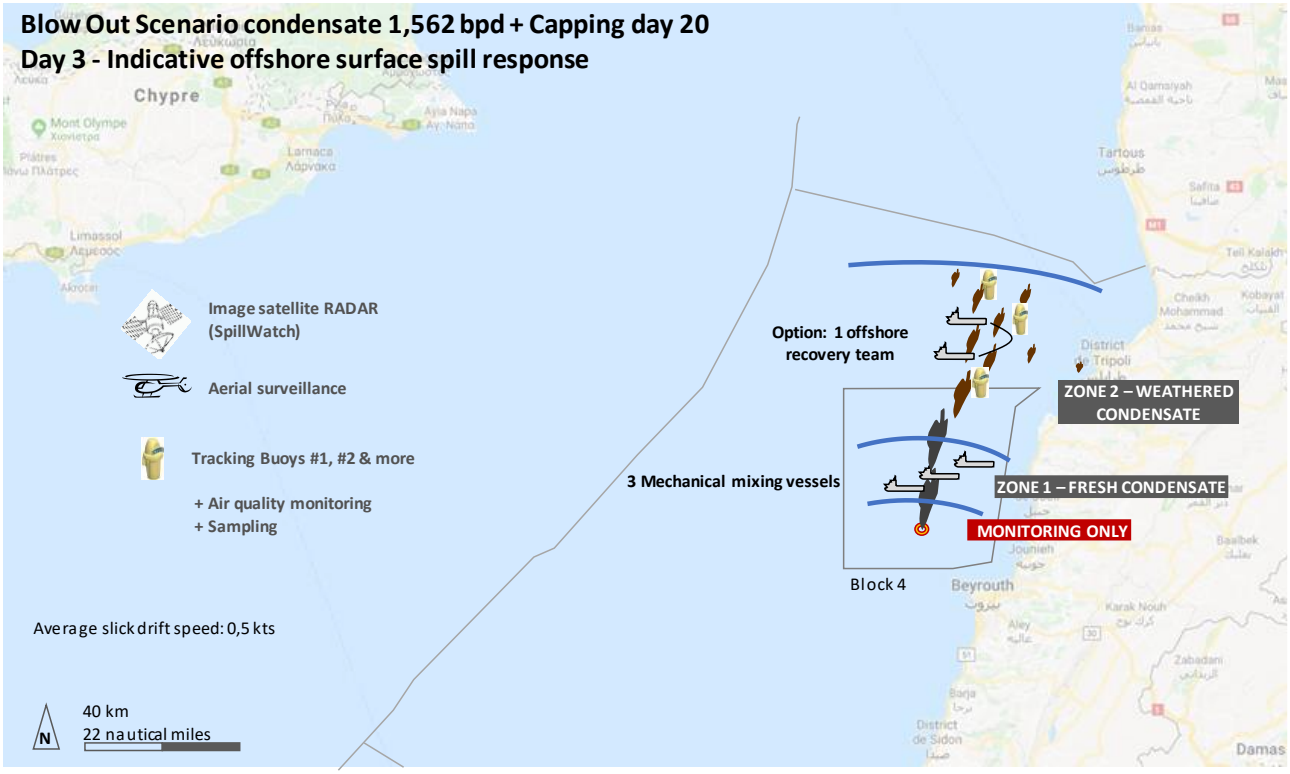


Figure 17 : TEP Liban Block 4 well 2019 - Condensate blow-out 1,562 bopd - Indicative zoning of surface response on day 3

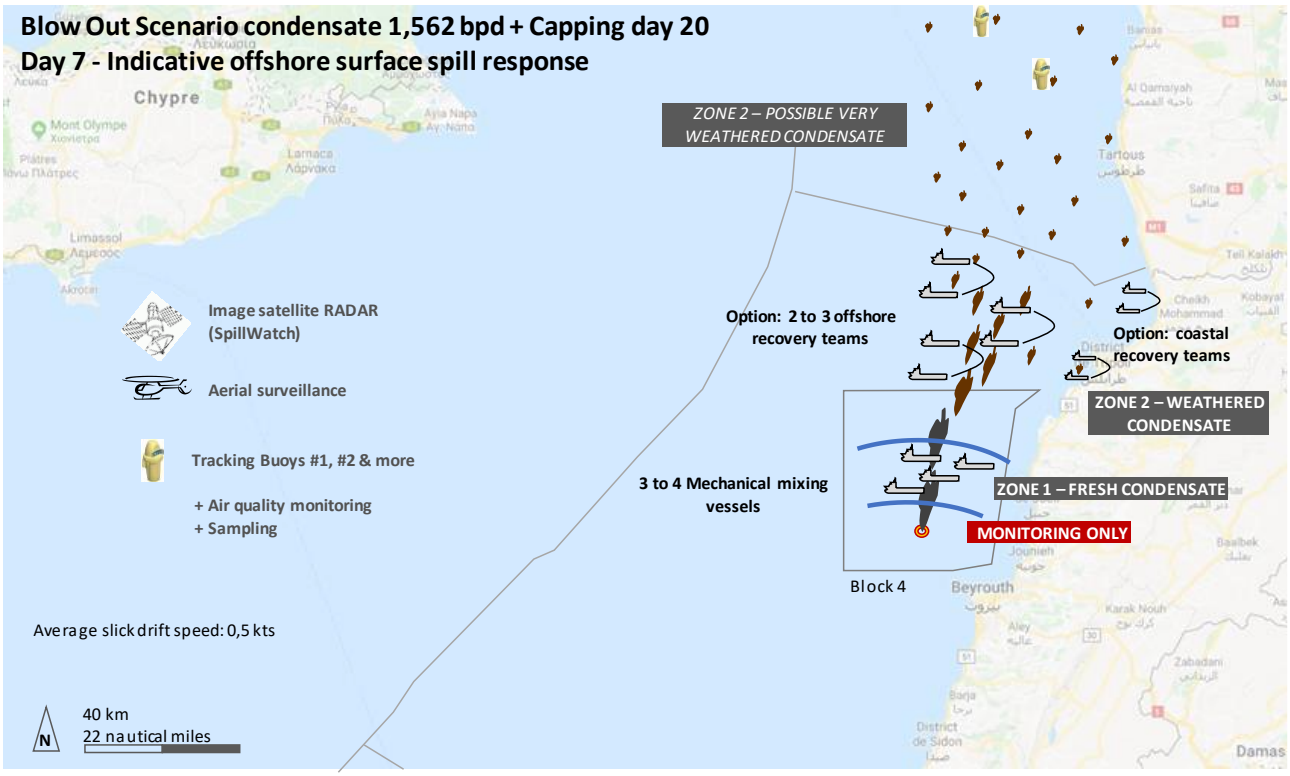


Figure 18 : TEP Liban Block 4 well 2019 - Condensate blow-out 1,562 bopd - Indicative zoning of surface response on day 7

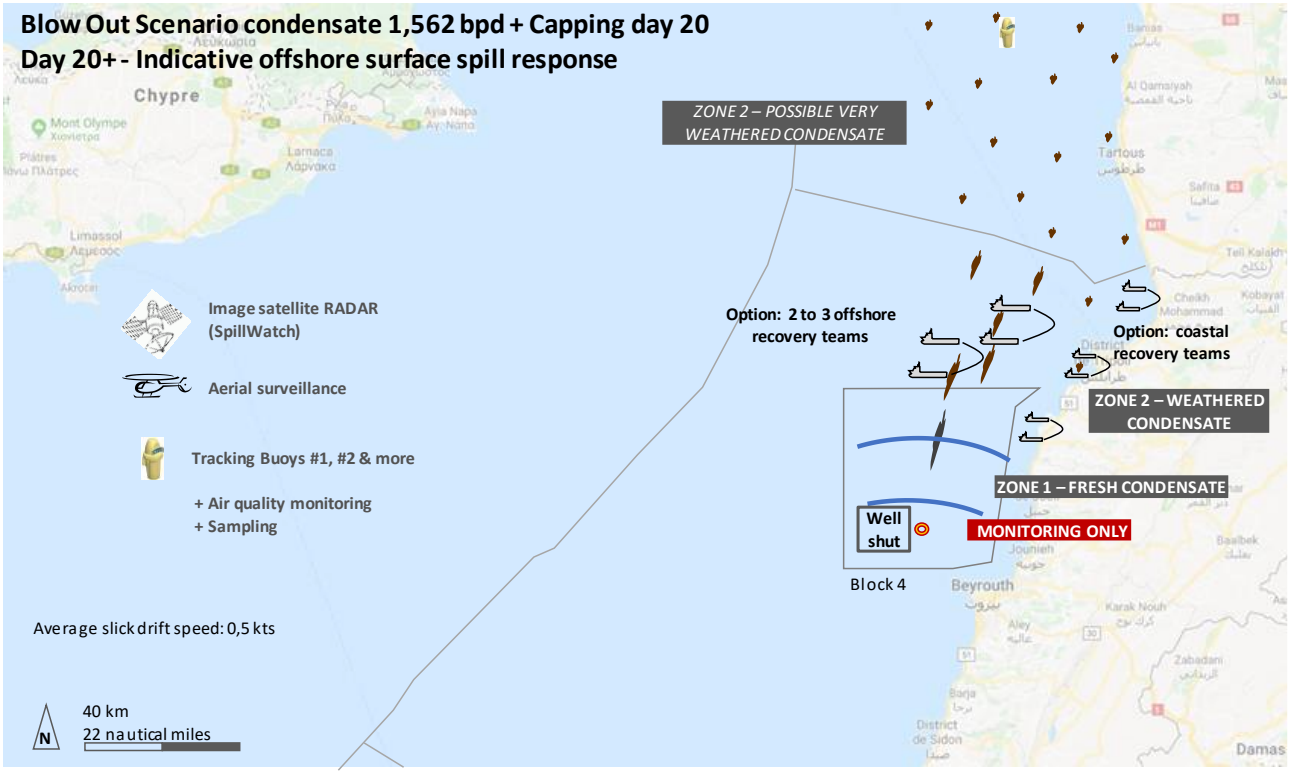


Figure 19 : TEP Liban Block 4 well 2019 - Condensate blow-out 1,562 bopd - Indicative zoning of surface response on day 20+

5. PREPARATION, IMPLEMENTATION, COORDINATION & FOLLOW-UP

IMT/ Operations prepares the response operations, with the advice of IMT/ Planning regarding oil characteristics, behaviour, window of opportunity for mechanical mixing, choice of tactics and appropriate response equipment etc.

5.1 Combined maritime and aerial operations

A key operational challenge is the daily planning and coordination of simultaneous subsea, aerial and maritime operations, during a blow-out.

The dedicated areas in the vicinity of the well (Initial Exclusion and Hot Zone or No-Go zone) are defined and enforced each day for subsea response.

Dedicated surface response and monitoring are set-up (with maritime and civil aviation authorities).

Flight plans are defined with the pilots; and agreed by the civil air traffic control.

5.2 Mechanical mixing operations

To have an estimation of the treatment capabilities of mixing vessels, see:

"Mechanical mixing (« Propeller wash ») ", p.87

5.2.1 Preparation of mechanical mixing

ANY SPILL

Initial mixing operations are managed by the Local IC (initially the RSES), with available TEP Liban supply vessels. TEP Liban head office will provide technical assistance.

Dispersibility

▶ **Evaluate the efficiency of natural dispersion + evaporation, and need for mechanical dispersion**

- MGO, indicative ranges:
  - < 5 kts winds ➔ >50% oil remaining at sea surface after 48 hrs ➔ Mechanical mixing immediately.
  - 10 kts winds ➔ <10% oil remaining at sea surface after 24 hrs ➔ Mechanical mixing to consider.
  - > 15-20 kts ➔ <5% oil remaining at sea surface after 6 hrs ➔ No mechanical mixing needed.
- Condensate. Always prefer initially natural evaporation/ dispersion (fist hours). Case-by-case after.

Operational Support n°3 FATE & BEHAVIOUR OF OIL AT SEA

▶ **Evaluate the mechanical dispersibility of hydrocarbons**:

- Freshly spilt MGO is dispersible and remains dispersible a few days (particularly with low winds).
- Condensate may be dispersible after the initial evaporation for few hours to days – to confirm case-by-case.

▶ Organize:

- Hydrocarbon sampling at sea surface;
- Test of mechanical mixing with vessel sailing through the slick (after safe conditions are confirmed).

Slick location

▶ Request aerial surveillance.

▶ Locate target-slicks.

▶ Ensure vessels are guided onto and remain in the thick slicks.

▶ Anticipate the drift of slicks during the vessel mobilization. Relocate vessels as the slicks drift.

Dimensioning

▶ Estimate the number of vessels to engage for the volume of oil to recover and considering the efficiency of natural dispersion and evaporation.

Tactics

▶ Ensure the Local IC is advised on the tactics (i.e. best way to engage vessels): slick to treat first, sailing direction, relocation, reporting etc.

Operational Support n°5 OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION

Health & safety

▶ Ensure captains carry out air quality monitoring.

TIER 2 SPILLS in addition to "ANY SPILL" actions	**AND TIER 3 SPILLS**

Overall planning, preparation and coordination of spraying operations is the responsibility of the IMT.

Mechanical mixing is coordinated on site by the Local IC.

▶ Estimate the "window of opportunity" (How long may hydrocarbons remain dispersible?) to estimate the time available to mobilize additional mixing vessels.

Note. Prudently over-estimate the window of opportunity (if oil is not dispersible sooner than expected; resources are demobilized. Worst case is having dispersible oil without vessels).

▶ Estimate the number of additional vessels to mobilize.

▶ Source other vessels to mobilize (external providers).

5.2.2 Implementation & coordination of mechanical mixing

/!\ Aerial guidance on thicker/ larger slicks is critical.

ANY SPILL – MIXING VESSEL

▶ Mobilize vessel available on site (instructed by the RSES) or request vessel.

▶ Organize aerial surveillance early in the morning, to locate the thickest slicks.

▶ Transfer information from aerial surveillance (spraying targets) to Local IC.

▶ Instruct vessels:

- Remind need for air quality monitoring.
- Provide information on nature of products and risks.

▶ Organize next day operations.

TIER 2 SPILLS in addition to "ANY SPILL" actions	**AND TIER 3 SPILLS**

Reinforced vessel mixing

▶ Mobilize additional vessels (TEP Liban vessel or external).

▶ Designate the leading vessel for operations.

▶ Inform the Local IC of the arrival of the vessels and provide contacts.

▶ Review each day the zoning of mixing operations according to the location of target slicks.

▶ Organize transit and integration of the other vessels.

5.2.3 Follow-up of mechanical mixing

ANY SPILL

▶ Request a daily report from the Local IC at sea (feedback from each vessel):

- Appearance of encountered slicks.
- Visual assessment of the mechanical mixing efficiency;
- GPS track, photos, samples etc.

▶ Evaluate the efficiency of mechanical mixing: volume of oil dispersed (past slick observations, oil mass-balance etc.). Compare amount of dispersed oil compared to expected results.

5.3 Containment and recovery operations

Recovery operations may be required for Tier 2 or 3 spills if weathered condensates remain after evaporation. Mechanical recovery is normally not needed for MGO but is kept as an option. Due to the non-persistent nature of MGO and condensates, recovery operations will be limited (compared to spills of crude oil).

TEP Liban can have access to resources to implement one containment and recovery operation within 24 to 36 hrs if needed.

To have an estimation of the treatment capabilities for recovery for TEP Liban, see:

"Recovery treatment ", p. 88

To organize on site and carry out maritime recovery operations, see:

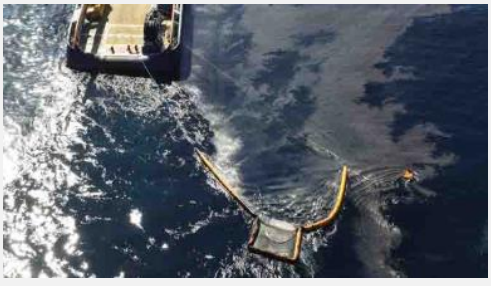
Operational Support n°5, section "CONTAINMENT AND RECOVERY".

For the recovery equipment TEP Liban has access to, see:

Operational Support n°6, section "OFFSHORE OIL SPILL RESPONSE EQUIPMENT".

5.3.1 Recovery equipment - examples

Following table proposes guidelines to select recovery equipment depending on the nature of hydrocarbons.

	ZONE 1 FRESH CONDENSATE	ZONE 2 OFFSHORE WEATHERED CONDENSATES	ZONE 2 FURTHER OFF WELL AREA VERY WEATHERED CONDENSATES
	INCREASING DRIFT & WEATHERING		
	Large slicks	Scattered patches of weathered, viscous & emulsified condensate	Scattered weathered & viscous condensate
Recovery System	N/ A. Monitored Natural attenuation is preferred.	Weir skimmer (med./high viscosity) or Brush skimmers (Oleophilic) + Pumps suited to med./high viscosity oil (e.g. screw pump)	Same as ZONE 2 And special high-viscosity oil residue recovery nets, e.g. THOM SEA (picture below). + Makeshift tar balls recovery nets (coastal).
Examples	Pictures : French Marine National, 2019		

TEP Liban will use offshore shore robust equipment adequate for the recovery of weathered MGO or condensate, e.g.

- 250m (mini.) of offshore conventional inflatable boom, total height: 1.5m mini.
- Offshore weir & brush skimmer, mini 50-70 m3/ hr theoretical flow rate

5.3.2 Overview of offshore containment & recovery operations

Figure below outlines the set-up of TEP Liban for the first offshore containment & recovery operation.

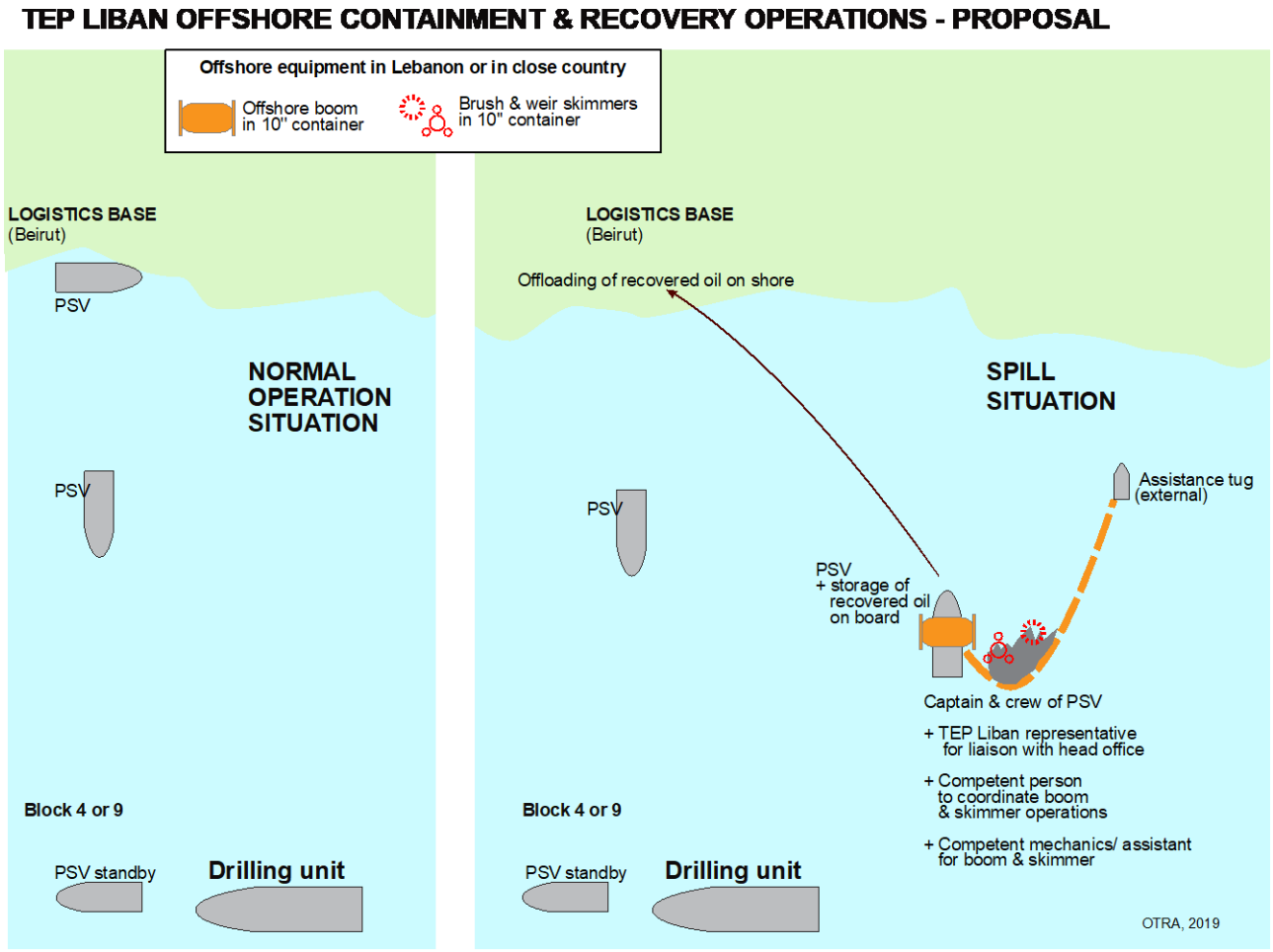


Figure 20 : set-up of TEP Liban for offshore containment & recovery operations

5.3.3 Preparation of offshore containment & recovery operations

TIER 2 SPILLS	AND TIER 3 SPILLS

A recovery team usually comprises 2 ships:

- 1 main vessel with boom and skimmer (see *"Requirements for recovery vessels", p.92*)
- 1 towing vessel (e.g. tug).

Involved personnel

Ensure **competent personnel** deploys and operates offshore boom & skimmer:

▶ Recovery team leader (on main vessel): competent personnel for recovery

▶ Mechanical engineer (on main vessel): competent personnel for spill equipment

▶ Crew of the vessels

Oil recovery equipment

▶ TEP Liban can have access to offshore containment & recovery equipment, at all time during the drilling campaign, and mobilized in up to 48 hrs.

- Offshore heavy-duty boom (1.5m total height minimum deflated)
- Offshore skimmer (weir/ brush/ drum).

Support vessels identified

▶ Main vessel: TEP Liban PSV (option. chartered vessel).

▶ Support vessel: chartered tug from Lebanon (or close country)

Oil characteristics

▶ Evaluate the type of hydrocarbons to recover and its initial viscosity.

- Remaining condensate: low/ medium/ high viscosity? Emulsification?
- Other hydrocarbons?
- *Note. Viscosity always increases, mainly with emulsification*.

▶ Confirm the TEP Liban spill equipment is adequate depending on the type of oil.

Consider options if needed: specialized trawling nets for weathered/ viscous residue (deployed with only one vessel using a BoomVane/ Paravane system).

Slick location

▶ Plan aerial surveillance.

▶ Locate target-slicks for recovery.

▶ Ensure vessels are guided onto the thick slicks.

▶ Anticipate drift of slicks for the vessel mobilization. Relocate vessels as slicks drift.

Dimensioning

▶ Confirm the number of recovery teams to engage considering the oil to recover.

- **Initial mobilization of one recovery team** is considered for TEP Liban (if and when needed).
- Tier 3 or blow-out: additional team s may be mobilized.

▶ Confirm vessels and equipment to mobilize. Evaluate the need for ancillaries, PPE, sorbent, transfer pumps etc.

Management and procedures

▶ Agree on responsibilities for the commandment of operations at sea between the vessels: managed by TEP Liban only? Authorities? Other if mobilized?

▶ Ensure captains of recovery vessels have correct operational procedures, job risk assessment etc.

Tactics

▶ Agree on tactics with local IC for containment & recovery (i.e. best way to engage vessels): slick to recover first, sailing direction, relocation, reporting etc.

▶ Outline the zoning of operations, see:

Operational Support n°5, section "COASTAL CONTAINMENT AND RECOVERY".

Management of recovered hydrocarbons

▶ Evaluate for the recovery team:

- The recovered oil storage capabilities of each vessel compared to the possible volume of oil recovered daily.
- The approximate possible number of days work before needing to offload the recovery vessel.

▶ Plan decantation of recovered oil at sea (authorization/ information of authorities? Equipment on vessels?).

▶ Identify the facility(ies) onshore to offload the recovered oil.

▶ Plan the offloading of the recovery vessels &/ or intermediate storage vessel/ tanker.

5.3.4 Implementation & coordination of containment and recovery

/!\ Aerial guidance on thick target slicks is critical.

TIER 2 SPILLS	AND TIER 3 SPILLS
▶ Mobilize vessels and recovery equipment. ▶ Understand operational capabilities and limitations of the recovery vessels: length of boom, type of recovery equipment, recovered oil storage oil capability etc. ▶ Have ETA of recovery vessels on area of operations.	
▶ Designate the leader vessel for recovery operations (TEP Liban, authority or other). ▶ Inform the Local IC of the arrival of the recovery vessels.	
▶ Organize aerial surveillance early in the morning, to locate the thick target slicks. ▶ Review each day the zoning of spraying operations and location of target slicks. ▶ Transfer information from aerial surveillance (target slicks) to Local IC.	
▶ Instruct vessels: • Provide H&S instructions (regarding oil to recover). • Ensure crew have adequate PPE + sorbent + deck protection etc. • Follow the drift of the slicks to remain in the thick target slicks. • Check the oil content in the oil & water mix recovered.	
▶ Plan the operations for following days (based on findings of the aerial surveillance).	
▶ Request the exceptional authorization to carry out decantation at sea – if needed. ▶ Follow-up the filling of the recovered oil tanks. ▶ Plan offloading of the recovery vessels in Logistics base with the waste management contractor of TEP Liban.	

5.3.5 Management, decantation & transfer of recovered oil

A mix of oil and water will be recovered on board the recovery vessels.

Decantation on board the vessel allows pumping the decanted water back to the sea (from the water/ oil mix) to maximize the use of the storage capability onboard.

This practice is common during spill response. However, even after a careful decantation, water with more than 15 ppm of oil may be discharge at sea.

/!\ The Mediterranean Sea is a “special area” (since 1983 October 2nd, as per MARPOL/ Annex 1 & IMO conventions) where discharge at sea of oil or oily residue is prohibited for vessel above 400 gross tonnage (only treated bilge waters may be discharged – under conditions).

http://www.imo.org/en/OurWork/Environment/SpecialAreasUnderMARPOL/Pages/Default.aspx

TEP Liban will limit as much as practically possible decantation at sea and will require an authorisation from the Authorities. The limited volumes to be recovered (even in a blow-out situation) should limit decantation.

Recovered oil will be offloaded in Beirut port or in the most convenient port, and managed by an adequate oily waste management company with certified installations for oily waste treatment.

Waste management company with contract at Logistics base is one viable option for waste treatment.

5.3.6 Follow-up of containment and recovery

TIER 2 SPILLS	AND TIER 3 SPILLS

▶ Request a daily report from the Local IC at sea (feedback from each vessel):

- Appearance of encountered oil and slicks.
- Volume of recovered oil & water mix, estimated recovered pure oil, samples, area of operations etc.
- GPS track, photos, samples etc.

▶ Evaluate the efficiency of the recovery operations: volume of oil recovered (past slick observations, oil mass-balance etc.).

▶ Compare amount of recovered oil compared to expected results.

6. MOBILIZATION OF ASSISTANCE

IMT/ Logistics section manages the mobilization of external resources and is the contact point with assistance providers (except advisor & specialists, managed by IMT/ Planning).

6.1 Emergency contracting procedure

TEP Liban has an emergency contracting procedure in place, allowing to expedite single-source contracts in emergency situations within few hours, by exceptionally bypassing the normal TEP Liban purchase procedures.

The emergency contracting procedure is managed by the C&P department of TEP Liban.

6.2 Mobilization of personnel, Total and external

The following table proposes an indicative list of personnel to request from Total H.Q. (internal or external) to initially re-enforce the IMT in Beirut for a large Tier 3 / Blow-out situation, with offshore response and possible oil on the shore.

INDICATIVE TOTAL PERSONNEL TO MOBILIZE FOR TIER 3/ BLOW-OUT

Proposed positions, numbers & source of personnel are indicative.

Blow-out specific positions are highlighted in brown.

	Position - refer to TEP LIBAN OSCP Vol 1.1	Total	Team	Location
	Incident Commander (assistant/ replacement)	1	IMT	Beirut
	Legal advisor (insurance, claims, environmental damage…)	1	IMT	Beirut
	Planning Section / Situation Unit Leader	1	IMT	Beirut
	Planning Section / Situation / Incident Situation	1	IMT	Beirut
	Planning Section / Situation / GIS specialist	1	IMT	Beirut
	Planning Section / Resources Unit Leader	1	IMT	Beirut
	Planning Section / Documentation Unit Leader	1	IMT	Beirut
	Planning Section / Environment Offshore Unit Leader	1	IMT	Beirut
	Planning Section / Environment Onshore Unit Leader	1	IMT	Beirut
	Planning Section / Environment Onshore Unit / Protection	1	IMT	Beirut
	Planning Section / Environment Onshore Unit / SCAT	1	IMT	Beirut
	Operation Section / Surface branch director	1	IMT	Beirut
	Operation Section / Surface / Subsea monitoring group supervisor	1	IMT	Beirut
	Operation Section / Surface / Surface monitoring group supervisor	1	IMT	Beirut
	Operation Section / Surface / Mixing group supervisor	1	IMT	Beirut
	Operation Section / Surface / Recovery group supervisor	1	IMT	Beirut
	Operation Section / Air Operations branch director	1	IMT	Beirut
	Operation Section / Vessel branch director	1	IMT	Beirut
	Operation Section / Shoreline branch director	1	IMT	Beirut
	Operation Section /Shoreline / Onshore survey group supervisor	1	IMT	Beirut
	Operation Section /Shoreline / Protection group supervisor	1	IMT	Beirut
	Operation Section / Waste branch director	1	IMT	Beirut
	Logistics Section / Support branch director	1	IMT	Beirut
	Logistics Section / Support / Supply unit leader	1	IMT	Beirut
	Logistics Section / Support / Supply ordering manager	1	IMT	Beirut
	Logistics Section / Support / Supply ordering - Local	1	IMT	Beirut
	Logistics Section / Support / Supply ordering - International	1	IMT	Beirut
	Logistics Section / Support / Supply ordering - Ships & aircrafts	1	IMT	Beirut
	Logistics Section / Support / Equipment manager	2	IMT	Beirut
	Logistics Section / Support / Personnel manager	2	IMT	Beirut
	Logistics Section / Support / Facilities unit leader	1	IMT	Beirut
	Finance Section Chief	1	IMT	Beirut
	Finance Section / Cost unit leader	1	IMT	Beirut
	Finance Section / Time unit leader	1	IMT	Beirut
	Finance Section / Procurement unit leader	1	IMT	Beirut
	IT support (computer & Telecom)	2	IMT	Beirut
	IMT room set-up, furniture, consumables, display etc. support	2	IMT	Beirut
	Security specialist	2	IMT	Beirut
	IMT Total	**43**		

The following table proposes an indicative list of personnel to request from Total H.Q. (internal or external) to initially re-enforce site teams for large Tier 3/ blow-out situation.

INDICATIVE TOTAL PERSONNEL TO MOBILIZE FOR TIER 3/ BLOW-OUT				
	Position - refer to TEP LIBAN OSCP Vol 1.1	**Total**	**Team**	**Location**
	Local Incident Commander Offshore (spill response)	1	Vessel	Offshore
	Blow-out flow rate Team leader	1	Vessel	Offshore
	Sampling/ Dispersion SMART-Fluorometer/ Air quality Team leader	1	Vessel	Offshore
	Planning officer in Local Incident Command Post	1	Vessel	Offshore
	Oil mixing Team leader	1	Vessel	Offshore
	Oil recovery Team leader	1	Vessel	Offshore
	Aerial observer - Helicopter	1	Helicopter	Offshore
	Aerial observer - Aircraft	1	Helicopter	Offshore
	Equipment reception	1	Airport + base	On shore
	Staging area & stock management	1	Airport + base	On shore
	Community Liaison Officer	2	Onshore	Onshore
	Oiled shoreline survey / SCAT Team Leader	1	Onshore	Onshore
	Protection Team Leader	1	Onshore	Onshore
	Site Total	**10**		

The following table proposes an indicative list of personnel to request from OSRL and Cedre for a large Tier 3/ blow-out situation, focusing on offshore response and mainly monitoring.

The first 5 OSRL responders for the first 5 days are free of charge ("5 for 5"). OSRL can allocate a maximum of 18 responders simultaneously in country.

Cedre can allocate a maximum of 3 to 4 responders.

INDICATIVE OSRL & CEDRE PERSONNEL TO MOBILIZE FOR TIER 3/ BLOW-OUT					
Proposed positions, numbers & source of personnel are indicative.					
Blow-out specific positions are highlighted in brown.					
	Position - refer to TEP LIBAN OSCP Vol 1.1	**OSRL**	**Cedre**	**Team**	**Location**
	Planning Section / Situation / Incident Situation	1		IMT	Beirut
	Planning Section / Environment Onshore Unit / SCAT		1	IMT	Beirut
	Planning Section / Environment Onshore Unit / Protection	1		IMT	Beirut
	Operation Section / Air Operations / Air tactical group supervisor	1		IMT	Beirut
	Logistics Section / Support / Supply ordering - OSRL	2		IMT	Beirut
	In country OSRL representative (management of OSRL contract)	1		IMT	Beirut
	IMT Total	**6**	**1**		
	Position - refer to TEP LIBAN OSCP Vol 1.1	**OSRL**	**Cedre**	**Team**	**Location**
	Sampling/ Dispersion SMART-Fluorometer/ Air quality Team leader	2		Vessel	Offshore
	Oil recovery Team (deployment of boom & skimmer on PSV)	2		Vessel	Offshore
	Aerial observer - Helicopter	1		Helicopter	Offshore
	Aerial observer - Aircraft	1		Helicopter	Offshore
	Equipment reception in country	2		Airport + base	On shore
	Staging area & stock management	2		Airport + base	On shore
	Oiled shoreline survey / SCAT Team	1	2	On shore	On shore
	Protection Team	2		On shore	On shore
	Site Total	**13**	**2**		

6.3 Mobilization of any equipment

Before initiating any mobilization, TEP Liban will agree with the assistance provider on a contract, daily rates and date, time and location for the **transfer of responsibility** for each resource mobilized.

If operation extends over a long period of time, purchasing the equipment, rather than renting, may be economically sound.

All documentation is sent to TEP Liban prior to the mobilization, e.g.

- Packing lists
- Pro-forma invoices or Commercial Invoices
- Load summary
- Dangerous Goods Notes
- Safety Data Sheets

When receiving the equipment in country, TEP Liban carries out a detailed inventory of the equipment (type, quantity, status, accessories etc.), compares it to the request and documents it with pictures. Any discrepancy between requested and received resources, or fault/ damage, is immediately notified to the provider to clear the responsibility of TEP Liban. Received assistance may be rejected if discrepancy or damage is too significant. Each resource is clearly identified and tracked by TEP Liban throughout the response. Staging/ standby and use times are documented.

TEP Liban require, if needed, the assistance of technician(s) from the provider to deploy the equipment.

See Appendices: "Checklist for the mobilization of Tier 2 & 3 equipment*", p.95*

Similar process is applied for the personnel (from where and when TEP Liban should provide support, safety, transport etc.?).

6.4 Mobilization of national and regional assistance

There are no known national stockpiles of offshore oil spill response equipment in Lebanon.

Lebanese Armed Forces and civil Defence both hold some equipment for coastal, port and shoreline response.

Capabilities and contact details are in:

Operational Support n°11 "INVENTORY OF OIL SPILL RESPONSE RESOURCES"

Lebanese authorities may also request external assistance through the Barcelona Convention directly to other countries or through the REMPEC.

Note. EMSA maintains a network of oil spill response vessels across Europe but is not accessible to Lebanon. Cyprus authorities may request the mobilization of EMSA if hydrocarbons drift or threaten to drift into Cyprus waters.

6.5 Mobilization of OSRL personnel & equipment

Indicative mobilization times (provided by OSRL) for the mobilization from Southampton are as follow:

- **Personnel**. Daily flights from UK to Beirut enabling a possible arrival in Lebanon next day after request.
- **Equipment**. Estimated 4 to 5 days. Approximately 2-3 days for permits application (subject to aircraft availability) + Loading of aircraft + Flight to Lebanon.

OSRL notification and authorization mobilization are detailed in:

Volume 1.1, section "Notification and mobilization authorization of OSRL".

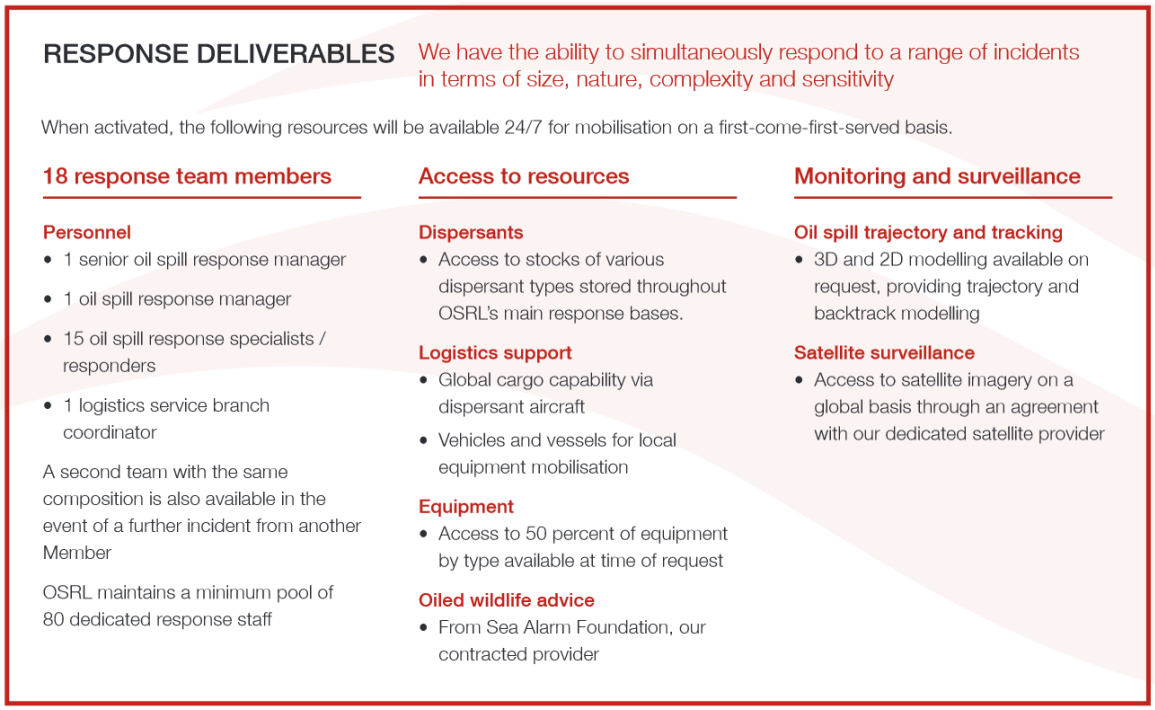
6.5.1 Agreements for OSRL mobilization: SLA & Supplementary Agreement

TEP Liban has access to OSRL resources through two agreements: SLA and Supplementary agreement:

	SURFACE RESPONSE	SUBSEA INTERVENTION – SWIS
	➔SERVICE LEVEL AGREEMENT, SLA	➔SUPPLEMENTARY AGREEMENT
Resources	Oil spill response at sea, on shore, port and inland	Subsea Well Intervention Service SWIS for blow-out, for wells nominated by the client
Bases	Southampton (UK), Fort Lauderdale (USA), Singapore and Bahrein	Saldanha (South Africa), Tananger (Norway), Angra Dos Reis (Brazil) and Singapore
Examples	Personnel + HERCULES & B727 spraying planes + boom, skimmers, pumps, ancillaries, storage tanks, powerpacks etc. + Dispersant >700 m3	SSDI + Debris clearance toolkit + Capping stack + Global Dispersant Stockpile 5000 m3
Access	50% of resources. Up to 18 responders in country simultaneously.	100% of resources

	"5 for 5": 5 responders in country for the first 5 days free of service charge.	
Transport	Transport by OSRL up to the port or airport chosen in the country of destination.	Transport by OSRL up to the port or airport chosen in the country of origin. Transport (land, maritime, aerial) by Total, except for dispersant in SLA base.
Mobilization	**By a TEP Liban Call-Out-Authority** (refer to TEP Liban OSCP vol. 1.1)	
Point of contact & management	IMT/ Logistics section with support of Total Oil Spill Support Cell	As per BOCP

OSRL, through the SLA, provides access to the following resources:



RESPONSE DELIVERABLES We have the ability to simultaneously respond to a range of incidents in terms of size, nature, complexity and sensitivity

When activated, the following resources will be available 24/7 for mobilisation on a first-come-first-served basis.

18 response team members

Personnel
- 1 senior oil spill response manager
- 1 oil spill response manager
- 15 oil spill response specialists / responders
- 1 logistics service branch coordinator

A second team with the same composition is also available in the event of a further incident from another Member

OSRL maintains a minimum pool of 80 dedicated response staff

Access to resources

Dispersants
- Access to stocks of various dispersant types stored throughout OSRL's main response bases.

Logistics support
- Global cargo capability via dispersant aircraft
- Vehicles and vessels for local equipment mobilisation

Equipment
- Access to 50 percent of equipment by type available at time of request

Oiled wildlife advice
- From Sea Alarm Foundation, our contracted provider

Monitoring and surveillance

Oil spill trajectory and tracking
- 3D and 2D modelling available on request, providing trajectory and backtrack modelling

Satellite surveillance
- Access to satellite imagery on a global basis through an agreement with our dedicated satellite provider

OSRL maintains the following bases in the world (Singapore is an integrated SLA/ SWIS base).

6.5.2 OSRL documentation for surface oil spill response equipment under SLA

/!\ It is reminded that: "*The majority of OSRL's SLA at-sea equipment is not housed in DNV 2.7.1 containers, if at-sea certification is required then containers or baskets must be supplied by the mobilising party and welding may be required prior to loading onto vessels*."[3].

All files in : …\ Vol Ops Support \ OSRL Equipment & Mob Plan

All files from: https://www.oilspillresponse.com

TITLE	CONTENT	FILES
Oil Spill Response Mobilisation Fact File 2017	Surface oil spill response equipment accessible under SLA Aviation capability Subsea well intervention services SWIS (under Supplementary Agreement) Global Dispersant Stockpile GDS Scale of fees	2017-mobilisation-fact-file.pdf
Oil Spill Response Mobilisation Fact File 2018	Status & availability of oil spill response equipment as of October 2018	2018-october-2nd-osrl-global-sla-stockpile-report.pdf
Scale of fees 2018	Costs of rental of oil spill response resources & equipment	osrl-oper-con-00048---scale-of-fees.pdf
Logistics Planning Guide (LPG) OSRL Service Level Agreement Equipment	Procedures for mobilization & de transport Types of cargo planes & capabilities: Boeing B747-F, Ilyushin IL-76TD-90VD, Antonov AN-124, AN-124-100 Diagram of responsibilities (Total & OSRL) Type, dimension & weight of key equipment	osrl-oper-gui-00705--logisitcs-planning-guide-sla.pdf
Oil Spill Response Limited Service Level Agreement, OSRL-OPER-SCP-00313, Revision 15, Issue Date: 08 June 2017	General Terms & Conditions of SLA	osrl-oper-scp-00313-service-level-agreement-2.pdf

[3] Source: OSRL "Logistics Planning Guide (LPG) OSRL Service Level Agreement Equipment", Sept 2017, OSRL-OPER-GUI-00705 V0 Sept 2017

6.6 Mobilization of planes

TEP Liban will request the service of a private support company at the airport to provide assistance when mobilizing planes (surveillance or cargo).

INTERNATIONAL AIRPORT

Beirut – Rafic Harir International Airport is identified in Lebanon • Only operational commercial airport in the country.

Source: https://en.wikipedia.org/wiki/Beirut–Rafic_Hariri_International_Airport

and https://www.beirutairport.gov.lb

Airport	Beirut – Rafic Harir International Airport
Runway	Runway 03/21: 3,800 m - 12,467 ft (concrete) Runway 16/34: 3,395 m - 11,138 ft (concrete) Runway 17/35: 3,250 m - 10,663 ft (asphalt)
Maximum aircraft size	Ilyushin II-76, MacDonnell Douglas MD11F, Antonov AN-124. B747 cargo planes – **to confirm**
Location	Beirut
Altitude	27 m / 87 ft
Coordinates (WGS 84)	33°49′16″N 035°29′18″E
Owner/Operator	Directorate General of Civil Aviation (DGCA) www.beirutairport.gov.lb
Contact	009611628000
International Air Transport Association airport code (IATA)	BEY
International Civil Aviation Organization airport code (ICAO)	OLBA
Ground handling operators	Middle East Airlines Ground Handling (MEAG, subsidiary of national carrier MEA) provides ground handling services for MEA, as well as most of the passengers and cargo carriers. Lebanese Air Transport (LAT) is a smaller ground handling operator that conducts ground handling operator, specialized in charter flights and some regular companies.
Fixed-base operators FBO	“Cedar Jet Centre”, MEAG FBO services. “Aircraft Support & Services”, private and executive aircraft. “JR Executive”, fleet of small propeller aircraft. “Universal Aviation Beirut”.

6.7 Mobilization of offshore equipment

There are no known local companies that can provide offshore response equipment.

6.8 Mobilization of vessels

Offshore vessels may be chartered locally (to confirm on a case-by-case basis).

Specialized services from Total H.Q. provide support to mobilize vessels (e.g. PSV, AHTS) from other regions.

To expedite the vessel mobilization process during a spill, TEP Liban will request a minimum information about the vessel (adapted on case-by-case basis by Marine specialist of TEP Liban or Total):

- Technical specifications of the ship;
- Registration Certificate;
- Class Certificate;
- International Tonnage Certificate;
- International Load Line Certificate;
- Certificate of Compliance (Code ISM);
- For each crew member:
  - Professional diploma (captain, officer, mechanical, crew etc.),
  - Passport,
  - Yellow fever vaccination.

6.9 Mobilization of dispersant from Total

In a blow-out situation, the provision of dispersant for the SSDI is managed by the Blow-out Task Force as per the provisions of the TEP Liban BOCP.

The mobilization of dispersant by exploration affiliates before any drilling, in order to set-up a minimum stock of dispersant in country is addressed in:

ⓘ *Memo "LSO 19-038 & GCA 19-01"*

However, this procedure is not used by TEP Liban as surface dispersant spraying for condensate or MGO spill is not adequate. And SSDI (in case of blow-out) is only an option for TEP Liban.

Total E&P has access to three main stocks of dispersant with contracts in place:

- Total stockpile: approximately 180 m3;
- OSRL SLA stockpile (50%): 714 m3;
- OSRL Global Dispersant Stockpile GDS: 5,000 m3.

Refer to Total H.Q. Memo about stocks of dispersants available for Total.

http://lutte-antipollution.ep.corp.local/sites/oil-spill/SitePages/EP_procedures.aspx

For a blow-out situation in Block 4 (2019 campaign), a limited amount of dispersant <u>may</u> be required if the SSDI is activated (range of 50 m3).

In this case, TEP Liban mobilizes FINASOL OSR 52 from the Total stockpile, stored near Vatry airport, east of Paris (France).

Reminder. The Global Dispersant Stockpile is described – for information – In:

ⓘ *"OSRL TECHNICAL INFORMATION SHEET | DISPERSANTS Global Dispersant", file "tis-gds-2017-oct-27.pdf" in …\Vol Ops Support\OSRL Equipment & Mob Plan*

6.9.1 Dispersant supply chain

Only a limited amount of dispersant could be needed if SSDI is required, in the range of 50 to 100 m3, which would be air freighted to Lebanon, transferred to a port to be loaded onto a vessel.

Aircrafts carry varying quantities of dispersant depending on the type of cargo aircraft (see table below).

Air cargo carrier global availability indicative estimates

Aircraft type	Estimated number globally for cargo	Estimated short notice spill availability	Cargo capacity (tonnes)	Capacity following Service Letter (tonnes)	World coverage (potential)
Boeing 747 / 777	150	10	100-130	42-50	Global
Antonov 124	24	2-3	100	100*	Global
Antonov 225	1	1	250	250*	Global
Ilyushin IL 76	7 (that can land in the UK)	1-2	45	45	Global – shorter journeys
MD11	9	1-2	85	85	Africa centric with some USA

*These figures may reduce due to volume constraints and are subject to an ongoing investigation into pressurisation of holds

Tableau 5: Air cargo carrier global availability indicative estimates (Source OSRL, B727 Mobilization & Logistics Plan, 2016)

6.9.2 Responsibilities of TEP Liban & Total to mobilize dispersant

A specific Total procedure allows a first delivery of dispersant (from known stocks with agreements in place) within 72 hours after reception of the request and guarantees a flow of approximately 100 ton/ day.

Procedures is detailed in a Memo[4].

ⓘ *File "Memo_Urgent Dispatch of Dispersant to EP Affiliates.pdf" in …\Vol Ops Support\Op Sup 4 Doc*

The affiliate is responsible for the activation of the mobilization plan, approved by a Call-out Authority. Once the decision is taken, the way forward for each stockpile mobilization is as follows (from Memo):

1. ***Total EP Stockpile, range of 180-200 m³***
   - *The mobilization requested by the Call-out authority is sent to:*
     - *DG/PSR/HSE/GCA/SUP (OSPR Expert),*

[4] Total Memo « Urgent dispatch of dispersant to EP affiliates », from Oluwafemi OLUOKUN (EP/DSO/IP/LSO/LOG) & Yannick AUTRET (DG/PSR/HSE/GCA/SUP), 10/01/2018, Chrono # LSO 18-03 & GCA 18-01

- *copy to DG/PSR/HSE/GCA (Vice President); and to EP/DSO/IP/LSO (Logistic Dispersant Dispatch Expert, see Emergency Booklet).*

- *Upon receipt of the formal request, EP/DSO/IP/LSO becomes the responsible party for the follow-up and shipping process to the airport of destination.*

- *The request includes:*
  - *The ordered volumes, delivery deadlines and final destination.*
  - *The financial amounts to be committed for which the affiliate gives delegation to H.Q. (RFS).*
  - *The logistic point of contact within the affiliate, in charge of customs clearance on arrival.*

In any case, the affiliate takes complete responsibility of the dispersant upon arrival at the airport of delivery i.e. customs formalities and other logistics related actions, such as transportation of cargo to final destination and so forth.

See the Responsibility matrix RACI attached to the Total Memo in:

"RACI matrix of responsibilities for mobilization of dispersant (Total & OSRL)", p.97

Transport is managed in the framework of the contract N° TGP/CBS/LTR 19-0013 signed between Total[5] and DHL to "*organize the transportation of the equipment/dispersant previously defined by the Affiliate, in case of blow out / spill*".

6.10 Emergency immigration procedure

Visa is compulsory for French citizens. A short term one-month renewable visa can be delivered on arrival at Beirut airport. The passport must be valid for 6 months from the date of entry into Lebanon. This can be extended for up to three months by the General Security office.

/! Entry requirements are subject to change, so check with the Lebanese Embassy before you travel.

/! Entry may be refused into Lebanon even with a valid Lebanese visa if passport contains Israeli stamp; or flight ticket mentions an Israeli city, or luggage contains documents written in Hebrew (etc.).

French embassy in Lebanon

- Espace des Lettres - Ras El-Nabaa - Rue de Damas
- Beyrouth
- Tel : +961 (0)1 420 000
- Mail : cad.beyrouth-amba@diplomatie.gouv.fr
- Website : https://lb.ambafrance.org

French consulate in Lebanon – Same as embassy

- Espace des Lettres, bâtiment A - Rue de Damas
- BP 11-477

[5] Memo LSO ref. 19-076 "Blow-out emergency Plan – DHL transportation contract", date: 15/05/2019, from: Pierre SOURY, Philippe MAGNIN, EP/DSO/IP/LSO/LOG

ⓘ File "2019-05-15 - MEMO Logistics Manager - en .pdf

- Beyrouth
- Tel: +961 (0)1 420 100 (Monday – Friday, 14h15 to 16h).
- Emergency phone number (fatality, serious accident, being under arrest, person missing) weekdays after 16h30, week-ends and holidays: +961 (0)3 566 388

Lebanese embassy in Paris

- 3, Villa Copernic 75116 Paris
- Tel: +33 (0)1.40.67.75.75
- Fax : +33 (0)1.40.67.16.42
- Email : amb-liban@outlook.fr

Lebanese consulate in Paris

- 123, Avenue de Malakoff 75116 Paris
- Tel: +33 (0)1.40.67.26.36
- Fax : +33 (0)1.40.67.26.27
- Email : consulatduliban@gmail.com

6.11 Customs clearance

External resources mobilized may enter Lebanon by air (Beirut airport) or by sea (Lebanese ports). Road transport is very unlikely.

TEP Liban is responsible for the applicable Customs Clearance process and may request the assistance of Lebanese authorities to expedite the Customs Clearance. See Lebanese Customs Administration:

http://www.customs.gov.lb/home.aspx

Customs clearance process depends on the type of resource, country of origin and final destination, as outlined in the table below.

Equipment imported in country and…	…re-exported at the end of the operations.	Temporary importation	Applicable procedure to be confirmed by TEP Liban with national competent services
	…remaining in country at the end of the operations.	Permanent importation	
Consumables imported in country and…	…used in country.	Permanent importation	

NOSCP 2017 Rev0 Vol. A, section 4.5.3.1 Importing of equipment:

> *The Lebanese Customs Administration (MOF) is responsible for ensuring that all goods entering and exiting Lebanon do so in accordance with the relevant laws and regulations. In the event of a Tier 3 oil spill, large amounts of equipment and stores would be required to enter Lebanon quickly to support the response. In these circumstances, it is imperative that rapid and effective customs clearance procedures are in place to affect entry. This would be done through the following procedures:*
>
> ***Importation of Equipment**: Under certain conditions, the Director of Lebanese Customs can authorize, for a period not exceeding three months, the import under temporary status of machinery and equipment for the conduct of works and projects of public concern. This includes equipment in support of oil spill response*

(Article 278 of the Customs Law). In the case of an emergency, verbal authority can also be granted and a decree for customs exemption issued retrospectively.

***Customs Tariffs**: Customs tariffs apply to all imports unless they are provided as grants. However, the following caveat applies: "When equipment is imported under temporary status it is, therefore, not subject to customs. If subsequently it becomes permanent status, then customs tariffs are applied, unless the equipment is provided as a grant. In this case, the equipment remains exempt.*

References: Customs Law – Decree 4461 dated 15 December 2001

7. DEMOBILIZATION OF RESOURCES

7.1 Demobilization of equipment

Response equipment provided by assistance should be returned in good condition. Some equipment exposed to spilled oil may be difficult to return to its pre-spill condition. In this case, purchase and replacement is probable.

7.2 De-activation of OSCP and demobilization of IMT

Once offshore response is completed and end of operations accepted by the authorities, operations can be stopped, spill response equipment demobilized, repaired, maintained and stored or re-sent.

The Local Incident Commander demobilizes completely the teams from the sites once all operations have been terminated and with the agreement of the Incident Commander.

Once the Incident Commander has ensured that all issues related to the spill management have been satisfactorily dealt with, he proposes to the GM to demobilize the IMT. With the GM's agreement, the Incident Commander officially stands down the IMT and de-activates the OSCP and resources.

Some task forces may remain, e.g. to manage post-spill environmental monitoring (see next section).

8. ENVIRONMENTAL IMPACT MONITORING

/!\ The NOSCP 2017 Rev 0 Vol. A, section 6 "*Termination and demobilisation" states that: "Post spill monitoring of areas affected by the oil spill will be required to determine the level of contamination of the shoreline or biological species. Monitoring will include an extensive campaign of sampling and analysis over a period of time to observe the recovery of an area following a spill*.".

Total has issued a "Guide & Manual" to assist in the scoping of the impact environmental, economic, societal and sanitary impact studies.

See:

ⓘ *"Oil Spill Environmental and Health Impact Assessment" (GM-GR-ENV-005, Rev. 0, Date: 21/02/2012).*

While oil spill monitoring (offshore) and shore surveys are initiated immediately, an environmental impact monitoring program cannot start in the first days of the spill.

/!\ However, it is strongly recommended that a "quick" environmental and societal baseline is expedited as soon as possible in case of a spill to collect some key environmental and societal information before any oil groundings. This information will serve as reference to monitor impacts and environmental restoration, as well as effects on coastal communities and activities/ usage.

Information to collect relate to the quality of water, sediment, and of the environment key features.

A detailed scope of work for the impact monitoring (environmental, societal and economic) cannot be pre-established before-hand in the framework of the OSCP. It is always defined specifically depending on the spill, on the type of product and volume spilled, location and extent of the spill (based on monitoring results), environmental compartments (atmosphere, sea surface, subsea, sea-bed, etc.) and resources potentially affected by the spill.

The scope of work will be developed by TEP Liban, in consultation with competent authorities and agencies (MoE and others as required). The finalized scope of work will be presented to the Authorities for information and acknowledgement.

TEP Liban may use the comprehensive guidelines for "MARINE IMPACT ASSESSMENT AND MONITORING" issued by the U.K. Centre for Environment Fisheries and Aquaculture Science, CEFAS.

ⓘ https://www.cefas.co.uk/premiam .

Impact monitoring work (field survey, analysis, reporting etc.) is carried out mainly post-spill (except or a blow-out), by a reputable and recognized company, specialized in impact monitoring (or a consortium of companies if needed). The company(ies) proposed by TEP Liban will be acknowledged by the competent authorities.

The project team will include at least:

- Specialized personnel from the contractor;
- TEP Liban representatives;
- One or two representatives of the competent authorities if and when needed.

Intermediate results will be forwarded regularly to the competent authorities during the study.

Spill monitoring

The preliminary step (and pre-requisite) of any impact monitoring program is oil spill monitoring activities (during the spill) to characterize the spilled material and define its extent/ dissemination in the environment:

Air quality monitoring	Air quality monitoring in the vicinity of the spill: VOC, BTEX and other parameters if needed.
Sampling	Sampling of: • spilled material in the vicinity of the spill, and after drifting (offshore), • water, sediment, other as needed.
Oil spill monitoring offshore	Oil spill monitoring offshore to track: • the oil slicks at the surface, define the maximum extent of the spill: aerial surveillance, RADAR imagery, Options: fluorometry • the oil subsea (blow-out situation): ROV, water column monitoring kit, AUV, gliders etc.
Oiled shoreline survey	Oiled shoreline survey to define the coastal/ inland areas affected, the extent of oiling, identify sunken/ buried oil etc. (use of SCAT method and Scuba-SCAT when needed).

The monitoring focuses on tracking the spilled material (and not on impact assessment) and lasts until the response and clean-up operations are completed.

Monitoring results are used to define the scope of the impact monitoring.

If and when possible, and for very sensitive resources/ habitats, environmental assessment may be carried out before the oil grounding to collect information, which will be used as baseline information (community/ bio-cenotic indicators, biomarkers, fauna and flora analysis etc.).

Impact monitoring

Objectives of impact monitoring program	Based on the spill monitoring, the objectives of the impact monitoring program are defined as well as the geographic extent and duration of the study (short-term or medium-long term). Proposals are summarized in the initial interim report.
Impact monitoring activities program	Environmental compartments to consider are selected. Monitoring sites and targets/ resources (environmental) are chosen, and for each, adequate monitoring parameters are defined. Measurement method, amount, duration and frequency are defined.
Impact assessment strategy	Various options are possible, according to available data: • Comparison of affected area data with: ○ historical reference data (same/ other area before the spill); ○ geographical reference data (other unaffected location); • Analysis of post-spill data over a given period of time. • Health: Dose-response assessment, Human exposure assessment etc.
Communication	Results are regularly communicated during the study through: • Interim reports; • Dedicated website.
Final report	Final consolidated results are presented and discussed during a workshop with authorities, contractor(s) and TEP Liban.

EBS's and EIA's provide key information for sensitive marine resources (species, habitats, activities etc.) that may be severely affected by the spill, and that should be considered in the impact monitoring study.

9. APPENDICES

9.1 Other oil fate & behaviour models

Other modelling tools and services are accessible for TEP Liban:

- Gnome (by the Office of Response & Restoration, N.O.A.A., U.S.A.)
- OILMAP (by OSRL);
- MOTHY (by Météo-France);
- SPILLTRACK (from CLS company);

Note. CleanSeaNet system (European satellite-based oil spill and vessel detection service) may also be activated by EMSA, e.g. if hydrocarbons enter or threaten to enter EU waters.

ⓘ http://emsa.europa.eu/csn-menu.html

GNOME

Office of Response & Restoration from U.S.A. provides freely Gnome software (General NOAA Operational Modelling Environment) :

- as standalone application:
  - https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/gnome.html
- as web application: https://gnome.orr.noaa.gov/
- with links to providers of georeferenced MetOcean data:
  - tides: e.g. Tidal Currents Generated from VDATUM ADCIRC tidal constituents,
  - winds: NCEP Global Forecast System GFS, Global spectral data assimilation and forecast model system,
  - currents: e.g. Hybrid Coordinate Ocean Model HYCOM,

MetOcean data is available on GOODS:

GNOME Online Oceanographic Data Server : https://gnome.orr.noaa.gov/goods

OILMAP

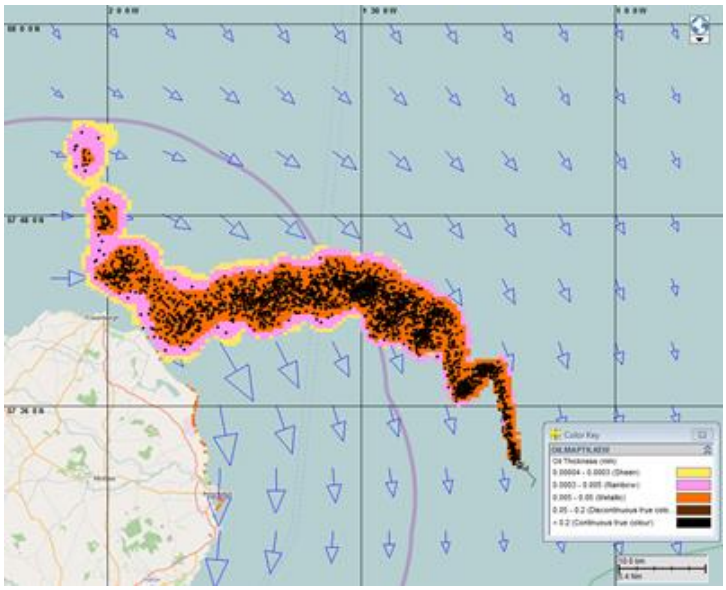
OSRL can activate (inhouse and in the framework of the SLA) the OILMAP model:

https://www.oilspillresponse.com/technical-library/technical-information-sheet---oil-spill-response-modelling-in-oilmaptm/

- Integration of:
  - wind and surface current predictions for the area,
  - characteristics of the oil and of the spill incident;
- modelling of:
  - Drift and mass balance predictions;
  - Predictions of behaviour of oil in the water column in case of blow-out (« OILMAP Deep – Seabed Blowout Module »);
  - Atmospheric dispersion (module “AirMap – Air Dispersion Module”).
- Results include:
  - Report (PDF format);

- GIS data, that can be integrated into ArcGIS and WebGIS from Total H.Q.

Activating OILMAP is requested directly to the OSRL Duty Manager in Southampton and based on the information contained in the OSRRL Notification form.



OILMAP (OSRL)

MOTHY

Météo-France proposes MOTHY (Modèle Océanique de Transport d'HYdrocarbures).

http://www.meteofrance.fr/nous-connaitre/missions-institutionnelles/securite-des-personnes-et-des-biens/suivi-des-pollutions-marines

MOTHY can be activated through the Cedre.

"…*En relation avec le CEDRE, Météo-France peut simuler la dérive des nappes de polluants et localiser des objets flottants à la surface de la mer avec MOTHY, son modèle de dérive en mer. MOTHY tient compte d'un grand nombre de données, en particulier des vents observés et des prévisions de vents effectués par Météo-France, mais aussi des courants marines plus profonds, analysés et prévus par le système d'océanographie Mercator Océan et le programme européen Mediterranean Forecasting System*…".

SpillTrack

CLS provides the SpillTrack model.

https://www.energyoffshore-cls.com/project/spilltrack/

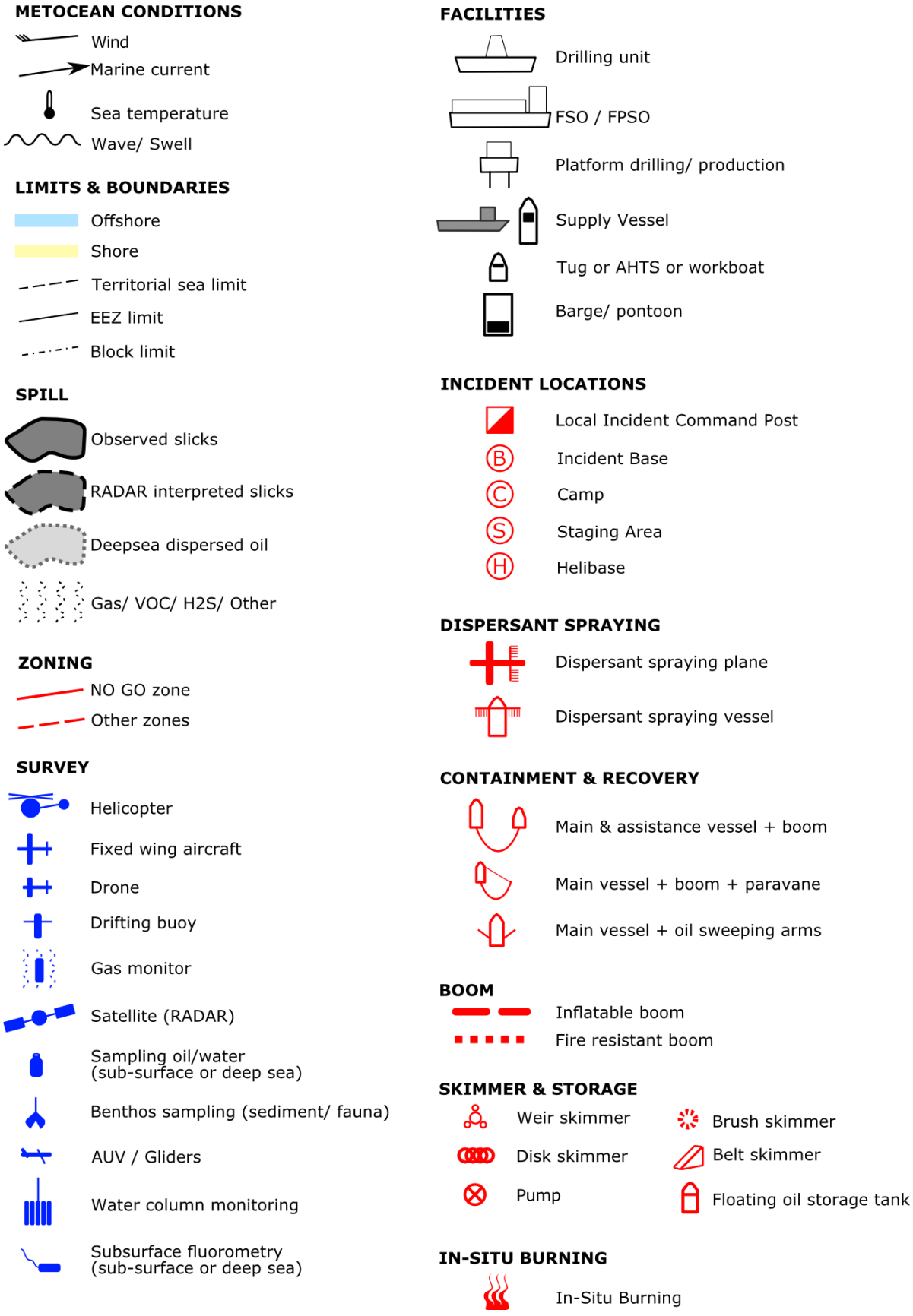
9.2 Remote sensing systems - comparison

Remote sensing system	Active/ Passive	Sensing means	Range	Layer thickness interval detected	Limitations
Side-Looking Airborne Radar (SLAR). *Note. Synthetic aperture radar (SAR), more costly, is capable of much greater range and resolution than older SLAR technology.*	Active	Detects dampening by wind and oil of capillary waves generated by the wind.	During reconnaissance flights (from 1,500 to 4,000 feet), SLAR can detect oil 15 to 20 NM away, on either side of the plane, except in a "blind spot" directly under the plane, which is equal in width to the altitude of the plane. This gap can be covered by an infrared scanner.	Over 3 to 5 µm (to produce a dampening effect on capillary waves)	Penetrates the cloud layer. If the sea is too calm (0 to 1 on the Beaufort scale), the waves created by the wind are not high enough. On the other hand, if the sea is too rough (over 7 or 8 on the Beaufort scale), the oil layer will not dampen the capillary waves. The results must always be confirmed by visual observation and/ or IR-UV scanning.
Infrared Line Scanner (IR)	Passive	Detects thermal radiation with a wavelength in the band of 8 to 12 µm.	Zone scanned is equal to twice the altitude of the plane. Compensates for the "blind spot" of the SLAR. In practice, scanning should be carried out at 1,500 feet and 160 knots, allowing a width of approximately1,000 m.	Over 10 µm. Slicks appear black or white on the screen depending on their thickness and temperature.	Thickness of slicks
Ultra Violet Line Scanner (UV)	Passive	Detects the ultraviolet component of light from the sun reflected by oily liquids.	Zone scanned is equal to twice the altitude of the plane. Compensates for the SLAR "blind spot". In practice, scanning should be carried out at 1,500 feet and 160 knots, allowing a width of approximately 1,000 m.	From 1 µm	Cannot distinguish between different thicknesses.
Microwave Radiometer	Passive	Similar to IR Line Scanner. Has the advantage of being able to measure the thickness, and therefore volume of slicks detected.		From 100 µm	Calibration necessary to determine volumes. For thick slicks and emulsions, the surface area of the slick can be calculated, but the thickness must be determined using other methods, such as by ships involved in response operations.
Forward-Looking Infrared Scanner (FLIR)	Passive	Detects thermal radiation with a wavelength in the band of 8 to 12 µm.	Depends on the altitude of the plane and the field of view selected by the operator, as well as the hygrometry.	From code 2 or 3	FLIR detects zones of different temperatures but cannot be used as a principal pollution research sensor. FLIR recordings can be used as a complementary method in addition to visual observation.

Note. Active sensors emit a signal, reflected by objects and receive the modified signal. Passive sensors do not emit signal but receive signal naturally emitted by the objects.

9.3 Offshore spill response tactical sketching

Figure below provides sketching items to prepare and map the daily tactics.



9.4 Oil spill response techniques treatment rates for TEP Liban

Oil treatment capabilities for each response technique are based on:

- **Encounter rate** (per hour or day): the amount of oil encountered by a response technique depending of:
  - Oil slick thickness and fragmentation,
  - Width of sea surface covered by the response technique,
  - Speed of progress,
- **Daily duration** of the operations.
- **Efficiency** of the treatment depending of the state of the oil, equipment mobilized &/or product used, operational and logistics constraints, etc.

Following sections presents some estimations of oil treatment rates for TEP Liban.

/! All figures are indicative only and used to estimate the level of mobilization for the different tactics.

9.4.1 MetOcean & operational settings

MetOcean and operational settings for oil weathering and offshore spill response are as follow (change of settings/ bad weather may decrease the oil spill response effectiveness):

- Sea surface temperature: average 20°C, from 17°C in January to 28°C in August
- Average sea surface salinity: 38 ppt
- Air temperature: from 10° - 15°C to 25° - 30°C (Lebanese coast)
- Wind: average 8 knots (episodes of stronger winds will occur).
- Daylight (source:):
  - 9h54 (22nd Dec.: 06h39 to 16h33 in 2019)
  - 14h25 (21st June: 05h27 to 19h51 in 2019).

Deployment of floating boom offshore and oil skimming can be limited by adverse MetOcean conditions (strong winds and short/ high waves), be inefficient and dangerous. Vessels, with robust offshore boom and skimmer system can usually operate in sea conditions up to Force 5 Beaufort Scale (17–21 knots) and 1 - 2m high waves (or more with swell).

Considering approximately >90% winds on Lebanese coast are under 20 kts (Operational Support n°3), it is considered that MetOcean allow recovery operations nearly all time.

For simplification purpose:

- Mechanical mixing is considered is considered possible 7 days per week.
- Recovery is possible 7 days per week but requires 1 day/ week to offload recovered oil, carry out maintenance etc. (approximation). Consequently, recovery is active 6 days per week for a vessels team.

9.4.2 Mechanical mixing (« Propeller wash »)

Table describes the parameters used for two types of vessels (large supply vessel and smaller tug).

A **mean daily treatment capability of 10 m3 oil/ vessel is considered, best case**.

Swath: width of sea surface covered by one vessel **breadth** + width of the **2 bow waves** (portside and starboard side).

Vessel speed: speed of vessel while mixing (9 kts for larger PSV, 8 kts for smaller tugs).

Surface covered in 1 hr: swath x vessel speed.

Daily duration of operations: estimated at 10 hrs (maximum possible in winter).

Surface covered daily (km2/ day): swath x vessel speed x Daily duration of operations.

Mean thickness of target slicks (mm): thickness of slicks potentially encountered. 0.003mm is considered here (average value for rainbow sheens, common for MGO spills).

Break-up of target slicks: surface of sea covered by the slicks of above-mentioned thickness.

Characteristic of vessel	Supply vessels	Offshore tug
Vessel breadth (m)	18	12
Width of bow wave (m)	6	5
"Swath" = vessel breadth + 2 x width of bow wave (m)	30	22
Vessel speed (kts)	9	8
Duration and surface covered by operations	*(10h to 14h30 daylight)*	
Surface covered in 1 hr (km2)	0,50	0,33
Daily duration of operations (hrs)	10	10
Surface covered daily (km2/ day)	5,00	3,26
Characteristic of slicks		
Mean thickness of target-slicks (mm)	0,003	0,003
Volume of oil/ km2 with continuous coverage (m3/km2)	3	3
Break-up of target-slicks (% sea surface covered with oil)	80	80
Volume of oil/ km2 with break-up (m3/km2)	2,4	2,4
Efficiency of operation (%)	80	90
Operational efficiency		
Oil treated daily (m3)	10	7
Water content of emulsified oil (%)	0	0
Oil only theoretically treated/ day (m3)	10	7

Volume of oil/ km2 with break-up (m3/km2): oil that can theoretically be encountered by the vessel, considering the swath, slick thickness and break-up.

Efficiency of operations: oil effectively dispersed compared to the oil encountered and is estimated to be 80% (which is a safe assumption as MGO and fresh condensate are – normally – easily dispersed).

Oil only theoretically treated/ daily (m3): Surface covered daily (km2/ day) x Volume of oil/ km2 with break-up (m3/km2).

A PSV can theoretically treat approximately 10 m3/ day, based on the above assumptions.

A tug can theoretically treat approximately 7 m3/ day, based on the above assumptions

9.4.3 Recovery treatment rates

Table describes the parameters used for recovery operations with two offshore vessels and 250m of boom.

A **mean daily recovery capability per vessel of 10m3 of weathered emulsified condensate is considered**.

Characteristic of vessel	Supply/ AHTS & 250m boom
Vessel breadth (m)	15
Distance between vessels (m)	80
"Swath" (m)	95
Vessel speed when towing boom (kts)	0,9

Duration and surface covered by operations	*(12h30 of dayli*
Surface covered in 1 hr (km2)	0,16
Daily duration of towing operations - not skim& & pump (hrs	7
Surface covered daily (km2/ day)	1,11

Characteristic of slicks	
Mean thickness of target-slicks (mm)	0,5
Volume of oil/ km2 with continuous coverage (m3/km2)	500
Break-up of target-slicks (% sea surface covered with oil)	5
Volume of oil/ km2 with break-up (m3/km2)	25
Efficiency of operation (%)	70

Operational results	
Fresh oil-only or emulsified oil+water recovered/ day (m3)	19
Water content of emulsified oil (%)	50
Oil only theoretically recovered/ day (m3)	10

Swath: width of sea surface covered by the two recovery vessels, estimated approximately as half of the vessel's **breadth** + **distance between vessels** (1/3 of the length of the boom deployed).

Vessel speed: speed of the vessel while they are towing the boom to collect and contain oil slicks. 1kt is the limit with conventional boom. 0.9 kt is safely considered here.

Surface covered in 1 hr : swath x vessel speed (when towing).

Daily duration of towing operations estimated at:

- 7 hrs for scattered patches of weathered condensate (considers relocation sailing time).

Surface covered daily (km2/ day): swath x vessel speed (when towing) x Daily duration of towing operations.

Mean thickness of target slicks (mm): thickness of the slicks potentially encountered. 0.5mm is considered here for emulsified condensate (slick thickness of 1mm is considered for weathered/ emulsified crude oil).

Break-up of target slicks: surface of sea covered by the slicks of above-mentioned thickness, estimated at 5% here. Break-up of weathered oil slicks after few days always increases, is very important, and a major operational limiting factor (with oil spreading at sea surface).

Volume of oil/ km2 with break-up (m3/km2): oil that can theoretically be encountered by the vessel, considering the parameters of the vessels, slick thickness and break-up.

Efficiency of operations: oil effectively recovered compared to the oil encountered. Efficiency decreases with the type of oil (due to the difficult recovery of viscous hydrocarbons at sea) and with time. A conservative 70% is chosen (without definite data).

Fresh oil-only or emulsified oil + water recovered/ day (m3): oil or emulsified oil recovered daily by the recovery team, calculated with the above parameters.

Water content of emulsified oil is based on modelling results for crude oil.

Oil only theoretically recovered/ day (m3) is calculated accordingly to the:

- Fresh oil-only or emulsified oil + water recovered/ day (m3);
- Water content of emulsified oil (%).

Note. 200m of offshore boom can hold >50m3 oil. So, oil holding capacity of the boom is not a limiting factor.

2 vessels towing 250m of boom can theoretically collect approximately 10 m3 of hydrocarbons/ day, based on the above assumptions.

9.4.4 Subsea dispersant injection – SSDI

The dispersant to oil ratio for SSDI is usually considered (as a base case) to be 1:100 (based on DEEPWATER HORIZON feedback, with MACONDO light crude).

A DOR of 1% is usually considered for oil, and similarly for condensates for Block 4 (which is conservative but justified by the lack of knowledge of SSDI efficiency on deep-sea blow-out condensates).

The injection of dispersant is continuous – day and night – and that there are no interruptions. This implies that there is no breakdown in the supply chain of dispersants and no mechanical failures. Any interruption translates into amounts of un-dispersed oil reaching the sea surface and adds to the total quantity of oil having to be treated by surface response.

9.5 Oil spill response planning EXCEL tool

To evaluate the type and amount of resources to engage each day, the daily efficiency of the response and resulting oil mass-balance is estimated based on the response planning assumptions, using an EXCEL tool "Blow-out spill integrated response planning" (by OTRA, originally developed for the LuLa very large-scale exercise, TEP Angola, Nov. 2013 and improved afterwards).

BLOW-OUT SITUATIONS

The "Blow-out response planning" tool allows to:

- Develop a comprehensive (day by day) tactical plan spill response in case of blow-out (considering days for SSDI and capping);
- Detail for each the type and amount of resources engaged;
- Evaluate the overall daily efficiency of the response (oil treatment rate) based on the resources engaged.

This tool is for planning purpose only and is not a model of the overall response and/ or the oil mass balance of the blow-out. Numerous assumptions and approximations are made, results are indicative only.

The conceptual model is detailed in the figure below.

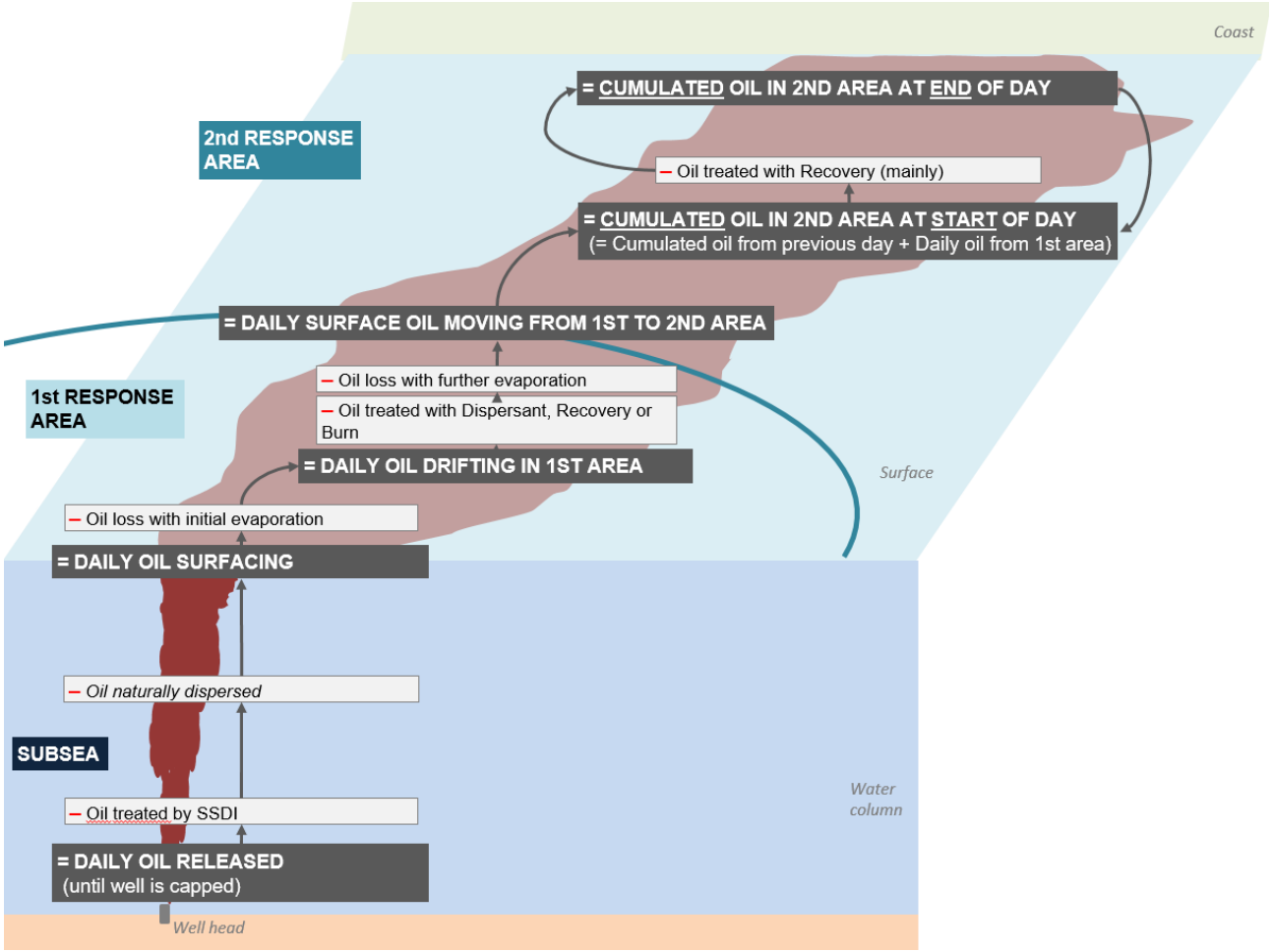


Figure 21 : "Blow-out spill integrated response planning" EXCEL tool – Conceptual model

Mass balance is estimated each day for the 3 areas as follow:

- **Sub-surface**. Oil rises to the surface; a small part may be lost by natural dispersion.
- **1st Response area**, close to well head.

- Some oil evaporates. Some oil is treated (mechanical dispersion, dispersant, recovery or burning).
- Non-treated oil drifts to the second area. There is no oil cumulating in this area.

- **2nd Response area**.
  - Non-treated oil from the 1st area enters the 2nd area and cumulates with oil remaining in the 2nd area from the previous day.
  - Some oil is treated (mainly recovery because of weathering).
  - Non-treated oil at end of day in 2nd are remains considered in this area.

Summary graphics are produced to help visualize the level of engagement.

For TEP Liban, surface dispersant spraying and In-Situ Burning are not considered.

INSTANTANEOUS SPILLS

A simplified version of the file is used for instantaneous spills with only one zone.

9.6 Requirements for recovery vessels

Vessels must have some specifications to be suitable for offshore containment and recovery. Table 3 provides guidelines on specifications of suitable vessels.

Table 3: Requirements for vessels to be mobilized for offshore containment and recovery operations

Main vessel geared for recovery, i.e. to deploy the boom, operate the skimmer (able to deal with viscous oil because of emulsification &/ or partial burning) and store the recovered oil:	• Ability to tow at low speed 1 knot or less for several hours. • Good manoeuvrability below 1.0 knot • On board tanks for the storage of recovered oil, with decantation and offloading system. • Engines horse power greater than 1,500hp • Towing bollard pull greater than 20 tons • Freeboard aft less than 2.5m • Opening Aft deck (stern gate or stern roller) or transom no higher than 1m or transom with door • Clear deck space of 10-12m long x 7-8 m wide aft • Boom reel or container with boom reel secured on deck by lashing or locking or welding • Crane to deploy the skimmer on the side of the vessel, with radius sufficient to overboard the skimmer and SWL 1.5 Tons • Preferred on board storage of recovered oil: 400-500 m3 or more with decanting possibilities and transfer pump for viscous oil.
Assistance vessel to help the main ships for the towing of the boom:	• Ability to tow at low speed 1 knot or less for several hours. • Good manoeuvrability below 1.0 knot. • Towing bollard pull greater than 10 tons • Engine horsepower greater than 500hp
Ship to shuttle the floating storage tanks from the ships to intermediate/ shore storage:	• Engine horsepower greater than 500hp
Barges of a Coastal tanker may have to be chartered.	To be used as an intermediate storage facility on site, and enable storing the oil recovered, until it can be transferred to adequate facilities on shore.

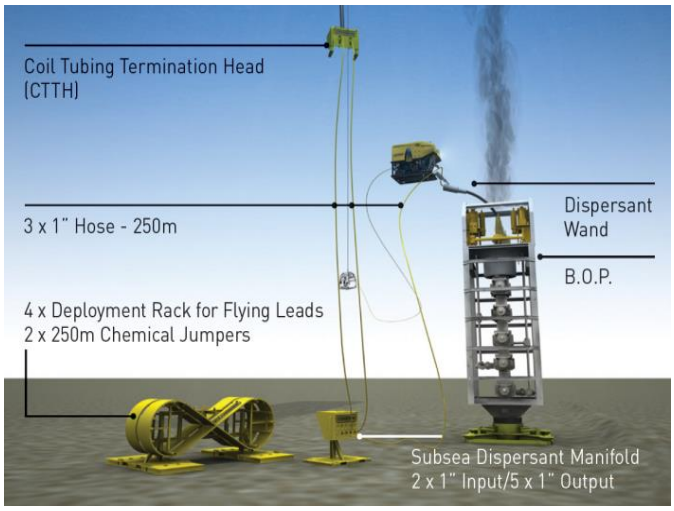
9.7 SubSea Dispersant Injection – SSDI kit (OSRL)

The Subsea Dispersant Injection (SSDI) will be mobilized as per the Blowout Contingency Plan (BOCP).

The implementation of Subsea Dispersant Injection involves:

- A support vessel or rig, equipped with a coiled tubing, from which the system can be launched and the dispersant injected.
- The use of ROVs to connect all the parts of the system (see the presentation of the Subsea Dispersant Injection System below) and to operate the system (flow control, handling of the spraying wands)

The Subsea Dispersant Injection (SSDI) Kit content is composed of eight main elements:



1 off Coiled Tubing Termination Head

1 off Subsea Dispersant Manifold

4 off Deployment Racks

8 off 250 meters Chemical Jumpers

1 off Dispersant Wand 30”

2 off Dispersant Wand 40”

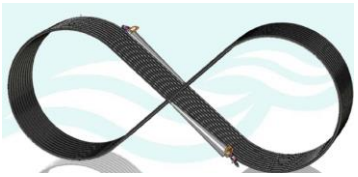
1 off Dispersant Wand 50”

2 off Dispersant Wand Spear

Minimum operating set-up requirement:

- ✓ 2 Work class ROV - 86 Kg carrying capacity
- ✓ 3600 Kg load crane deployment
- ✓ 2” Coiled Tubing with 1-1/2” AMMT-S BOX interface or 2 3/8” PAC DSI BOX interface
- ✓ Dispersant

Item	Description	
Coiled Tubing Termination Head (CCTH)	▪ Interfacing with two flexible lines though high flow hot stabs ▪ Installed with ROV grabber bars, ROV operated valves and pressure gauge	
Subsea Dispersant Manifold (SDM)	▪ Two 1" high flow receptacles to connect from the CTTH ▪ Five 1" high flow receptacles to connect jumpers to aid in oil spill area	

Deployment Racks	▪ Transportation and storage of 250m chemical jumpers. ▪ Supplied with a mud-mat for deployment on the seabed	
Chemical Jumpers	▪ Two 1" lines to transfer dispersant from the CTTH to the Subsea Manifold ▪ Five 1" jumpers to transfer dispersant from manifold to oil spill area. One 1" spare line	
Dispersant Wands	▪ Hook type wand to direct dispersant in a set direction ▪ Can be handled by the ROV manipulator ▪ Comes in four different sizes: 30in, 40in, 50in and Spear type	

The system can operate 1 to 5 wands, with a total cumulated maximum flow rate of 110 l/min. Pressure loss will range from 1.5 bar (with one wand) to 4.3 bars (with 5 wands).

The maximum flow rate corresponds to a daily injection of 158 m^3/day. Considering a DOR of 1:100, 15,480 m^3 of oil or approx. 100,000 bopd can be treated with the current system (independently of the number of wands used).

9.8 Checklist for the mobilization of Tier 2 & 3 equipment

Items to be checked, by the IMT/ Logistics Section, before the mobilization of any resource from external assistance, other than those already covered by existing oil spill assistance contracts set-up by TEP Liban.

CONTACT OF ASSISTANCE	FEEDBACK FROM PROVIDER?
Company contacted	
Name, contact and position of person contacted	
Authority to release some resources	
EQUIPMENT REQUIRED/ PROPOSED	**FEEDBACK FROM PROVIDER?**
Type and specifications of equipment	
- Brand and model - Year of manufacturing - Short description - Engine (diesel/ gasoline) - Dimension - Weight - Standard operating procedures - Spare parts included	
Amount available	
All ancillaries included to deployment, operate and recover the equipment? - hoses, buoys, lines, etc.	
Packaging for transport - type of packaging - dimension of packaged equipment - Weight of packaged equipment - Lifting arrangements - Lifting certificate (for lifting gear and lifting points)	
Mobilization and cost - Mobilization time - Location of point of transfer of responsibility - ETA to point of transfer of responsibility - Contact of person in charge of transport to point of transfer of responsibility - Daily rate for equipment (in stand-by and in use)	
CONSUMABLE (EX. DISPERSANT)	**FEEDBACK FROM PROVIDER?**
MSDS	
Type and specifications: - Brand and model - Year of manufacturing - Short description - Dimension - Weight	
Amount available	

Packaging for transport: - type of packaging - dimension of packaged equipment - Weight of packaged equipment	
Mobilization and cost - Mobilization time - Location of point of transfer of responsibility - ETA to point of transfer of responsibility - Contact of person in charge of transport to point of transfer of responsibility - Daily rate for equipment (in stand-by and in use)	

9.9 RACI matrix of responsibilities for mobilization of dispersant (Total & OSRL)

Source:

ⓘ *File "Memo_Urgent Dispatch of Dispersant to EP Affiliates.pdf" in …\Vol Ops Support\Op Sup 4 Doc*

R: Who is Responsible: the person who is assigned to do the work A: Who is Accountable: the person who makes the final decision and has the ultimate ownership C: Who is Consulted: the person who must be consulted before a decision or action is taken I: Who is informed: The person who must be informed that a decision or action has been taken	Total EP (EP/DSO/IP/LSO)	Total HSE (DG/PSR/HSE/GCA)	EP Affiliate	OSRL	Freight Forwarder (HQ)
Strategy					
Establish & maintain the policy of managing oil spill response in E&P activities	C	R/A	C		
Establish and maintain Oil Spill Response Plan of the affiliate	I	C	R/A		
Freight Forwarder contracts holder , manager & focal point	R/A	I	I	I	
Activate and deactivate the mobilization plan	I	I	R/A		
Finances					
Financial commitment	I	I	R/A		
RFS issuance	I	C	R		
RFS management	R	C	I		
Service providers invoices payment	I	R	A		
Dispersant stock management					
Total SA Stock Management	I	R			
Notify Total SA stockpile warehouse of the mobilization	I	R			
Inform Total SA stockpile warehouse of the start of operation	R				
SLA & GDS stock management		I		R	
Inform GDS & SLA stockpile warehouse of the start of operation			I	R	
Logistics plan					
Approve the logistics means & plan for Total SA & GDS stockpiles	R	C	C		
Daily logistics reporting for Total SA stock and GDS	R	I	I	I	
Pilot the dispatch process of Total SA stockpile	A	I	I		R
Pilot the dispatch process of SLA stockpile		I	I	R/A	
Pilot the dispatch process of GDS stockpile	A	I	I		R
Import/Export					
Airfreight loading and customs clearance at departure	A	I	I		R
Airfreight unloading and customs clearance at arrival	I	I	R		
Import authorization for Total SA, SLA & GDS stockpile (affiliate level)	I	I	R		
Export authorization for Total SA Stockpile	R	I	I		
Export authorization for GDS & SLA Stockpile	I	I		R	
Re-export of surplus (if any) of Total SA / GDS / SLA stockpiles	I	I	R	I	
Airfreight					
Contact the airport of departure	A	I			R
Contact the airport of destination	I	I	R		R
Airfreight chartering of Total SA and GDS stockpile	A	I	I		R
Airfreight chartering of SLA stockpile		I		R	
Coordination with affiliate					
Coordinate between the affiliate focal point and the freight forwarders	R	I	I		I
Exercises					
Exercises organization	C	R	I /R		

9.10 Mobilisation of cargo & surveillance planes

LANDING PERMIT FOR HERCULES	To be provided by OSRL
Logistics section of the IMT to obtain the "Landing Permit", which includes all authorizations for entry into Lebanese air space, arrival at Beirut airport and carrying flights for (e.g. aerial surveillance). Note: • It should be possible to arrange for the "Landing Permit" while the aircraft is flying to Lebanon.	**Compulsory** ➔Name of operator of plane ➔Name of pilot in command ➔Number of crew ➔Full address of operator of plane **Additional (if requested)** ➔Airworthiness certificate ➔Aircraft Certificate ➔Insurance Certificate ➔Aircraft Operator Certificate + name and passport copy of all crew members
FACILITIES FOR CREW	
Logistics section to ensure that following facilities are arranged at the airport for crew and operators: - office, - toilet and lavatories, - phone and Internet, - lounge and catering, - Transport to and from accommodation.	
GROUND SERVICE	
- Parking place, - Forklift, - Ground Power Unit – GPU, - Air Start Unit – ASU, - Filling flight plans and dispatching the aircraft, - Weather briefings and NOTAMS (Notices To Airmen), - Management of Airport, Landing and Parking fees,	

9.11 TEP Liban responsibilities for OSRL general mobilization under SLA terms

Source: OSRL

This checklist describes the support TEP Liban provides to OSRL to mobilize equipment & personnel.

Requirement	Notes / Information
Country profiles / fact sheets	**Advise OSRL team before their departure on:**
	• Climate and any special requirements of the work place
	• Risks associated with working in Lebanon – advice on personnel safety, political stability, areas to avoid and TEP Liban security procedures
	• Items which may not be brought into the country (e.g. VHF radios etc.),
Airport: **General**	Confirm landing rights and over flight clearance
	Provide liaison person and translator at the airport to assist OSRL staff and with equipment arrival.
	Notification to customs covering: ▪ Immigrations issues ▪ OSRL personnel work permits ▪ Import regulations for equipment ▪ Bond money for aircraft (Appropriate currency).
	On demobilisation, return shipment of OSRL equipment and customs clearance must be organised.
Airport: **Arrival**	A company representative should be able to meet OSRL staff upon arrival at the airport and act as a local guide for the duration of the response operation. The representative should provide personnel with • a detailed up to date summary of the incident • site-specific health and safety advice • vehicles, road maps and fuel
Airport: **Equipment offloading**	Equipment offloading facilities including : Minimum of 2 forklifts and staff to drive them (available around the clock) capable of lifting typical weights of 2 – 4 tonnes. Flatbed lorries and drivers to take the equipment to its destination (capable of carrying the same weights – again available at short notice 24 hours a day)
Requirement	**Notes / Information**
Security	**Make any appropriate arrangements for security, including:**
	• Meeting staff at the airport, including transporting them and their luggage to destination.
	• Meeting OSRL equipment and ensuring its safe arrival from the airport to its destination (in conjunction with the requirements of the onsite OSRL body responsible for the equipment)
	• Laydown area for the storage of the equipment – preferably inside - security for this purpose should be 24 hour / 7 days a week for the duration of the equipment's stay.
Accommodation food and drink	Accommodation should be arranged for all OSRL members of staff before arrival in country (liaise directly with OSRL Duty Secretary once OSRL have been mobilised). Food and drink should be available upon arrival. On site, food and drink should also be catered for during the clean-up operation and made available for all members of the response team.

Requirement	Notes / Information
Material Safety Data Sheets	The MSDS must be made available to the response team members prior to arrival on site. Provide MSDS for all oils and chemicals likely to be encountered during clean-up operations.
Charts / maps	Provide up to date charts and maps of the incident area for on-site OSRL personnel, and also ensure copies of all working maps / charts are situated in the OSRL briefing room
Venue for OSRL staff briefings	This room should be located as close to the Incident Command Centre as possible and should include the following: • Communication lines (including phones, fax, computers on the company network) • Contact lists • White boards • Up to date charts and maps • Any other relevant information associated with the role of OSRL and the command centre
Personnel resources	If additional 'contract workforce' are required these must be sourced and equipped with the appropriate PPE before they are sent on site. Contractors need to know what their role is and who they report to. On-site response personnel should also be provided with decontamination facilities, food, drinks and toilet facilities.
PPE	A good supply of PPE should be available for the contract workforce, and for replacement throughout the response.
Communications	Provide mobile phones for appropriate personnel. Provide VHF radios and a channel. Provide contact lists (regularly updated) for everyone involved in the response.
Boats	Depending on the incident the equipment deployed from the vessels will vary. The following list details the requirements for deploying an offshore package of equipment. The details given are 'the ideal'. **Onshore area:** For boat work to be carried out inshore, vessels should have a shallow draft for example a Rigid Inflatable (RIB) type vessel. **Offshore areas:** Boats for deployment of boom and skimmer Good VHF communications – able to speak with towing vessel / aircraft / command centre (can also use mobile phones, fax, sat com etc.) Somewhere for crew to take breaks (wheel house) – food and drink should also be available Suitable vessel
Monies / purchasing	OSRL staff may require local currency or financial arrangements for the purchase of spare parts etc. TEP Liban may be required to assist in local banking, purchasing and ordering.
Stores / supplies	During the first days of a response operation OSRL will be self-sufficient, however if the response continues OSRL will need TEP Liban to organise resupply, maintenance etc.
Fuel supplies	OSRL response team members should have access to a regular supply of diesel / unleaded petrol.

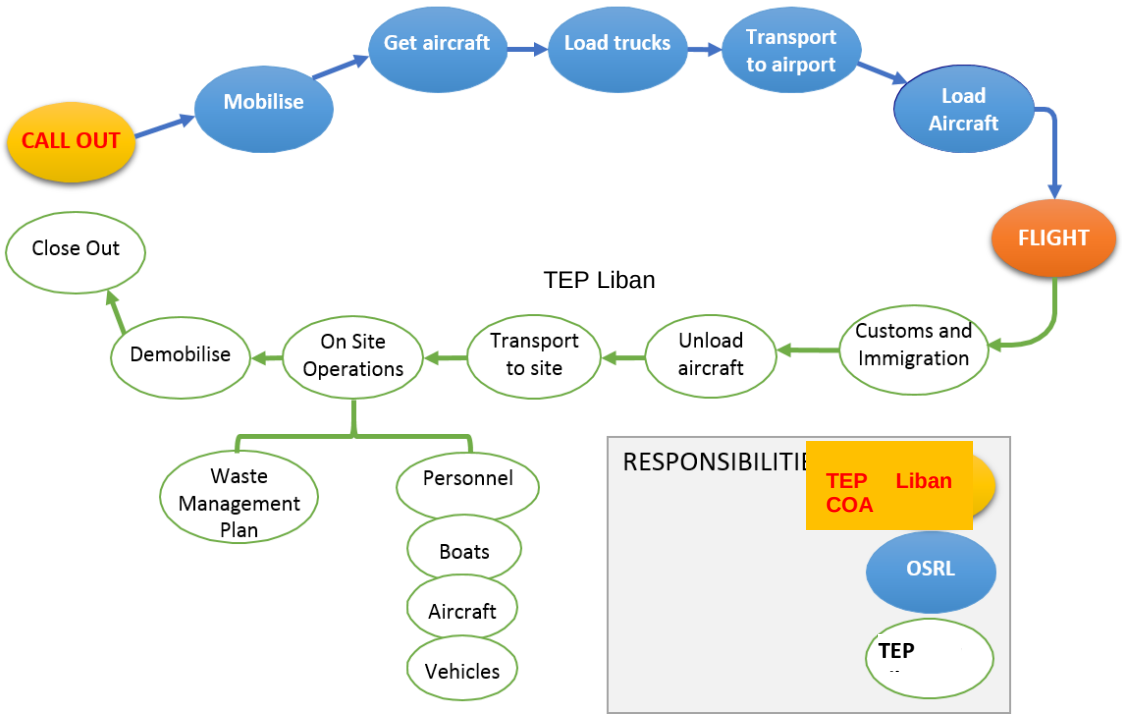
9.12 TEP Liban responsibilities for OSRL equipment mobilization under SLA terms

Source: OSRL

OSRL is responsible for the sending of equipment to Lebanon, until the landing in Lebanon.

TEP Liban is responsible for the mobilisation of the equipment and staff, from its arrival in Lebanon up to and including the loading and departure of aircraft from Lebanon.

The diagram below shows the tasks involved in moving equipment from the OSRL base to the scene of the incident and then to deploy these resources to mitigate the effects of the incident. This diagram clearly shows the tasks which are the responsibility of OSRL, and those which are the responsibility of TEP Liban.



CUSTOMS & IMMIGRATION

- Liaise with the OSRL Duty Manager to explain required documentation for Lebanon Customs and Immigration
- Arrange emergency clearance with the support of Lebanon authorities.
- Notify Customs / Immigration in country:
  - Immigrations issues
  - OSRL personnel work permits and safety.
  - Import regulations for equipment and dispersant product.
  - Bond money for aircraft (Appropriate currency).

FLIGHT

- Liaise directly with the OSRL Duty Manager to see if OSRL requires assistance with obtaining over-flight clearances and landing rights for the OSRL aircraft
- Provide list of local contacts
- Meet the flight (equipment will be normally be accompanied by an OSRL Specialist)

SAFETY AND SECURITY

- Arrange for secure transport to / from airport and during all operations, adequate personal protection if required, secure accommodation.

OFFLOADING

At the airport TEP Liban to arrange for:

- Staging area in airport
- Ground handling equipment
- Hi-loader and Forklifts (2 to 4 tons capacity, low mast for unloading Hercules L-382 aircraft)
- Local Agents to carry out aircraft unloading

TRANSPORT TO SITE

TEP Liban will be expected to arrange and to assist with:

- Flatbed lorries for transport and Forklifts, 2 to 4 tons capacity
- Provision of secure storage
- Control and tracking of equipment

ONSITE OPERATIONS

TEP Liban will be expected to arrange:

- English translator
- Access to a regular supply of diesel and / or unleaded petrol
- Facility for maintenance
- Food, accommodation and transport for OSRL personnel

DEMOBILISATION

OSRL will liaise with TEP Liban to plan demobilisation:

- Onsite cleaning, Return freight by air, sea or road

9.13 Profile of OSRL personnel

Source: OSRL

TEAM MANAGER

In most situations the OSRL Response Team Manager will operate from the IMT. The Response Team Manager acts as an advisor to the client, advising on all aspects of oil spill response including response strategies followed, clean up techniques, operational logistics, and aerial surveillance. From his post he will also control his chain of staff and the whole aspect of their operational duties.

The person fulfilling this role will have an exceptional level of expertise and experience and as such he will be assertively pro-active and ensure that the response is conducted in a professional, concise, and socio / environmentally effective manner.

Part of the Response Team Manager's responsibility is to report back to OSRL in the UK. He will keep a full daily activity log and report his information to the Chief Executive or the designated Support Manager, either verbally or by fax. The daily log will then be copied to the client's On Scene Commander.

TEAM LEADER

The Team Leader is also an experienced Technician with a broad skill base and variety of competencies. His role in an oil spill response operation becomes very flexible and will be strongly dependant on the situation on site. The Team Leader will work with the Site Emergency Team (SET) on site.

There are four main duties he is expected to fulfil:

- Assist the OSRL response team manager and provide his cover as necessary
- Take charge of the OSRL team in the field
- Liaise with appropriate authorities outside the command centre
- Reconnaissance and intelligence, reporting to the OSRL response Team Manager on the situation in the field and making appropriate recommendations for the presentation to the on scene commander / operations manager

SENIOR TECHNICIAN

The OSRL response team will normally include two senior technicians, one of whom will be available for offshore response and the other for onshore.

Their level in the command chain of OSRL staff is such that they are the most direct link to the team of technicians on the 'ground'. They are men with considerable experience and their knowledge of the equipment and its constraints is invaluable.

TECHNICIANS

All members of the OSRL response team are technicians of some description. In general the majority of OSRL technicians have been with the company for a number of years and have been exposed to a broad variety of spill responses. They are trained with the equipment they use, they know its strengths and weaknesses and can adapt and modify it should the need arise. They maintain the equipment themselves and therefore know it thoroughly.

It is not uncommon for technicians to work independently or in pairs and with limited contact from their superiors. Professionally they know their job and its requirements and if needed they will work remotely until they finish their tasks.

The technicians will be aware of the appropriate strategies and equipment constraints in relation to the site they are working. As a result they are in the best position to make a valued judgement on the methods of response operation to be applied and report their views through their chain of command.

Technicians are trained in all aspects of the oil spill response organisation so they have an understanding of social and environmental impacts. Primarily their function is to minimise the impact of the oil and remove it in a safe and conscientious manner.

OSRL technicians are also able to provide training during an oil spill clean-up. They are competent and have experience in taking control over many numbers of inexperienced 'local work forces'. It is common practice for them to have a team of local contractors working under them on site for the duration of the spill.

Some of the technicians have foreign language skills but they will overcome any language barrier by using translators where required. All OSRL technicians are trained in health, safety and the environment (HSE) and follow the strict OSRL HSE policy wherever they go. If the country / location they are working in does not adhere to its own HSE policies OSRL technicians training local workforce will do so in accordance with OSRL's HSE guidelines. In addition to this all OSRL staff are fully trained in first aid.

It is OSRL policy for all staff attending an oil spill response operation to maintain their own log of events and any expenditure occurred.

OIL SPILL CONTINGENCY PLAN

OPERATIONAL SUPPORT N°5:

OFFSHORE SPILL RESPONSE TACTICS & SITE COORDINATION

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

The client will use the present document if and when needed, under its sole responsibility. The client will modify, complete, update etc. the present document under its sole responsibility.

OTRA company will not be held responsible for any use of any part of the present document.

Any oil spill response should be implemented in a safe and efficient manner. It is crucial to evaluate the risks related to spilled hydrocarbon and response operations; and how to ensure the safety of the responders, through appropriate risk analysis and mitigations measures.

This document describes safety rules to follow to ensure the safety of all personnel involved in spill response operations offshore (in addition to the Golden Rules) and provides some Job Risk/ Safety Assessment for oil spill maritime response operations.

This Operational Support is designed for the Local Incident Commanders and team leaders on site, on board the response vessels. It provides guidance for:

- Tactical coordination of oil recovery operations at sea for Local Incident Commanders;
- Management of oil recovery operations by Team leaders on board the response vessels.

The development of offshore tactical plans is described in:

🗎 *Operational Support 4: "Offshore spill monitoring & response strategies and coordination".*

Instructions for the use of equipment and resources are in:

🗎 *Operational Support 6: "Use of offshore monitoring & response tools & equipment".*

Markings:

/!\ Warning

🗎 *Link to other documents of the TEP Liban OSCP*

ⓘ *Link to external document or information, not part of the TEP Liban OSCP*

TABLE OF CONTENTS

1. SAFETY PROCEDURES FOR OFFSHORE RESPONSE

1.1 Golden Rules

RULE 1

HIGH-RISK SITUATIONS

YOU MUST NOT:
- Smoke outside designated areas.
- Work or drive under the influence of alcohol.
- Work or drive under the influence of drugs.

YOU MUST:
- Assess all risks prior to the start of non-routine or complex operations or in downgraded situations.
- Report all downgraded situations to management, monitor them, take appropriate measures to mitigate the risks and formally notify the personnel concerned.
- Follow start-up and shutdown procedures and check progress.

RULE 2

TRAFFIC

YOU MUST NOT:
- Exceed the speed limit and authorized driving time.
- Use a mobile phone, even with a hands-free kit, while driving.

YOU MUST:
- Check condition and conformity of vehicles and machinery before use.
- Wear your seat belt.
- Use designated pedestrian paths/sidewalks and hold the handrail when taking the stairs.

RULE 3

BODY MECHANICS AND TOOLS

YOU MUST NOT:
- Use defective tools or tools not intended for the task or the area where the work is being performed.
- Use a tool, including those for pressure tests, under conditions that exceed the manufacturer's specified design limits.

YOU MUST:
- Use the tools specified in the work permit or procedures and adapt your body mechanics to the tool rating and repetitive nature of the task.

RULE 4

PROTECTIVE EQUIPMENT

YOU MUST NOT:
- Cross a barrier or reposition protective equipment without authorization.

YOU MUST:
- Wear the designated personal protective equipment (PPE) for the area and task and check its condition before use.
- Wear a life jacket whenever required.
- Report any damage to or malfunctioning of safety barriers.

RULE 5

WORK PERMITS

YOU MUST NOT:
- Perform any work without an approved work permit.

YOU MUST:
- Assess risks before starting work.
- Use any required additional permits.
- Re-issue a work permit if the conditions on the original permit change or the work procedure is modified.

RULE 7

POWERED SYSTEMS

YOU MUST NOT:
- Begin any work until you have checked that all energy and fluid sources have been isolated, unless you are specifically authorized to do so.

YOU MUST:
- Follow the isolation plan and supervision instructions attached to the work permit.
- Check all isolations, locks and tags before performing any work and remove them before restarting operations.

RULE 6

LIFTING OPERATIONS

YOU MUST NOT:

- Walk or stand under a suspended load.

YOU MUST:

- Perform a risk assessment, implement the lift plan and clearly mark out the area.
- Ensure all lifting equipment and gear is fit for purpose, in good condition and regularly inspected.
- Check that the load is securely slung and bundled.
- Designate a signaler and control the moving load at all times.

RULE 8

CONFINED SPACES

YOU MUST NOT:

- Enter a confined space without checking isolations and all atmospheric hazards.

YOU MUST:

- Cover suffocation, falls, explosion, crushing, drowning and other risks in the specific work permit.
- Ensure that you will be continuously monitored.
- Have an emergency response and rescue plan.

RULE 9

EXCAVATION WORK

YOU MUST NOT:

- Place machinery or spoil piles within one meter of a trench being excavated.

YOU MUST:

- Perform excavation work with a permit comprising a map of all buried hazards.
- Apply precautions for work in confined spaces, as necessary.
- Clearly mark all excavation areas and identify underground structures.

RULE 11

CHANGE MANAGEMENT

YOU MUST NOT:

- Make technical or organizational changes without getting prior authorization.

YOU MUST:

- Have a risk assessment and apply mitigation measures.
- Give workers appropriate training and update all relevant documentation.

RULE 10

WORK AT HEIGHT

YOU MUST NOT:

- Work under or near power lines without respecting the minimum safe clearance distance.
- Work on building or tank roofs without first checking their integrity and ensuring that the appropriate protective devices have been installed.
- Move a deployed mobile elevated work platform (MEWP), unless you are specifically authorized to do so.

YOU MUST:

- Put away tools when working at height (above 2 meters).
- Use a safety harness that is safely anchored, outside fixed barriers or in an MEWP.
- Use scaffolding that is fit for purpose and has been inspected.

RULE 12

SIMULTANEOUS OPERATIONS OR CO-ACTIVITIES

YOU MUST NOT:

- Perform simultaneous operations or co-activities without completing a preliminary field check.

YOU MUST:

- Conduct a risk assessment with the personnel concerned.
- Increase supervision and appoint a duly authorized coordinator.

1.2 Job Risk Assessment for offshore oil spill response – before any operations

General Job Risk Assessments JRA were developed (for the LuLa Large Scale Exercise, Total E&P Angola, Nov. 2013) and are provided here as baseline to adapt for any oil spill response exercise or operations offshore, addressing risks from:

- exposure to oil vapours;
- deployment of offshore inflatable boom;
- deployment of offshore oil skimmer (launched with the crane of the vessel or integrated crane);
- deployment of offshore large floating storage tank.

Another Job Risk Assessment covers risks from simultaneous subsea, maritime and aerial activities:

- **General risk**: interferences between maritime and aerial resources, general operating conditions;
- **Maritime interferences** between vessels;
- **Aerial interferences** between helicopter, plane, balloon, drones etc.

Main risk identified is due to the **aerial-maritime interferences** between different aircrafts at different altitudes in the same area and maritime units, which could result in collisions between helicopter, plane, balloon, vessels, drilling rigs.

Main mitigation measures defined in the JRA are considered in the present OSCP (Job tickets, strategy, tactics, instructions, organization on site etc.). Overall risk level is rated "Tolerable" due to the aerial activities for which gravity remains catastrophic even with a low probability.

Note. The Gravity was assessed based on CR EP HSE 102 and the Probability based on CR EP HSE 041, because risks generated by these activities are considered mainly occupational, rather than technological.

Results and link to files (in \Volume Ops Support\Op Sup 5 Doc\OSR JRA) are presented below.

EXPOSURE TO OIL VAPOURS	Overall risk level
Exposure to oil vapours COV, BTEX etc. *File « OSR offshore deploy.xlsx », tab « Exposure to oil vapours »*	Acceptable

OFFSHORE EQUIPMENT	Overall risk level
- Offshore inflatable boom	
File « OSR offshore deploy.xlsx », tab « BOOM »	Acceptable
- Offshore oil skimmer	
File « OSR offshore deploy.xlsx », tab « SKIMMER »	Acceptable
- Floating oil storage tank	
File « OSR offshore deploy.xlsx », tab « STORAGE »	Acceptable

SIMULTANEOUS OPERATIONS	Overall risk level
- Subsea, maritime and aerial activities interferences	
Multi-vessels (surface intervention + Subsea well intervention operations) and multi aircrafts operations (Helicopter surveillance and plane, tethered balloon, etc.). *File « Sim op - Maritime and aerial.xlsx », tab « JRA form »*	Tolerable

1.3 Safety instructions

Following procedure is implemented before any deployment of equipment offshore (exercises & real spills).

BEFORE THE DEPLOYMENT

AIR QUALITY MONITORING

- For any freshly spilled hydrocarbons (less than 12-24 hours) or continuous leaks/ blow-out or spill of oil spill from a tanker with unknown oil characteristics (loaded in another terminal), mobilize an air quality monitoring team which will define safe operating areas and areas where breathing apparatus is needed.
  - Flammability / Explosivity
  - Volatile Organic Compounds (VOC), including BTEX (benzene, toluene, ethyl-benzene, xylene)
  - Hydrogen sulphide (H2S) and Sulphur dioxide (SO2)
- Only allow operations after the feedback of the air monitoring team.

Note. H2S is not expected in Block 4.

JOB RISK ASSESSMENT

- Carry out a Job Risk Assessment for each equipment used offshore (booms, skimmers, floating storage tanks, etc.) – see provided examples of JRA.
- Review and update if required the examples Job Risk Assessments based on the air quality monitoring and operations planned.
- Ensure the operations procedures and equipment instructions answer all issues identified in the JRA.

LIFTING

- Ensure all equipment to be lifted has a valid Lifting Certification.
- Request assistance of a lifting specialist for any specific operation.
- Ensure the crane operators and deck crew are aware of:
  - The specific lifting arrangements,
  - The position and orientation of the packages on the vessel.

PREPARATION

- Provide to the captains of the vessels involved and to the TEP Liban manager of marine operations:
  - The operational procedure
  - The equipment instructions (from manufacturer/ provider)
  - The agenda of operations
  - Any special requirements (e.g. welding job)
  - Number of persons planned for the operation and person in charge

DAY OF THE DEPLOYMENT

SEA CONDITIONS

Confirm with the captain of the vessel that the sea and wind conditions allow a safe transfer, deployment and use of the equipment.

WORK PERMIT

Outside of the area of 500 m radius around the unit:

- Sign the Work Permit with the captain of the vessel.
- Check, in the vessel Bridging document, which work Permit is applicable:
    - Work Permit of the vessel?
    - Work Permit of TEP Liban?

Inside of the area of 500 m radius around the unit:

- Sign a TEP Liban Work Permit with the RSES of the Rig and vessel captain.

PRE-JOB MEETING

- **Bridge pre-job meeting** with the recovery team Leader and captain of vessel, 1st officer, person in charge of HSE on board (and crew member leading the operations on the deck if available):
    - Identify the team Leader and Safety officer.
    - Ensure everybody knows the channels of communication (team Leader - person in charge of the operations on the deck – captain).
    - Review the operations planned and equipment to be used.
    - Review the specific risks and safety measures to implement.

- **Deck pre-job meeting** with the recovery team Leader, crew member leading the operations on the deck, deck crew and recovery team:
    - Identify the team Leader and Safety officer.
    - Review the equipment to be used.
    - Review the operations procedures.
    - Review the specific risks and safety measures to be implemented.
    - Check the equipment.
    - Define the role and tasks of each operator.

1.4 Air monitoring for health and safety

"…*It is commonly agreed that Volatile Oil Compounds (VOC) have usually evaporated within the first 72 hours of an instantaneous spill.*

Aromatic hydrocarbons will have been volatilised and lost within a 24 hours period. Consequently, inhalation risks in open environment response operations are usually considered to be negligible after the first 24 hours.

Most volatile compounds are driven off from crude products within 8 hours…"

Source: "Consideration of total volatile hydrocarbon exposure during oil spill response" in International Oil Spill Conference, 2005

Main hazardous properties of oil are presented below with mitigation measures *(**Source:** "Oil spill responder health and safety" IPIECA and OGP. OGP Report Number 480, Date of publication: December 2012)*:

- Flammability
- Explosive vapours
- Toxicity and air quality
- Displacement of oxygen
- Slipperiness

1.4.1 Flammability

Hydrocarbons may present a risk of ignition in the first hours of spillage, particularly pooled oil on installations or concentrated at sea against the drilling unit. Flammability of oil slicks, once spread, is very low and rapidly non-existent.

➔ Check flash point of spilled product – when available.

➔ Exclude ignition sources in the first hours of the spillage when the oil is fresh.

➔ Light products with low flash points (gasoline, kerosene) require special care.

/!\ Enforce safety measures regarding flammability continuously during blow outs.

1.4.2 Explosive vapours

Explosivity risk is (very) low for oil slicks at sea, but may be significant for pooled oil on installations, concentrated oil against hulls etc.

➔Monitor the explosivity of the atmosphere in the first hours of the spillage when the oil is fresh.

➔No oil spill response operations within potentially explosive atmosphere.

➔Ensure engines are fitted with spark arrestors and air inlet shut-off devices (e.g. auto-shutdown Chalwyn valve) when operating close to potentially explosive atmosphere.

/!\ Enforce safety measures regarding explosivity continuously during blow outs.

1.4.3 Toxicity and air quality

Major concerns include; Volatile Organic Compounds (VOC), light aromatic compounds (benzene, toluene, ethyl-benzene, xylene – BTEX), hydrogen sulphide (H_2S) and sulphur dioxide (SO_2).

➔Monitor air quality prior to entering the slick area; and define a safe area (i.e. no respiratory PPE required).

➔Oil spill response operations are usually not carried out in potentially toxic atmosphere requiring breathing apparatus (except specific need).

➔Provide appropriate respiratory PPE on-board vessels if needed (particularly for monitoring teams).

➔Continuous air quality monitoring during the first 48-72h after an instantaneous spill.

/!\ Enforce safety measures regarding air quality continuously during blow outs.

Exposure limits are as follow (indicative):

Product	**VME or TLV-TWA** **= average exposure during 8 hours**	**VLE or TLV-STEL** **= exposure limit during 15 min**
Hydrogen sulphide (H2S)	5 ppm 7 mg/m^3	10 ppm 14 mg/m^3
Sulphur dioxide (SO2)	2 ppm 5 mg/m^3	5 ppm 10 mg/m^3
Benzene	1 ppm 3.25 mg/m^3	- -
Toluene	50 ppm 192 mg/m^3	100 ppm 384 mg/m^3
Ethyl-benzene	20 ppm 88.4 mg/m^3	100 ppm 442 mg/m^3
Xylene	50 ppm 221 mg/m^3	100 ppm 442 mg/m^3
HC vapours, C6-C12	284 ppm 1000 mg/m^3	426 ppm 1500 mg/m^3

(Source: Valeurs limites d'exposition professionnelles aux agents chimiques en France ; Aide mémoire technique n° ED 984 ; 2007)

1.4.4 Displacement of oxygen

Hydrocarbon gases can displace the oxygen (O_2) in an environment, particularly when they collect in confined spaces that are not adequately ventilated, leading to a risk of asphyxiation for those entering. Oxygen content readings should be taken prior to entering any confined space, or area where reduced ventilation may lead to an accumulation of hydrocarbon vapours. Entry should only be permitted if readings in excess of 19.5% O_2 are confirmed unless an independent oxygen source is used. Such areas should be monitored continually, entry by responders controlled using a permit to work system, and the appropriate tank entry procedures implemented.

Source: "Oil spill responder health and safety" IPIECA and OGP. OGP Report Number 480, Date of publication: December 2012

1.4.5 Slipperiness

The most common form of accident encountered during spill operations results from slips, trips or falls. Many of the products encountered are, by their very nature, slippery. Slips, trips and falls on oiled surfaces are some of the main causes of injury, and awareness of these hazards should be raised. Responders can also find it difficult to handle equipment when wearing oily gloves, increasing the time taken to complete familiar tasks and making some more complicated tasks impossible without decontaminating the equipment first.

Source: "Oil spill responder health and safety" IPIECA and OGP. OGP Report Number 480, Date of publication: December 2012

2. OFFSHORE CONTAINMENT AND RECOVERY

2.1 Coordination of recovery operations by Local Incident Commander

Local Incident Commander is designated by TEP Liban (TEP representative, captain of vessel or from a specialized company). He may be on the main recovery vessel (TEP Liban PSV) or another close vessel.

SAFETY

▶ Sign Job Risk Assessment. Review spill specifics and MetOcean conditions to authorize (or not) the operation.

▶ Ensure PPE, sorbent material and waste storage for oiled PPE & sorbent as needed.

▶ Ensure adequate air quality monitoring tactics are implemented if a risk has been identified.

MOBILIZE PERSONNEL, VESSELS AND RECOVERY EQUIPMENT

▶ Supervise the loading of containment & recovery equipment on the main recovery vessel (TEP Liban PSV or chartered vessel).

▶ Confirm competent personnel (for spill recovery) is on board the main vessel to act as **VESSEL RECOVERY COORDINATOR** (to operate equipment with the crew and advise captain.

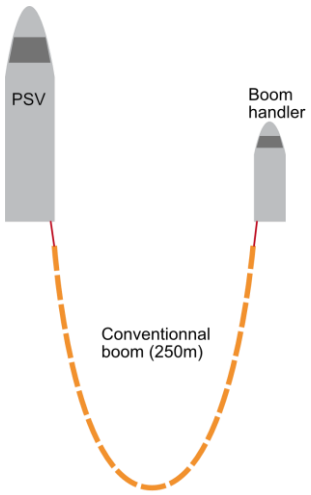
- OPTION. Mechanical engineer with hands-on knowledge of the response equipment.

▶ Vessel captain retains the ultimate authority to carry out or not the response operations at sea.

Conventional boom and skimmer are deployed from a vessel with the assistance of another vessel to tow the boom.

Recommended:

- 250m (mini.) of offshore conventional inflatable boom, total height: 1.5m mini.
- Offshore weir & brush skimmer, mini 50-70 m3/ hr theoretical flow rate



Some boom & recovery systems can be deployed with one vessel only with a paravane/ BoomVane system.

Pictures: French Marine Nationale, 2019

LOCALIZE THICK SLICKS TO RECOVER

➔Estimate the drift of slicks to relocate vessels:

- Calculate the drift using wind & current forecast (100% of current + 3% of wind).
- Use manual calculations or OSRA “Trajectory” module.

➔Locate the larger accumulations of patches of weathered condensate.

- Request results of aerial surveillance + last positions of drifting buoys.
- Confirm with visual observations from the vessels (+ possible use of drone).
- DO NOT recover silver sheen, or rainbow appearance slicks or “metallic” colour slicks.

See Operational Support n°4, section “MONITORING & MODELLING OF HYDROCARBONS SPILL AT SEA”

➔Night recovery is very rarely envisaged, and should only be considered if:

- Weather is very calm;
- Infrared image (balloon/ drone) to locate the slicks is available;
- Competent observer is on the vessel.

DECIDE OF RECOVERY TACTICS

➔Consider the limited manoeuvrability of recovery vessels.

➔Inform other vessels in the vicinity to give way to recovery vessels.

➔Decide the position of vessels considering the shape of slick(s), wind and number of vessels available, to operate simultaneously on the same large slick, or separately on smaller slicks.

- Prefer to recover completely a slick or one area, rather than partially treat numerous slicks.
- Focus on larger accumulations of weathered condensate.
- Work as much as possible upwind to recover hydrocarbons (easier to maintain oil in the boom, and easier to maintain the shape of the boom).

INSTRUCT VESSELS.

Communication of instructions is mainly between the **LOCAL IC** and the **VESSEL RECOVERY COORDINATOR,** and vessel captain as needed.

➔Provide Health and Safety instructions to the captain regarding the spilled product.

➔Provide initial GPS coordinates of slicks to be recovered to the captain of the vessel.

➔Sailing speed while towing (conventional) boom is 0.9 to 1 kt.

MONITOR THE RECOVERY OPERATIONS.

➔Regularly communicate with the vessel to ensure:

- Operations are carried out as planned timeline.
- Vessels are in the thickest slicks.
- Recovery is efficient.

➔Regularly ask the vessels to report their observation of the slick (silver sheens, rainbow? Or true colours?).

➔Instruct the vessels to re-position based on the latest aerial observation (helicopter, balloon, drone etc.).

PLAN OPERATIONS FOR NEXT DAY

➔Confirm with the IMT the recovery action plan for the next day and management of recovered oil.

➔Request the authorization for the vessel to carry decantation of Rec. Oil and overboard the settled water from the Rec. Oil tanks.

➔Organize the offloading of recovered oil from vessels on site when needed to other vessel/ floating storage/ storage tanker/ other facility.

➔Request the crew of recovery vessel to sample the rec. Oil / water mix from the Rec. Oil tanks.

REQUEST A REPORT FROM VESSEL RECOVERY COORDINATOR AT THE END OF EACH DAY

- Total volume of water & oil recovered;
- Estimated part of oil & appearance of oil;
- Difficulties, overall efficiency of operations;
- Times of start/ stop of boom towing + skimming operations,
- GPS coordinates of route followed;
- Geo-tagged photographs of the operations.

2.2 Containment and recovery operations on vessels

General instructions are provided here for the deployment of conventionnel offshore boom, inflated section by section, towed by two vessels and for the use of offshore sea skimmer operated independently from the boom.

Note. This section may be updated once the equipment has been purchased/ rented by TEP Liban.

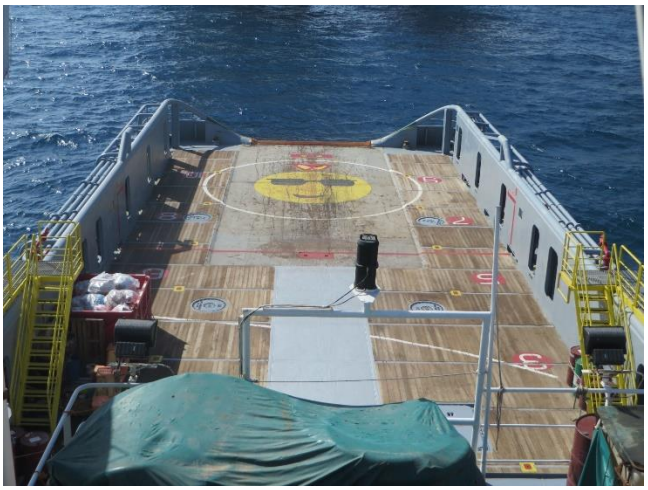
HEALTH & SAFETY

Captain of vessel request instructions on safety regarding product spilled (VOC, etc.) and gives the authorization to initiate boom deployment and recovery operations.

Vessel recovery coordinator (external) comes on board to assist on deck for the deployment of boom and skimmer and to advice captain on manoeuvres and sailing for containment & recovery.

TEP Liban representative may be present on board to liaise with the Local IC.

VESSEL DECK LAYOUT – MINIMUM REQUIREMENTS



➔ Minimum deck space (10 m x 20 m)

➔ Tanks for recovered mix of oil and water > 150m3

➔ Open stern with roller to launch & recover the boom

➔ Crane to launch & recover the skimmer

➔ Lashing/ fastening gear to fasten containers and equipment on deck

➔ tow pin on deck to secure towing line, or winch on forecastle to pull the towing line alongside the vessel

Note. Some skimmer systems (i.e. TransRec Oil Skimmer System) comes with built-in crane system and do not require using the main crane on the vessel.

PERSONNEL & ROLES ON BOARD

➔ **VESSEL CAPTAIN**: overall in charge of the operation, communicating and coordinating with other vessels, and ultimately in charge of safety of all on board.

➔ **VESSEL RECOVERY COORDINATOR**
competent external person coordinating on the deck the deployment and operation of equipment (with recovery deck team leader) and advising for recovery operations (with captain).
He is alternatively located on:

- the deck (during deployment) and
- the bridge (during recovery).

He communicates directly with the captain and recovery team leader on deck (radio communication on board and between vessels are managed by captain and crew).

➔ **DECK RECOVERY TEAM LEADER**: crew member commanding the crew to deploy and operate equipment, with advice from VESSEL RECOVERY COORDINATOR. Has ultimate authority on deck for operations and safety.

➔ **DECK RECOVERY TEAM** (crew members)**:**

- 1 x personnel: operating the power pack
- 2 x personnel: inflation hoses.
- 1 x personnel: installation of valve caps
- 4 x personnel: To pull on the boom, guide it and launch it to the water.
- 1 x Mechanical engineer

Note. The Vessel Recovery Coordinator is a competent person with specific training on the equipment.

*Note. A designated person on deck remains is in charge of **health & safety.** He maintains a constant watch on all health & safety issues. Operates air quality monitoring equipment. This role can be allocated to the Recovery Deck Team Leader or any other competent team member on deck.*

LOADING AND PREPARATION OF EQUIPMENT

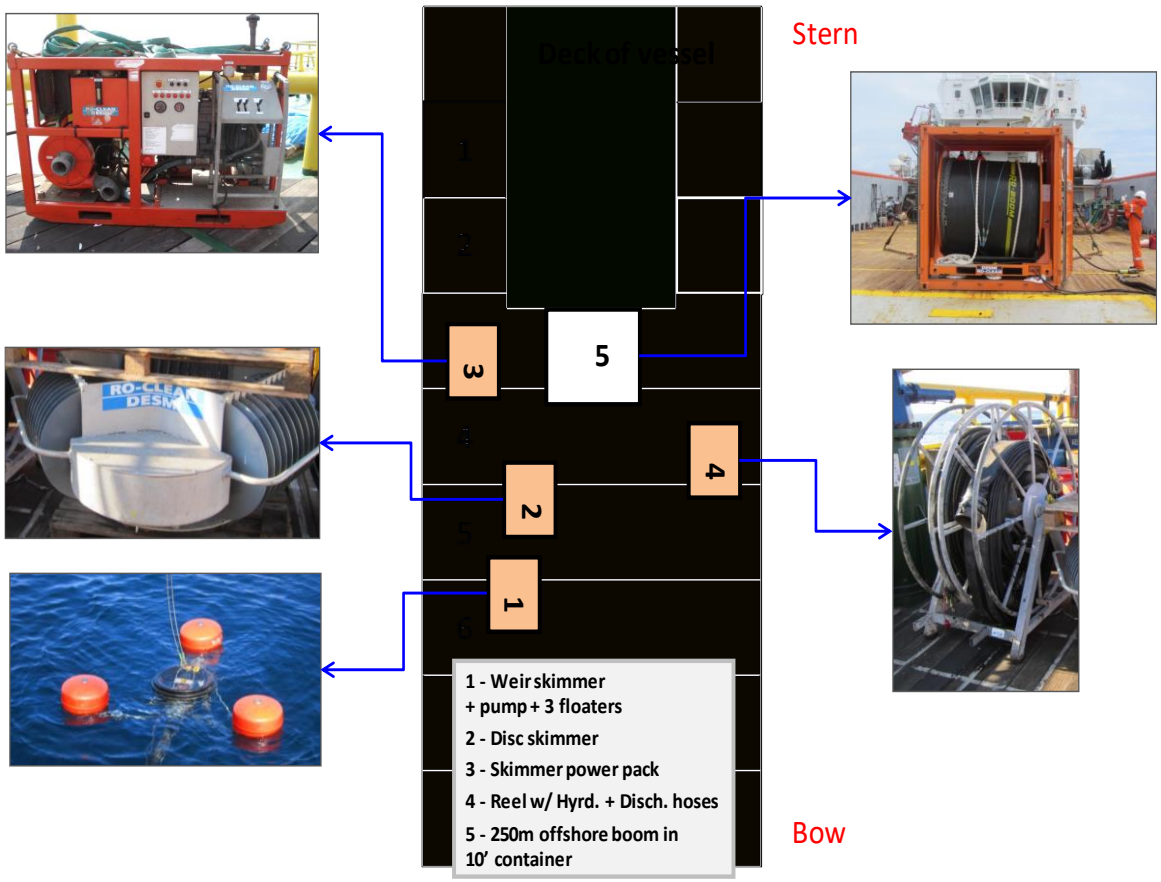
➔Deck layout of all equipment is discussed and agreed with vessel captain before the loading, as well as the method to secure equipment on the deck.

➔The **COLD** + **WARM** (with a decontamination area) + **HOT** zones (with oiled equipment) are defined on deck.

➔All equipment is loaded, positioned & secured on the deck, e.g. usually:

- Boom reel/ container centred at stern, 8-10m from stern & lashed at the 4 bottom corners.
- Skimmer close to the crane, with lines clear to be launched overboard.
- Other equipment welded/ lashed/ secured as needed.

EXAMPLE OF DECK LAYOUT ON PSV (OR AHTS)



LOCALIZATION OF TARGET SLICKS

➔ Report on a nautical chart the latest GPS positions of the slicks or have a real-time observation (drone).

➔Adapt the course (direction and speed) of the vessels to remain close to/ in the target slicks.

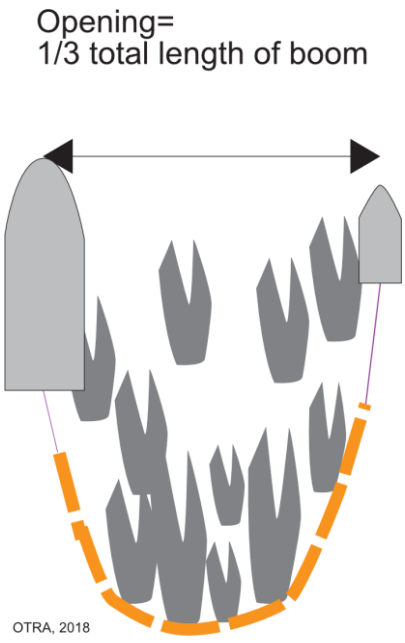
➔ Warn other vessels in the vicinity to keep clear of the booming & recovery operation and slow sailing vessels.

DEPLOYMENT OF BOOM

➔ Review the boom deployment & securing procedure step-by-step. 3 configurations are illustrated below.

1 – Boom secured on vessel side

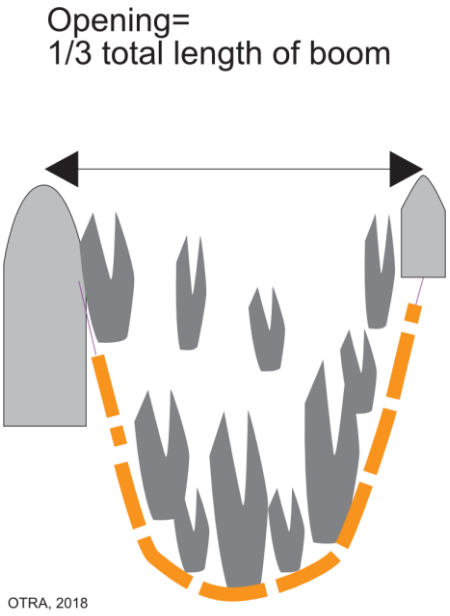
Launching of skimmer with crane of vessel.



2 – Boom secured to vessel stern

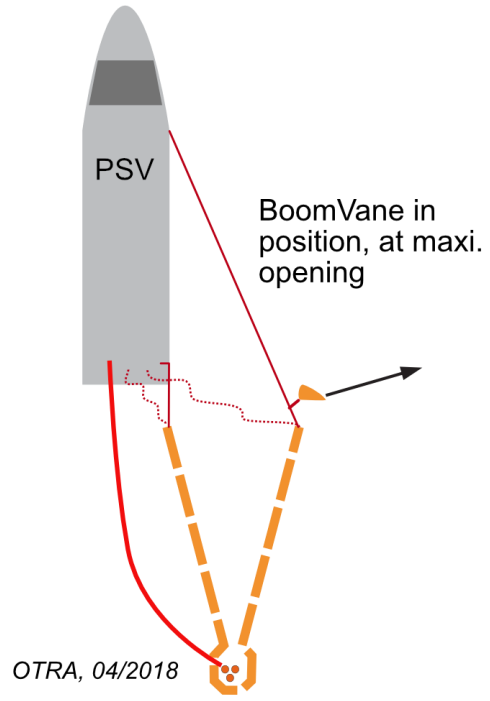
Launching of skimmer with crane of vessel.

Additional length of hydraulics and discharge lines required to reach the apex of the boom



3 – Boom towed with Paravane/ BoomVane system

Boom with integrated recovery system, launched with one vessel.
Requires additional experience.



➔Confirm the launching procedure for the boom depending on the type of boom used: conventional ? With paravane?.

KEY STEPS FOR DEPLOYMENT OF CONVENTIONAL BOOM are outlined below.

1 – Prepare the boom.

Prepare the lines : launching + recovery + stopper + towing. Use floating material (e.g. polypropylene) of adequate diameter (check break load), equipped with buoys and a weak/breaking point.

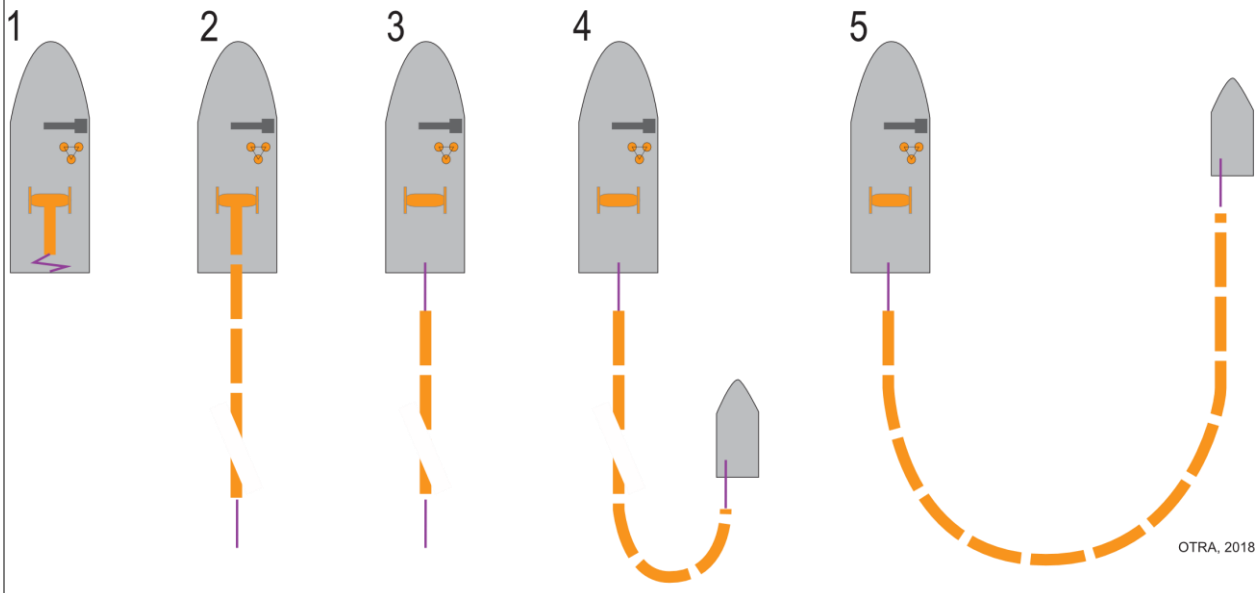
2 – Inflate and launch boom.

3 – Secure the boom to the vessel once all boom is launched.

4 – Have assistance towing vessel to take the other end of boom.

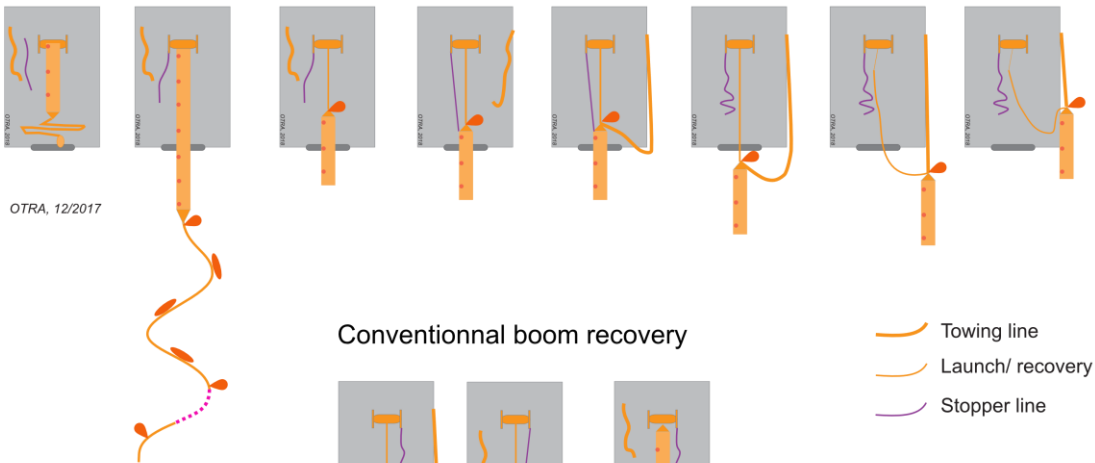
5 – Have both vessels sailing to have boom in « U » configuration.

And prepare the skimmer.

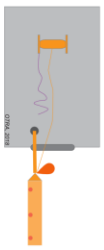


Manoeuvres with the lines are outlined below.

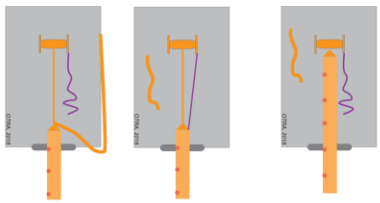
Conventionnal boom deployment on vessel side

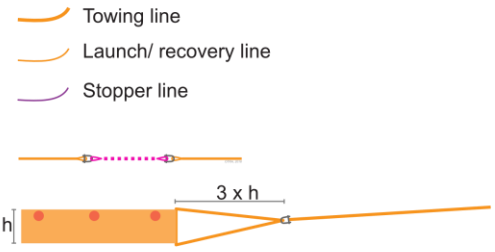


Note.
Secured on tow pin

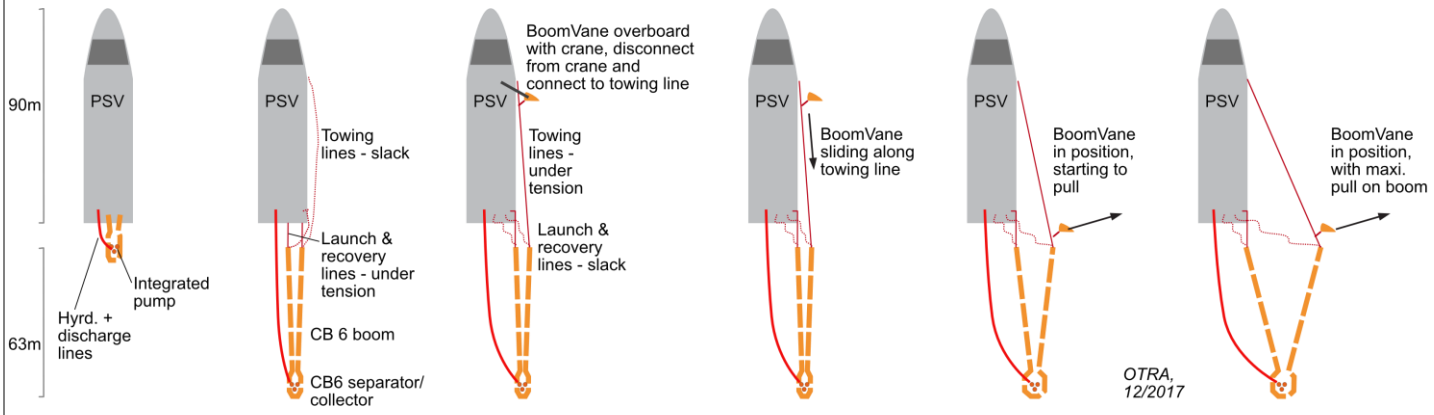


Conventionnal boom recovery

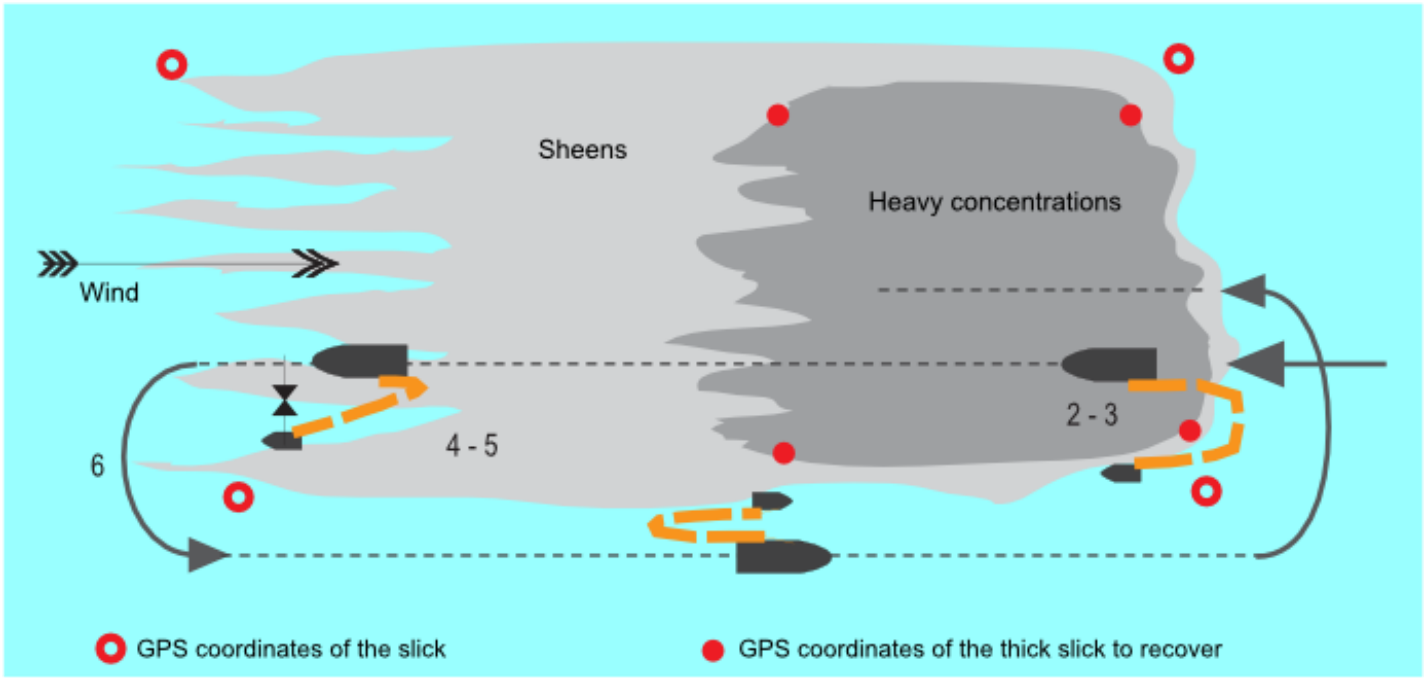




KEY STEPS FOR BOOM + PARAVANE/ BOOMVANE SYSTEM are outlined below.



OIL CONTAINMENT & RECOVERY

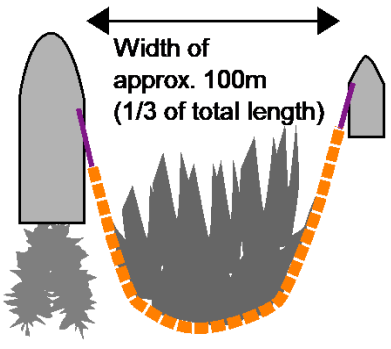


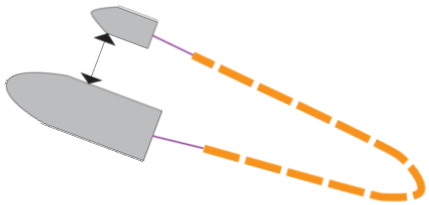
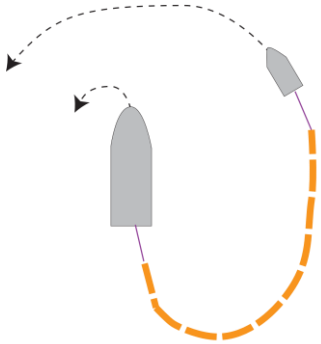
➔ Depending on the shape of the slick:

- **Slick with large leading edge parallel to the wind**: sail and recover in runs parallel to the wind, as figure above.
- **Long slick aligned with wind**: approach heavy accumulations from a downwind/ down current position and head upwind.

➔ To contain the oil, sail with boom in “U” shape:

- **Maximum speed: 1kt to contain oil** (1.5 to 2 kts with heavy duty offshore boom and without oil).
- Distance between vessels of approximately 1/3 of boom length.
- Constant watch of the recovered oil in the boom apex from the bridge.



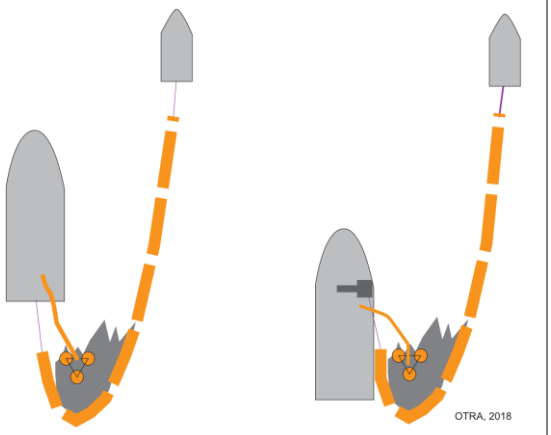
➔ To sail faster with the 2 vessels, sail in a “Closed U”: • Bring main and assistance vessels at the same level. • Reduce as much as possible the width between the vessels (e.g. 20 to 30m) to decrease the area of boom facing the current. • Increase speed to 3 to 4 knots.	
➔ **If higher speed is required**: • Assistance vessel releases the boom. • Main vessel can tow the boom in line with the vessel up to 6-8 kts. To be confirmed for each type of boom.	
➔ To turn: • Sail in “U” configuration. Slow down. • Main vessel remains “inside” the turn. • Assistance vessel turns around the main vessel, speed of +/-1 kt. • The 2 vessels keep the same bearing during all the turn. • The 2 vessels maintain the same distance between them during all the turn (as in the “U” configuration). Note. If a fast turn is required, disconnect the boom from a vessel.	

SKIMMING

➔ To concentrate the oil close to the main vessel and recover it, sail in "J" configuration (when apex of boom is full of oil):

- Slow down to speed less than +/-00.5 kt and remain upwind/ up current.
- Assistance vessel moves ahead of main vessel and comes closer.
- Recovery vessel launches the skimmer into the concentrated oil.

/!\ Ensure all hydraulic lines & discharge hoses connections are secured.



➔Always launch the skimmer and unhook from crane so that it can reach the boom apex where oil is (for skimmer launched with the crane of vessel).

➔Always keep a visual watch on the apex of boom to ensure oil is not leaking out of the boom.

➔Always skim with a low pump speed on the skimmer to minimize the intake of water.

➔Ensure the skimmer operator has a constant visual watch over the skimmer or is assisted by another operator.

➔ Use oil/mud tanks of the vessels to store and carry out decantation the recovered oil & water mix.

➔ Oil can be offloaded to a floating storage tank or coastal tanker.

RECOVERING OILED BOOM & SKIMMER

Before recovering oiled skimmer/ equipment:

➔Set up on deck the Cold + Warm (with a decontamination area) + Hot zones (with oiled equipment).

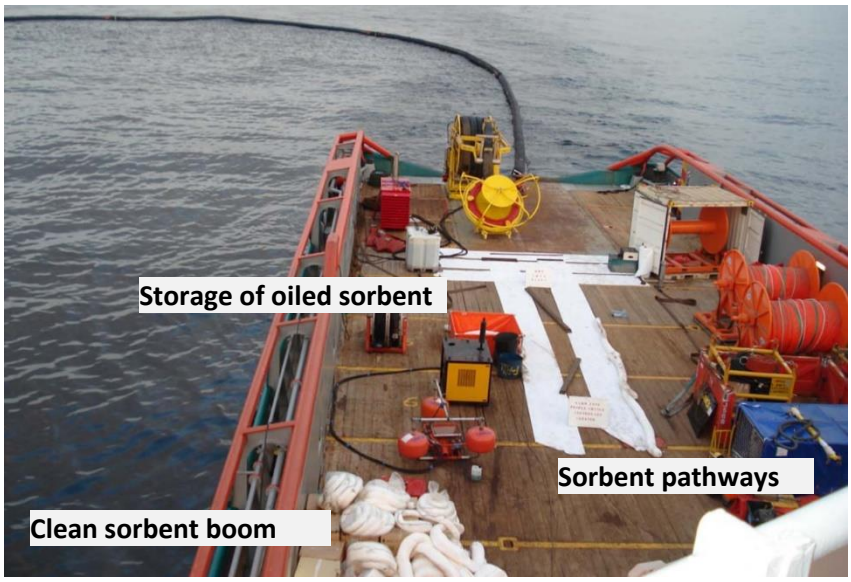
➔Cover pathways to Hot zone with sorbent pads/ roll.

➔Place plastic liner on deck to store of oiled skimmer and ancillaries.

➔Prepare PPE (coveralls, oil resistant gloves, boots or cover boots) for operators in the Hot zone.

➔Prepare a Decontamination area between the Hot & Warm zone, with dustbin bags to dispose of oiled PPE.

➔Prepare water tight big-bags or skips with plastic liner to store oiled sorbent material.



(Source: Total, 2008)

➔ After operations, at the end of the day:

- Boom tow line is released by the assistance vessel and secured on the main vessel.
- Boom remains in the water to minimize operations with vessel at slow speed to avoid boom entanglement.
- Skimmer is brought back on deck and “roughly cleaned” & checked.

➔ Provide a report with pictures.

REMINDER: WIND & CURRENT EXERTED ON A BOOM

➔**Force of current** Fc (kg) of velocity Vc (kts) exerted on a boom of sub-surface Area As (m2) **Fc = 26 x As x (Vc)²** Example. Boom 100 m long with 0.6 m skirt at 90° of 0.5 kt current : Fc = 26 x (0.6 x 100) x (0.5)² = 390 kg	➔**Force of wind** Fx (kg) exerted of velocity Vw (kts) on a boom of freeboard surface Area Af (m2) **Fx = 26 x Af x (Vw/40)²** Example. Boom 100 m long with 0.5 m freeboard in 15 kts wind : Fx = 26 x (0.5 x 100) x (15/ 40)² = 183 kg

Total force of wind and current = Fc + Fx

For a boom at 90° of the current direction, the total force **is split 50/50 at each end of the boom.** Note. Boom are flexible and moored with an angle: force will be less. Use above as guidelines.

2.3 At-sea transfer of recovered hydrocarbons and offloading

Recovered hydrocarbons at sea will be offloaded onshore by the recovery vessel into a suitable facility (Logistics base or other). Alternatively, recovered oil may be transferred from the recovery vessel to another vessel at sea.

Procedure is defined on a case-by-case basis by the affiliate.

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3. OFFSHORE MECHANICAL MIXING

3.1 Coordination of mechanical mixing by Local Incident Commander

Operations are managed by the Local Incident Commander with similar method as for offshore containment and recovery (see previous section).

3.2 Mechanical mixing operations on vessel

General instructions are provided here for mechanical mixing (or “propeller wash”).

HEALTH & SAFETY
Captain of vessel request instructions on safety regarding product spilled (VOC, etc.) and gives the authorization to initiate operations.
MIXING PREPARATION
➔ Report on a nautical chart the latest GPS positions of the slicks or have a real-time observation (drone). ➔ Warn other vessels in the vicinity to keep clear of the mechanical mixing operation.
MIXING OPERATIONS
➔ Define the sailing speed and use of propellers that generates the most turbulences for the best mixing effect. ➔ Depending on vessel and shape of the slick, define the best “mixing” tactics. Examples are provided below.

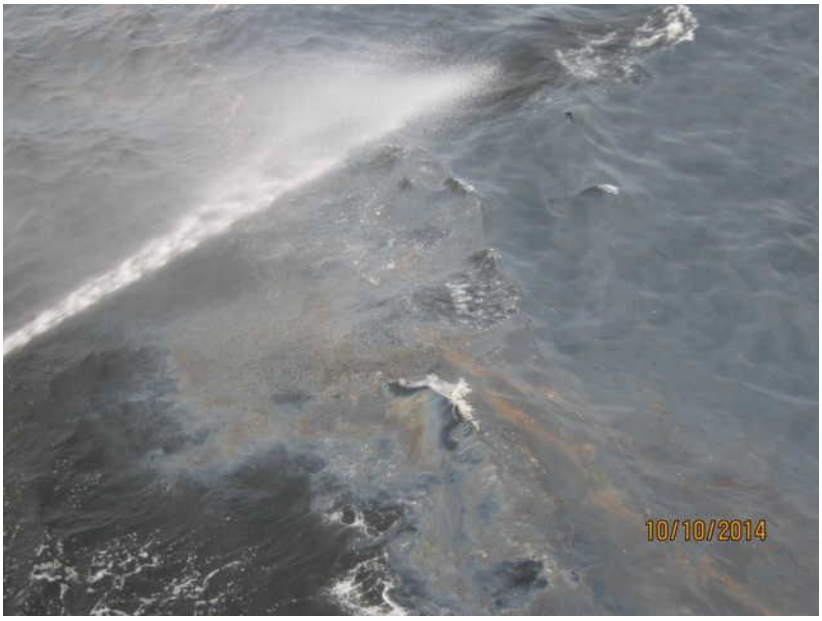
Elongated slicks: vessel sails in line, either sailing ahead or backwards – whatever provides the best mixing effects. Picture: TEP Angola	

Large round-shape slicks: vessels can work in “circles” sailing with the propellers having as much angle as possible to create a turbulent area.

Picture top: TEP Angola

Picture bottom: TEP Cyprus, Large Scale Exercise 2017, mechanical mixing with PSV

Additional use of Fire-fighting systems of vessels to increase the sea surface area treated.



➔ Provide a report with pictures.

OIL SPILL CONTINGENCY PLAN

OPERATIONAL SUPPORT N°6:

USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	**Date**	**Description**
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		
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Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

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OTRA company will not be held responsible for any use of any part of the present document.

This Operational Support is designed specifically for use by the personnel engaged in monitoring and response on the field offshore.

This document provides instructions and guidance for monitoring tools and software, as well as deployment and use of dispersant spraying and recovery equipment owned/ rented by TEP Liban and stored on the PSV's.

Note. Some equipment (GPS, Digital camera, sampling kit) may have slightly different specifications – unknown at the time of writing.

Note. Other equipment not readily available for TEP Liban are added here for reference.

Markings:

/!\ Warning

Link to other documents of the TEP Liban OSCP

Link to external document or information, not part of the TEP Liban OSCP

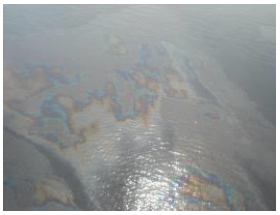
TABLE OF CONTENTS

1. INSTRUCTIONS FOR AIR QUALITY MONITORING

Refer to operating instructions provided by the manufacturer/ provider of equipment.

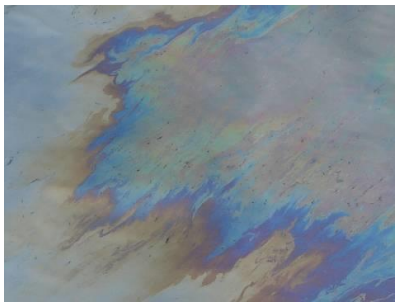
2. INSTRUCTIONS FOR AERIAL OBSERVER






AERIAL OBSERVATION OF OIL SPILLS

INSTRUCTIONS FOR OBSERVER

A - PREPARATION OF AERIAL SURVEY

1. Equipment for observer / check list
2. Estimate the position of the slick(s)
3. Agree flight plan with pilot

B - AERIAL SURVEY

4. Locate the oil slick and estimate its size
5. Qualify the oil
6. Quantify the oil

C – GUIDELINES: QUALIFY THE OIL

1. BONN COLOUR CODE: slick appearance, thickness and associated volume
2. Examples of types of oil slicks
3. Do not confuse with oil…

D – GUIDELINES: QUANTIFY THE OIL

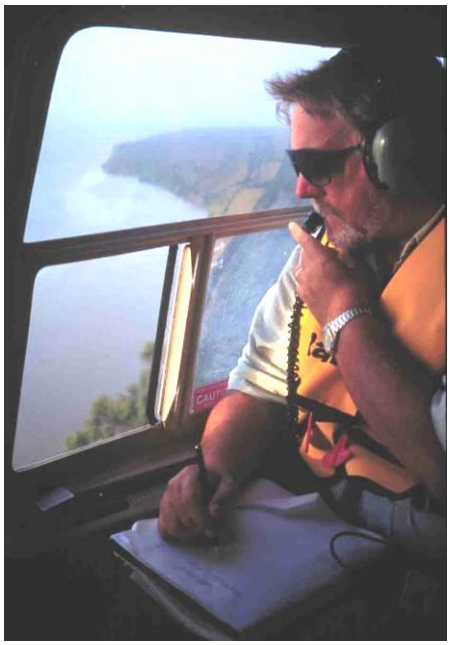
- Distribution of oil in a slick

4. Estimation of coverage percentages

E – AERIAL SURVEILLANCE REPORT: TEMPLATE

A - PREPARATION OF AERIAL SURVEY

1. EQUIPMENT FOR OBSERVER / CHECK LIST



Before leaving TEP Liban office

□ Obtain information on last known position of slick(s) and plot on map
□ Take observer kit and ensure it is complete
□ Backup GPS track log and clear for new flight

On the aircraft

□ Ensure you and assistant have seats with good viewing window
□ Consider flying with door open
□ Ensure good communications with pilot

Observation

□ Start searching oil at high altitude (1000 ft) for good overall picture. Drop down to half altitude to confirm and check appearance of oil.
□ Map out entire extent of oil slicks but concentrate on black oil
□ Divide work with assistant / Manual and GPS tracking + photos and videos
□ Have with you Map / Chart, good quality sunglasses (polarizing), Stopwatch, Notebook and pens

Documenting / Reporting

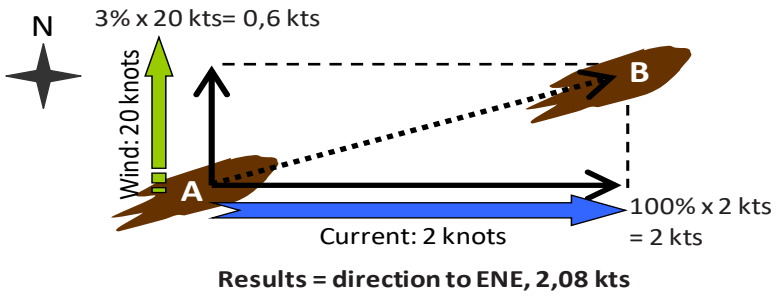
□ GPS + remote aerial + spare batteries
□ Digital camera + spare batteries
□ Reporting form

2. ESTIMATE THE POSITION OF THE SLICK(S)

□ Obtain latest position of ARGOS buoy

□ Obtain latest trajectory prediction

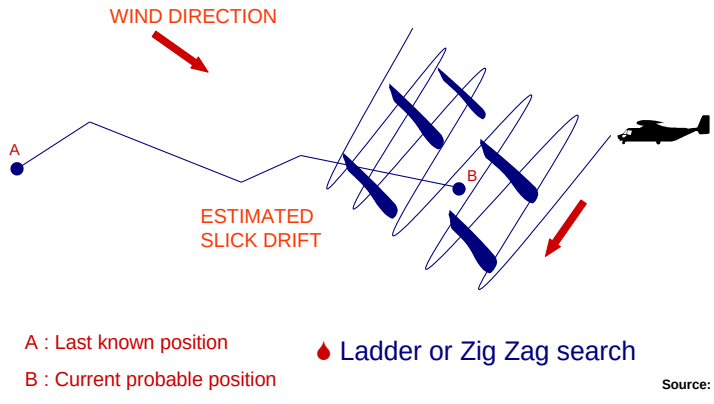
□ For manual calculations, use the following to estimate the drift of the oil:
- ➔ 100 % of current speed & direction
- ➔ 3 % of wind speed and direction



Results = direction to ENE, 2,08 kts

3. AGREE FLIGHT PLAN WITH PILOT

□ Estimate likely position of the slick(s), from last known position and current and weather conditions
□ Check with pilot time available for slick over flight once on site
□ Define search pattern for locating the oil with pilot
□ In case of shoreline survey, enquire of restrictions (overflying military, naval bases, etc.)



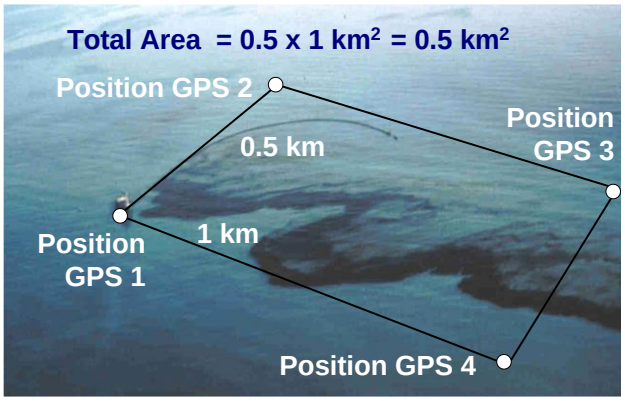
B - AERIAL SURVEY

4. LOCATE THE OIL SLICK AND ESTIMATE THE SIZE OF THE SLICK

□ **Locate** the slick(s) and record the position of the outer points of the slick using a GPS.

□ **Estimate the overall surface** of the area covered by the slick(s).
• By calculating length and width,
• or by computing surface from GPS locations.

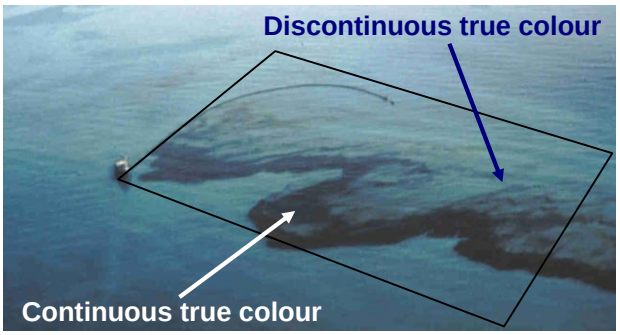
□ **Estimate the drifting direction** of the slick and **its speed** (by comparison with former observation).



5. QUALIFY THE OIL.

□ **Evaluate the oil appearance in the slick and respective coverage <u>using BONN Colour code.</u>**
1 Silver sheen **2** Rainbow sheen **3** Metallic
4 Discontinuous true colour **5** Continuous true colour
Focus on thick slicks: true colour (Code 4 and 5).

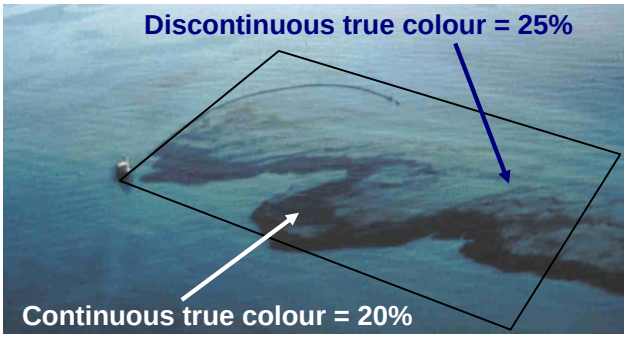
Note. Terminology of types of slick
• Slick (Ø or L > 30 m)
• Windrows (parallel stripes)
• Patch (5 cm < Ø or L < 30 m)
• Patty (10 cm < Ø 50 cm)
• Tar ball (Ø indiscernible)
□ **Note the state of the oil**
• Fresh oil • Dispersed oil • Emulsion



ⓘ Refer to the **BONN COLOUR CODE** next page.

6. QUANTIFY THE OIL.

Colour	Quantity (m3/km2)	Coverage	Vol. / km2 with coverage
Discontinuous	50 to 200	25%	= 12.5 to 50 m3
Continuous	200+	20%	= 40+ m3
	Total vol. in 1 km2		**52 - 90 m3**
	Total area of slick		**0.5 km2**
	Total vol. in 0.5km2		**26 - 45 m3**

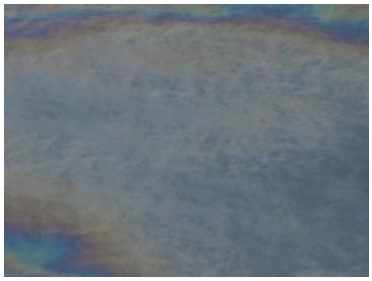
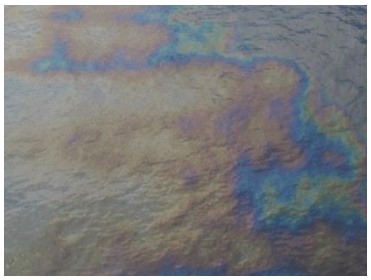


ⓘ Refer to D – GUIDELINES: QUANTIFY THE OIL and guidelines for QUANTIFICATION OF OIL ON WATER.

C - GUIDELINES: QUANTIFY THE OIL

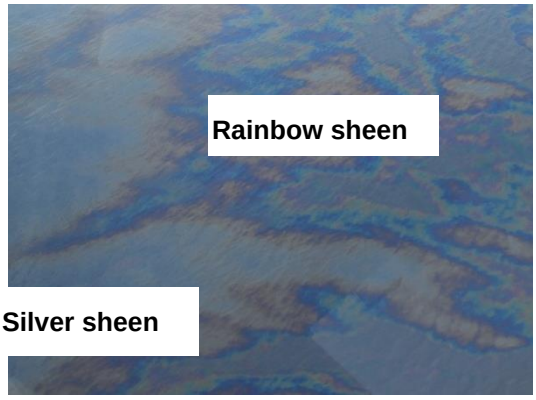
BONN COLOUR CODE: SLICK APPEARANCE, THICKNESS AND ASSOCIATED VOLUME

NOTE: The codes used in the present guidelines to qualify oil according to its appearance on the sea surface result from the Bonn Agreement Oil Appearance Code. See the Bonn Agreement web site for further information: http://www.bonnagreement.org

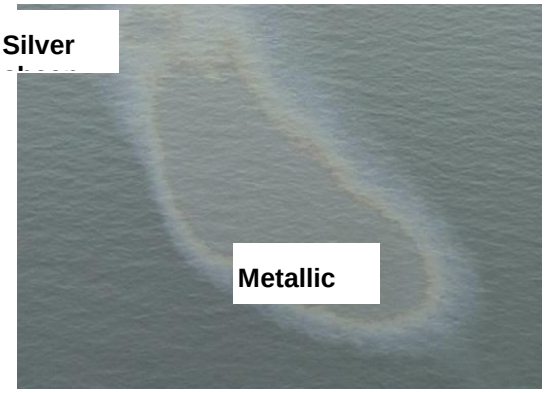
Code	Description	Appearance	Thickness	Quantity
1	**Sheen (silvery / grey)** Appearance is due to their thickness		**0.04 to 0.30 µm** Very thin films of oil which reflect the incoming light slightly better than the surrounding water	**0.04 – 0.3 m3 / km²** (40 - 300 litres)
2	**Rainbow** Rainbow oil appearance is independent of oil type		**0.30 to 5.0 µm** Oil films with thicknesses near the wavelength of different coloured light exhibit the most distinct rainbow effect	**0.3 – 5 m3 / km²** (300 - 5,000 litres)
3	**Metallic** The appearance of the oil in this class is oil type dependent		**5.0 to 50 µm** **0.005 – 0.05 mm** Metallic will appear as a quite homogeneous colour that can be either blue, brown, purple or another colour	**5 -50 m3 / km²**
4	**Discontinuous true colour** The broken nature of the colour is due to thinner areas within the slick		**50 to 200 µm** **0.05-0.2 mm** For oil slicks thicker than 50 µm the true colour will gradually dominate the colour that is observed	**50 – 200 m3 / km²**
5	**Continuous true colour** Homogenous colour can be observed with no discontinuity as described in Code 4		**> 200 µm** **>0.2 mm** The true colour of the specific oil is the dominant effect in this category. This category is strongly oil type dependent	**200 m3 and more / km²**

C - GUIDELINES: QUALIFY THE OIL

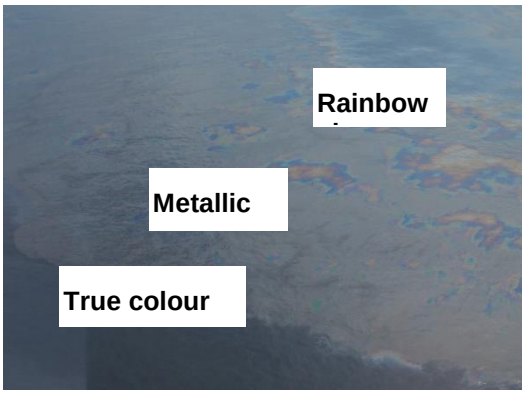
EXAMPLES OF TYPES OF OIL SLICKS



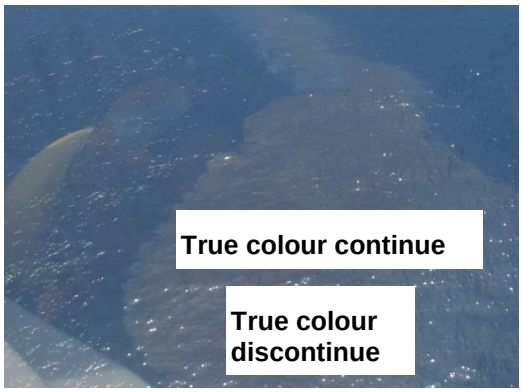
Silver & Rainbow Sheen, CODE 1&2 + Metallic, CODE 3



Silver Sheens (CODE 1) + Metallic (CODE 3)



Rainbow + Metallic CODE 3 + True Colour, CODE 4&5



True Colour, CODE 4&5

Oil, emulsifying (CODE >5)

Emulsified oil (CODE 5)

Weathered oil and emulsion (CODE 5)

Black oil stranded on shore (CODE 5)

- GUIDELINES: QUALIFY THE OIL

DO NOT CONFUSE WITH OIL...

Shadows of clouds

Seasonal algal bloom

D - GUIDELINES: QUANTIFY THE OIL

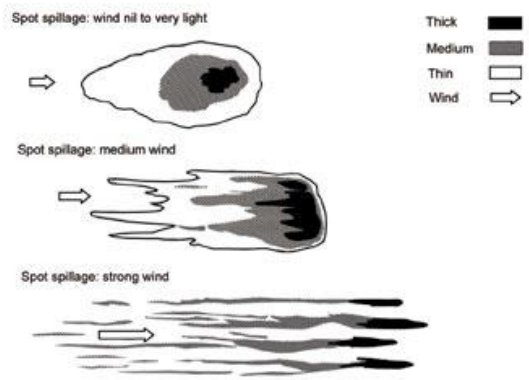
DISTRIBUTION OF OIL IN A SLICK

Focus on thick oil: Record contour of areas true colour, BONN Code 4 and 5.

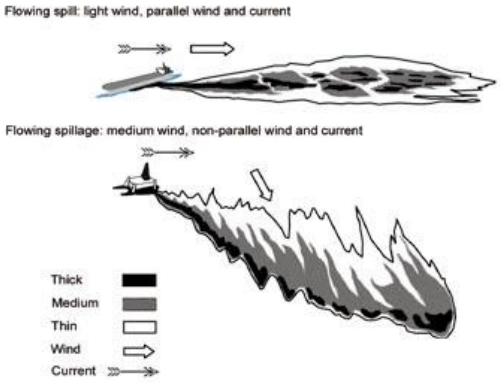
Heavy accumulations are usually downwind, followed by areas of metallic & silver sheens.

Rule-of-thumb: 90% of oil is in 10% of slick

Shape of slicks vary according to wind conditions:
Above 10 kts, oil tends to form windrows (elongated strips).



Combined current and wind respective directions influence the distribution of oil into oil slicks and the formation of patches or elongated windrows, followed by rainbow and silver sheen.



NOTES FOR OBSERVATION IN OPEN SEA

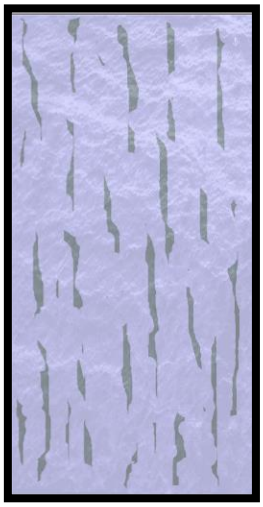
Strong surface agitation due to wind action often leads to the oil being temporarily subsurface, thus rendering it difficult to see from the air. However, oil will resurface when the weather is calm.
As crude oil weathers and emulsifies, its density increases reaching values close to the density of the sea water. Weathered oil can remain just below the sea surface, especially in case of strong wind condition and will not be visible from the air.
Regular over flights are needed in order to avoid losing track of the oil slicks

NOTES FOR OBSERVATION IN THE COASTAL AREA

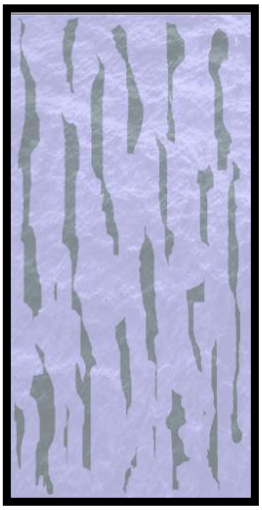
When oil reaches the coastal area and/or the shoreline, aerial surveillance is very useful to assess the extent of oiling of the shoreline and locate the largest accumulation of oil and assess the movements of the oil along the coastline, thus allowing predicting the likelihood of further impact to sensitive parts of the coastline and/or activities.
Pictures of previous page show that the presence of a number of features in the natural coastal environment which could be confused with oil.
Extra caution should be taken in interpreting the observations from the air and validation should be sought by sending a team to survey the suspected oiled sites from land.

D - GUIDELINES: QUANTIFY THE OIL

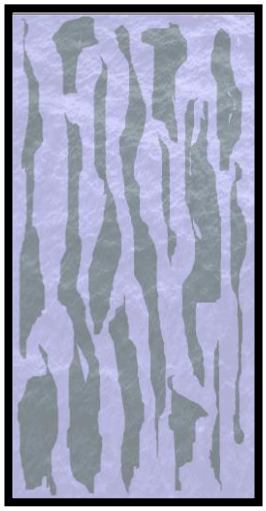
ESTIMATION OF COVERAGE PERCENTAGES FROM A HELICOPTER



10%



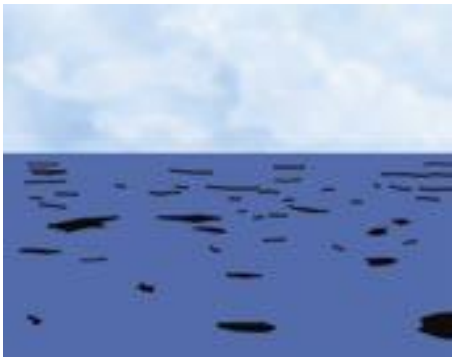
20%



40%

ESTIMATION OF COVERAGE PERCENTAGES FROM A VESSEL

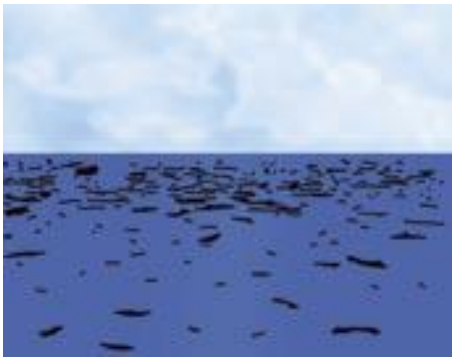
1% large slicks



5% large slicks

20% large slicks

1% small patches



5% small patches

20% small patches

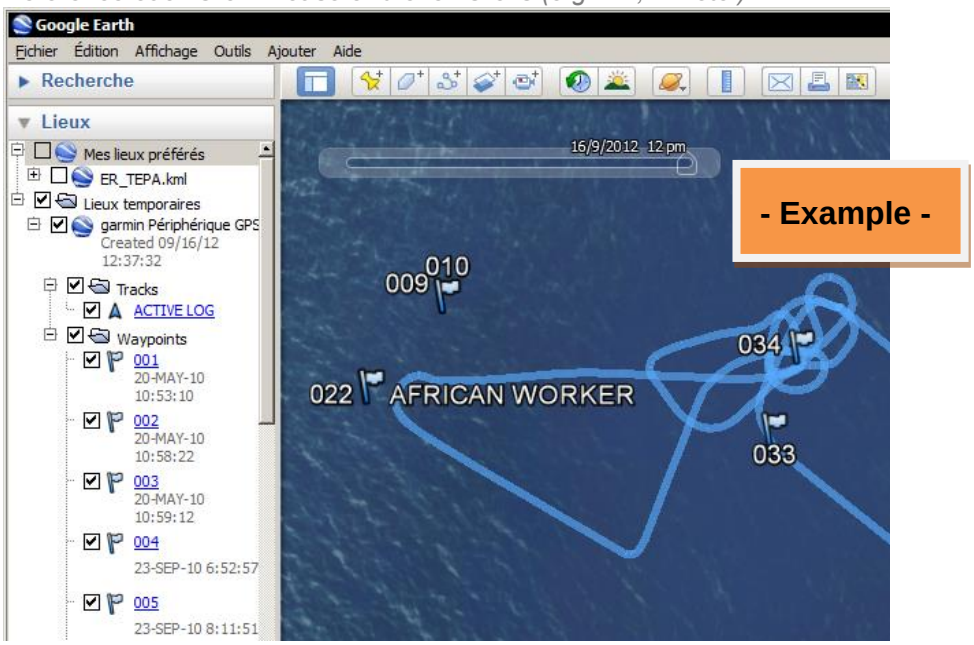
On completion of the aerial surveillance mission

1. **IMMEDIATELY:** Communicate to the OSC (and if possible to the response vessels) the location(s) of the thicker slick to enable positioning the response vessels rapidly.
    - Beware of slick drifting between observations and time for vessel to arrive on target.
2. **AS SOON AS POSSIBLE**: Prepare the report for the OCP and IMT
    - See template below.

E – AERIAL SURVEILLANCE REPORT: TEMPLATE	
Incident name:	**Aerial surveillance report No.**: **Date of mission**:
Observers: **Take off time** (UTC): **Landing time** (UTC):	**Aircraft type**: **Aircraft company**: **Name of pilot**:
Attached documents - YES / NO : maps - YES / NO : Photos (related to way points)	- YES / NO : Video - YES / NO : GPS track log - YES / NO : GPS way points
Weather conditions (rain, cloud, visibility etc.):	**Wind direction** (from the °): **Wind speed** (kts):
Sea state/ waves:	**Current direction** (to the °): **Current speed** (kts):

OVERALL SITUATION MAP

Include here a map (from Google Earth or similar) displaying key features/assets, track of survey, key way points, position and extension of slicks with the thickest accumulation.
Reference each slick in case of broken slicks (e.g. "A", "B" etc.).



SUMMARY OF SLICK(S) OBSERVATION(S)

List of all slicks surveyed

- Slick “A”:
- Slick “B”:
- Slick “C”:
- etc.

Estimation of total volume of oil spilled for all slicks (“A” + “B” + “C” etc.)

- Value for official reporting to the authorities (Minimum of all oil appearance category)
- Value for response planning (min. and max. of Cat 3, 4 and 5)

DETAILED SLICK(S) OBSERVATION(S)

Slick “A”

Edge position:
- Time:
- Latitude (N)
- Longitude (E)

Overall dimension:
- Length (m)
- Width (m)

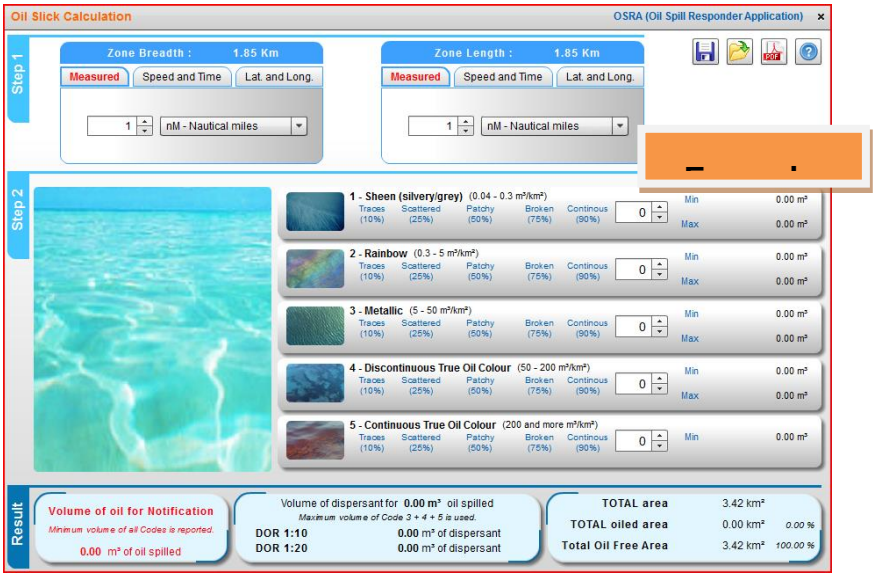
Overall shape of slick “A” and apparent drifting direction *(describe or include a map)*:

Description of oil appearance (Bonn code) and % cover in slick “A”

Describe each slick and the coverage by each oil appearance (Bonn code) expressed by:
- *the percentage of surface of the slick covered by each oil appearance; or*
- *the dimension covered by each oil appearance.*

Volume of oil spilled for slick “A”

Provide an estimation of the volume of oil spilled, calculated by hand or with OSRA “Quantification” module.



Reminder: Code 1: Silver sheen, Code 2: Rainbow, Code 3: Metallic, code 4 Discontinuous true colour, Code 5: Continuous true colour

SLICK "B"	
Edge position: • Time: • Latitude (N) • Longitude (E)	**Overall dimension**: • Length (m) • Width (m)
Overall shape of slick "B" and apparent drifting direction *(describe or include a map)*:	
Description of oil appearance (Bonn code) and % cover in slick "B"	
Volume of oil spilled for slick "B"	
SLICK "C"	
Use same template as above.	

3. INSTRUCTIONS FOR SURFACE MONITORING

3.1 Instructions for GPS (GARMIN 78s or similar) & CANON camera (EOS 600D or similar)

Correct use of GPS and camera during aerial surveillance will allow to:

1. Produce a Google Earth file showing the track of the helicopter and waypoints of the remarkable features of the oil slick.

2. Collect photos and notes related to the aerial surveillance, and particularly to the waypoints of the remarkable features of the oil slick.

3. OPTION. Produce a Google Earth file showing the track of the helicopter and waypoints and geo-referenced photos.

Note. Current instruction refers to:

- GARMIN 78S GPS, but most GARMIN GPS use the same interface.
- Canon DSLR 600D; but most Canon cameras of the same range uses the same interface.

A - AERIAL SURVEILLANCE USING GARMIN 78s GPS AND CANON 600D DIGITAL CAMERA

1 - GPS GARMIN 78s

2 - BEFORE LEAVING THE OFFICE

3 - AT THE AIRPORT

4 - ON THE AIRCRAFT

B - DATA MANAGEMENT FOR REPORTING

1 – DOWNLOAD AND SAVING OF DIGITAL PHOTOS TO COMPUTER

2 – DOWNLOAD AND SAVING OF TRACK AND WAYPOINTS TO COMPUTER

3 – IMPORT/ CONSULT/ SAVE WAYPOINTS AND TRACK INTO GOOGLE EARTH

4 – REPORTING

C - OPTION – GEO-REFERENCING OF PHOTOS WITH HELICOPTER TRACK

1 - DOWNLOAD AND SAVING OF DIGITAL PHOTOS TO COMPUTER

2 - DOWNLOAD AND SAVING OF TRACK TO COMPUTER

3 - SYNCHRONISATION OF TRACK & PHOTOS, EXPORT TO GOOGLE EARTH WITH GPicSync

4 – CONSULT GEO-REFERNECED PHOTOS WITH TRACK IN GOOGLE EARTH

A - AERIAL SURVEILLANCE USING GARMIN 78s GPS AND CANON 600D DIGITAL CAMERA

1 - GPS GARMIN 78s

GPS GARMIN 78s CONTROL BUTTONS

Buttons

- **ON/OFF** and quickly press button to open the backlight status page.
- **FIND/MOB**. Open the “Search” menu.
  Press and hold to store your current location as a waypoint and start navigating to that Way Point (Man Over Board function).
- **QUIT**. Cancel or return to the previous menu or page.
- **PAGE**. Scroll through the main pages.
- **MENU**. Open the Options menu for the page that is currently open.
  Press Menu twice to open the Main Menu.
- **ENTER/MARK**. Select options and acknowledge messages.
  Press and hold to save your current location as a waypoint.

GPS GARMIN 78s MAIN PAGES

/ MAIN MENU (only most used menus are listed here)

// **SETUP**
/// **SYSTEM** (Language)
/// **TRACKS** (Track Log, Record Method, Recording Interval, Auto Archive)
/// **RESET** (delete all tracks, way points and reset all settings)
/// **UNITS** (change units)
/// **TIME** (Time Format, Time Zone)
/// **POSITION FORMAT** (Position Format, Map Datum, Map Spheroid)
/// **ALTIMETER** (Position Format, Map Datum, Map Spheroid)

// **WAYPOINT MANAGER** (list all waypoints)

// **TRACK MANAGER**
/// **CURRENT TRACK** (Save, View, Clear, etc.)
/// **ARCHIVED TRACKS** (access to archived tracks)

// **SATELLITE** (information on quality of satellite signal and accuracy)

/ MAP (display track and waypoints + Zoom in/out function + marine chart available)

/ COMPASS (+ navigation information when navigating to a Waypoint)

/ TRIP COMPUTER (speed instantaneous, average, maximum, time, battery info.)

/ ELEVATION PLOT(display elevation)

2 - BEFORE LEAVING THE OFFICE

Use the Aerial Observer bag check list to verify content of bag. *(the checklist is kept at all times in the bag)*

GPS PREPARATION

GPS SETTINGS

☐ Ensure batteries are charged. Take 2 spare batteries.
☐Set GPS "Time Zone" to "Automatic": / MAIN MENU/ SETUP/ TIME/ TIME ZONE = Automatic

☐Check GPS time: / TRIP COMPUTER (use to synchronize the time of the camera).

☐ Set GPS to WGS 84:
/ MAIN MENU/ SETUP/ POSITION FORMAT/ Map Datum + Map Spheroid = WGS 84.

☐ Set altitude before take-off (known altitude or
/ MAIN MENU/ SETUP/ ALTIMETER/ Calibrate Altimeter = known altitude or pressure or auto.

☐ Setup the track recording (position, date, time, elevation)
/ MAIN MENU/ SETUP/ TRACKS/ Track Log = Record, Show On Map; Record Method = Auto; Record Interval = More often; Auto Archive = Daily.

☐ Clear the Current Track (Note. If below menu is not accessible, Current Track is empty).
/ MAIN MENU / TRACK MANAGER/ CURRENT TRACK/ CLEAR CURRENT TRACK = Yes

GPS SIGNAL ACQUISITION

☐ Move to an outside area & acquire a good signal: / MAIN MENU / SETUP / SATELLITE.
☐ Once it is done, switch GPS OFF, to save batteries.

DIGITAL SINGLE LENS CAMERA WITH POLARIZING FILTER

☐ Ensure the battery of the camera is charged and that you have spare battery.
☐ Fit the polarizing filter on the lens, clean it and check the rotation. Always rotate anti-clockwise to avoid unscrewing the filter accidentally.

☐ Set AF (Auto Focus) = ON (on lens) and STABILIZER = ON (on lens)

☐ Set Capture mode = Scene Intelligent Mode  &

☐ Set image size to Small / High definition (over 3000 images on the SD card).

/ MENU/  / Quality = press on SET/ Select 

☐ **Synchronize time of Camera with GPS <u>to the second</u>** (see GPS/ TRIP COMPUTER).

/ MENU /  / Date-Time/ Use arrows and SET to set the date and time. Press on OK.

☐ Clear all photos from previous missions.

/ MENU /  / Format/ OK

3 - AT THE AIRPORT

GPS

☐ Start the GPS and ensure the geographic position is acquired **on the helideck**.
☐ Inform aircraft crew that GPS and Camera will be used.
☐ Ensure good viewing position in aircraft.
☐ Secure the GPS flat, closest to a window, and secure notepad, pen and camera.
☐ Test the GPS reception of the GPS in the helicopter. *(option: use antenna)*.
☐ Test the camera and ensure there is no “rainbow” effect while using the polarizing filter through the window (if yes, prefer to remove the filter).
☐ Connect and test the headphone set.

4 - ON THE AIRCRAFT

GPS – WAYPOINTS AND TRACKS RECORDING

☐ Check reception of signal on a regular basis.
☐ Visualize the track of the helicopter and recorded waypoints.
/ MAP.
☐ Track of the helicopter is recorded automatically by the GPS.
☐ Record the main features of the slick using waypoints
- Press and hold ENTER/MARK.
- Check the waypoint number.
- Press DONE.

☐ Make note of waypoint number and signification: 1: South edge of slick, black oil, 2: North edge of slick...

DIGITAL CAMERA

☐ Place the lens of the camera as close as possible to the window, but avoid touching it (vibrations).
☐ Be careful of reflections of yourself or others in the window. If possible wear dark clothes.
☐ Take photos :
- Wide-angle view of the slick, with polarizing OFF and ON (same area of the slick)
- Close-up view of the slick, with polarizing OFF and ON (same area of the slick)
- If possible, include some reference points (FPSO, buoy, vessel, coast, etc.).
- Check quality of images.

Avoid taking too many pictures. Concentrate on direct visual observations and taking notes.

AFTER LANDING

☐ Save immediately the track of the flight. Note the name of the saved track.
/ MAIN MENU / TRACK MANAGER/ CURRENT TRACK/ SAVE TRACK/
- Enter Name (using arrows and ENTER to select letters, and select DONE when name is complete).
- “Do you want to clear the current track = No. Keep as a back-up (until next mission).

B - DATA MANAGEMENT FOR REPORTING

1 – DOWNLOAD AND SAVING OF DIGITAL PHOTOS TO COMPUTER

☐ Download all photos to computer using USB cable on the camera (or USB Card Reader - faster).
☐ Save data to a shared folder dedicated to emergency of the Total file system if possible, example:
☐ Use one folder for one mission with name as: “YYMMDD_name-of-mission”

2 – DOWNLOAD AND SAVING OF TRACK AND WAYPOINTS TO COMPUTER

☐ Turn the GPS ON and connect it to the PC with the USB cable (Cancel “Administrator right” message).
- GPS device should appear as an external hard drive in Windows Explorer: Garmin GPSMAP 78s (E:)
- Note. Do not open USB drive with folders “EULA” and “GARMIN” (marine charts of the GPS).

☐ If the GPS device does not appear, set the GPS to “USB Mass Mode”.
- Turn GPS OFF.
- Press the arrow key in any direction.
- While still pressing on the arrow key, connect the GPS to the computer.
- Press the arrow key until USB symbol appears on the GPS, and GPS appears in Windows Explorer

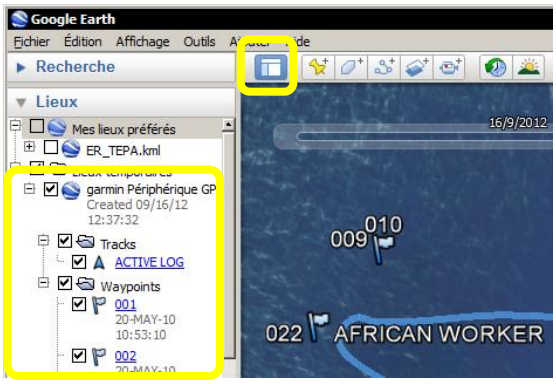
☐ Navigate to the folder of the device with saved tracks and waypoints: Garmin GPSMAP 78s (E:)\ Garmin\ GPX.
☐ Copy & paste the saved track *.GPX and *.GPX waypoints files of the day to the computer.

3 – IMPORT/ CONSULT/ SAVE WAYPOINTS AND TRACK INTO GOOGLE EARTH

IMPORT INFORMATION IN GOOGLE EARTH.

☐ Start Google Earth. If G. E. is not installed, portable version may be used (needs Internet for 1st connection).
- See “Google_Earth_Pro_Portable_7.3.2.5495_32_bit_Multilingual.exe” in folder D…\Vol Ops Support\Op Sup 6 Doc

☐ Drag & drop the track *.GPX and *.GPX waypoints files in the central window of Google Earth.
- Track and waypoints appear on the map and in the left column in Temporary Places.



CONSULT GPS INFORMATION

☐ Click on the **Left Panel** button to have access to the files (top-left).
☐ Click on the “**+**” signs to expand the folder structure (Track and Waypoints).
☐ Double click on a waypoint or track to zoom in.

SAVE GPS INFORMATION ON COMPUTER

☐ Right-click on the name of the file (e.g. “Garmin Périphérique GPS” or “GPS device””) and **Save as...** in the folder containing the photos.

4 – REPORTING

☐ Prepare a short WORD report containing:
- Screenshot of Google Earth with the waypoints and the track of the helicopter.
- A table with the way points and related photos.

C - OPTION – GEO-REFERENCING OF PHOTOS WITH HELICOPTER TRACK

Use GPicSync, available free from the Internet: https://github.com/FrancoisSchnell/GPicSync to synchronize pictures with GPS file (*.GPX): using date & time of the GPS tracks with the date & time of photos taken during the mission. **Before the flight, synchronize precisely the time on the digital camera with the one of the GPS (= reference).**

Alternative software: GeoSetter, https://www.geosetter.de/en/main-en/

1 - DOWNLOAD AND SAVING OF DIGITAL PHOTOS TO COMPUTER

- ☐ Proceed as in Section B above.
- ☐ Select the most interesting photos.
- ☐ Downsize the pictures (1280 x 800 for example) – if possible.

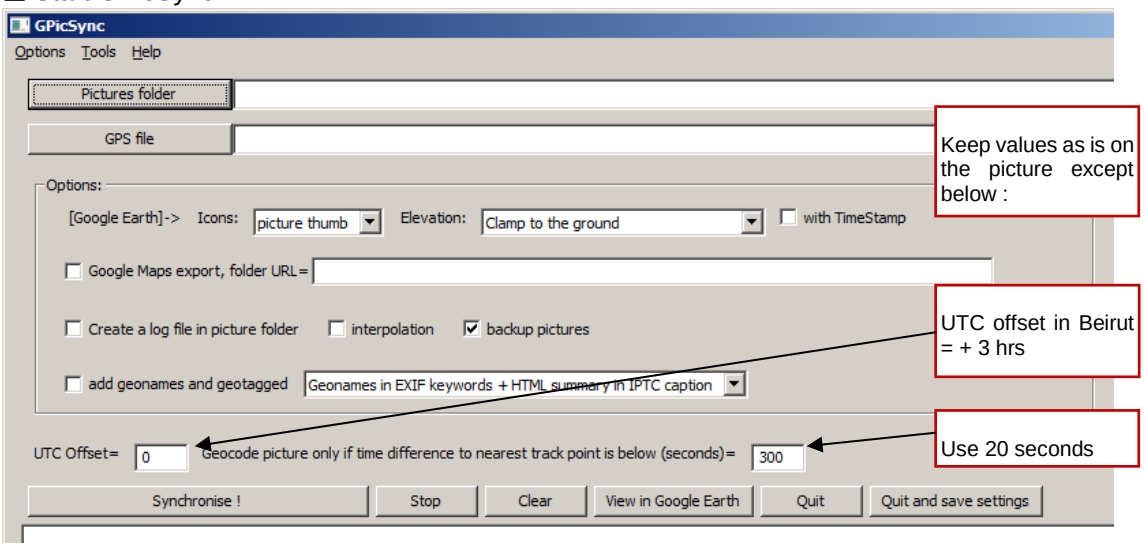
2 - DOWNLOAD AND SAVING OF TRACK TO COMPUTER

- ☐ Proceed as in Section B above.

3 - SYNCHRONISATION OF TRACK AND PHOTOS, EXPORT TO GOOGLE EARTH WITH GPicSync

IMPORT INFORMATION IN GOOGLE EARTH.

☐ Start GPicSync.



☐ Import the pictures in GPicSync.
- Click on “Picture Folder” and select folder with pictures.
- Click on GPS File and select the Track (*.GPX file).

☐ Generate the Google Earth file.
- Click on “Synchronize !”.
- Google Earth file (*.KML) with geo-referenced photos, is saved (usually) in the folder with the pictures.

-!!- “Geocode pictures only if time difference to nearest track point is below (seconds)”. This is the maximum time accepted between the time of shooting and the time of the nearest GPS point = 15-20 sec.

-!!- If there is a time difference between the GPS and the camera, it can be managed by GPicSync.
- Open “Local time corrections” (in Options menu).
- Enter the time of the camera, the time of the GPS, click on “Apply corrections” and re-synchronize.

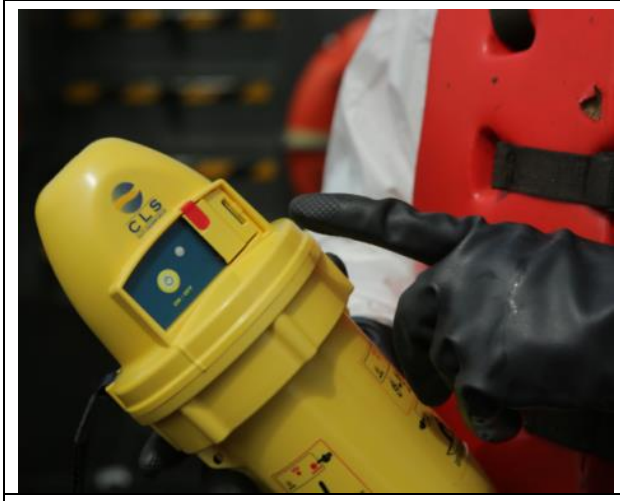
4 – CONSULT GEO-REFERENCED PHOTOS WITH TRACK IN GOOGLE EARTH

- ☐ Launch Google Earth.
- ☐ Navigate to the folder with the pictures.
- ☐ Drag & Drop the Google Earth file generated by GPicSync into Google Earth. Check photos are included.

3.2 Instructions for drifting buoy MAR-GE/T

/!\ Ensure DFMR and JRCC are informed of the launching of all buoys.

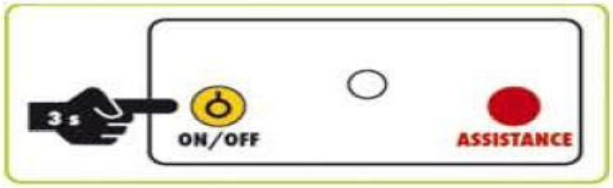
A - LAUNCHING ARGOS BUOYS



MAR-GE/T buoy (example)
(ARGOS & GPS technology, CLS company)

☐ Record the ID number of the buoy: “ID XXXXX” (behind the yellow plastic clip).

☐ Activate the buoy by pressing the ON/ OFF button for at least 5 seconds.
GREEN light flashes when buoy is activated (every 10 seconds in working conditions).



☐ Approach using a vessel, upwind from the oil slick.
☐ Respect safety distances to the slick.
/!\ Safety first. Beware of VOC, H2S and explosive atmosphere

☐ Launch 1 or 2 buoys as close as possible to the edge of the slick.
☐ Record the time and location of the launching (using a GPS) and initial drift observation (if possible).
☐ Notify Total PSR/HSE/GCA of the launching of the buoys.
Note. Autonomy in normal mode (4 hrs emission / 4 hrs off) is over 3 weeks.

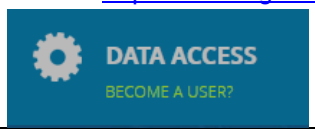
/!\ Do not press on the “assistance” button. This would trigger the assistance mode (alert of CLS and international rescue services).

B – CONSULTING LOCATIONS OF ARGOS BUOYS

1 – LOGIN TO THE ARGOS WEBSITE

☐ Log in to the ARGOS tracking website : http://www.argos-system.org

☐ Click on "**DATA ACCESS**".



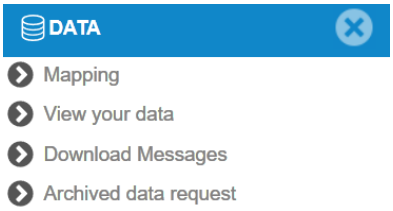
☐ Enter:

- Username: – Confidential –
- Password: – Confidential –
- Time zone : ……(choose in the drop down menu).
- Language : English

☐ Click on "**Enter**".

2 – INTERNAL CONSULTATION OF RESULTS

☐ Click on "**Data**" (top – left) OR click on the buttons below the horizontal menu.



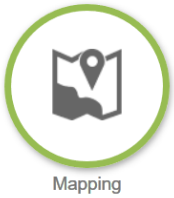
☐ Click on "**System**" (top – left) to access information about next satellite pass prediction or transmission prediction.

☐ Click on "**Settings symbol**" to change the settings: language, unit, time zone…

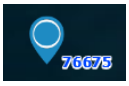
Option 1: map

☐ Choose "**Mapping"** to open a window with a map displaying the location of the buoy(s).

☐ Mouse Left click to pan, mouse scroll or "+" and "-" buttons to zoom in and out.

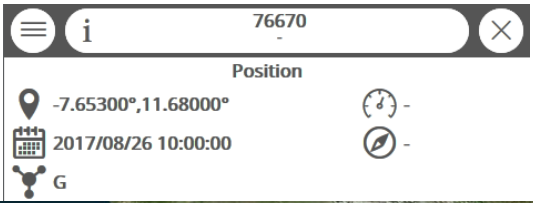


☐ **One buoy** is displayed by a blue label.

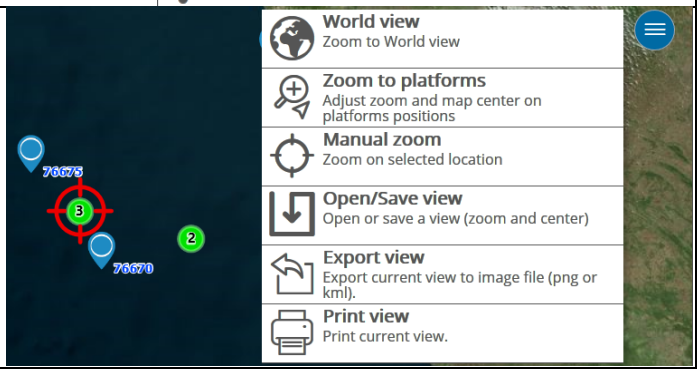


☐ **Multiple buoys** are displayed by a green marker with the number of buoys.

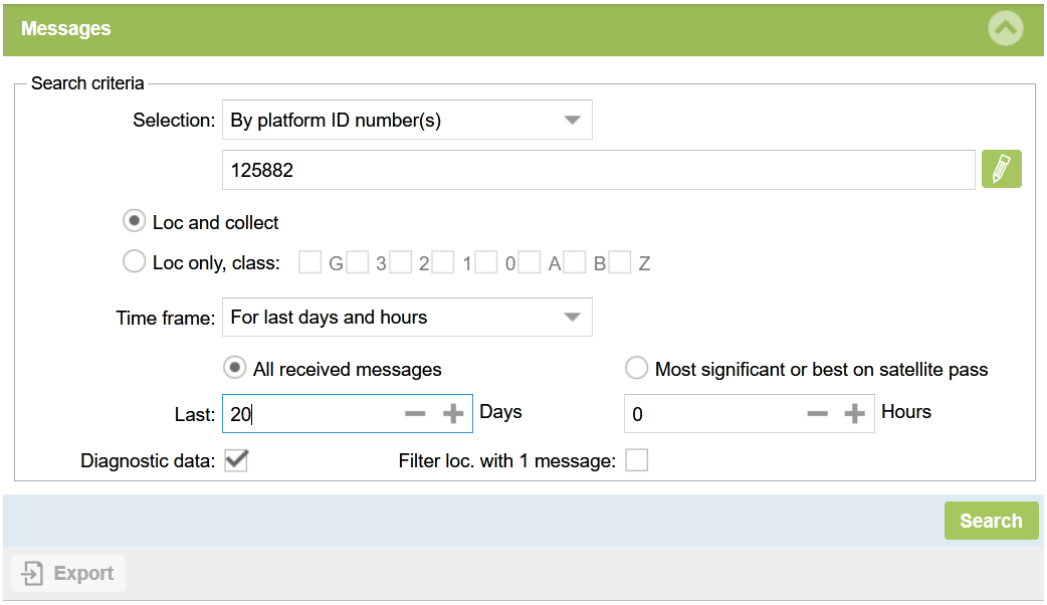
☐ Mouse over or click on buoy to display information.



☐ Click on Menu to access additional options to save and export map views.



Option: View data



☐ Choose "**Platform: by ID number"** and enter the ID number of the buoys.

☐ Choose "Loc & Collect".

☐ "Time frame": choose "For last days and hours", or "Most recent data" for older data.

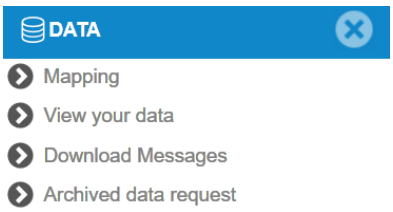
☐ Select "**All received messages**".

☐ Enter the number of days required.

☐ Click "**Search**".

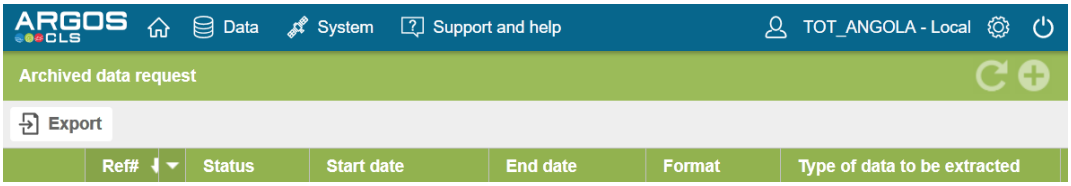
☐ Use "**Export**" to export the result of the search in CSV "Comma Separated Value for EXCEL, EXCEL, HTML to open in web browser, PDF or KML to open in Google Earth or a GIS).

Option: Download messages



Use to option to download directly (without viewing on screen) the full data received from the buoy.

Option: Archived data request



☐ Click on the "+" sign (top-right) to send a request archived data from ARGOS system (to be sent to a mail address).

3 – EXTERNAL CONSULTATION OF RESULTS

☐ Access with limited rights, specific username and password can be set-up for external third parties (ex. MRCC).

3.3 Instructions for oil & water sampling

STEP 1: SAMPLING MATERIAL TAKE-OFF LIST

Sampling equipment material, to store in a cool box (indicative list)

- 10 to 20 sampling glass jars, 100 to 250 ml capacity.
- 40 small plastic bags to store the jars.
- Tape for jar sealing.
- Teflon nets or pads for collection of sheens.
- Telescopic arm with adapter to hold jar or net
- 12 x Disposable gloves.
- Sorbent material and towels.
- 1 x Sampling log book and sample identification label.
- 1 x String or cord for hard to reach sampling areas and tongue depressor or metal scoop to Collect HFO / heavy crude oil.
- 1 x box for the storage of equipment and samples

Plastic containers should not be used to store the oil samples.

⚠ Explosive-meter and H_2S will be required for freshly spilled light oil with possible H_2S content.

⚠ For legal purposes, 3 samples are taken (lab testing + counter valuation + back-up) with an official witness.

STEP 2: SAMPLING TECHNIQUES

Medium to high viscosity oil	Use stainless steel spoons or spatulas (cleaned with solvent immediately after use).
Light fluid oil	Use a sorbent sheet, a sponge made of polyurethane or a teflon film.
Safety	Use protective clothing, oil resistant gloves (and goggles/face mask if necessary).
Storage	Jars must be stored in plastic bags and labelled (see below). Samples must be stored at positive cold temperatures (0° to 10°C) and shipped ASAP and if possible within a week.

STEP 3: QUANTITY TO SAMPLE

	To assess operational characteristics.	**To identify pollutant compounds.**
Minimum amount of oil to sample	**150-200 grams** 100 g at least for measuring viscosity, 30 g for measuring water content and remaining for efficiency testing of response products /further tests.	**5 grams**
Minimum amount of polluted material to sample	**about 500 grams**	**about 100 grams**

Note. Applicable for crude oil. For condensate: as much as practically possible (will be less due to sampling difficulty of very light product in open sea).

STEP 4: IDENTIFICATION OF THE SAMPLES

Each oil sample is labelled:

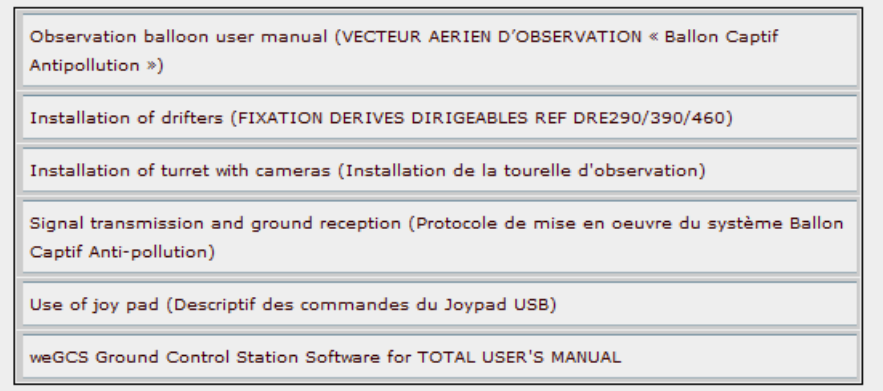
Sample label	
Case name:	Time: Date:
Sample n°:	Location (WGS 84):
Spill: Suspected source:	Sampler: Witness:
Sample description	

Note. Additional information is available in IMO guide "Section VI of oil pollution manual - Guidelines for Sampling and Identification of Oil Spills".

3.4 Instructions for the Total tethered observation balloon

Refer to the specific instructions provided by Total HQ (available from TEP Angola) in:

ⓘ …\ Vol Ops Support\ Op Sup 6 Doc\ Obs-Balloon



Valise du ballon	
	1 x ballon de 8,5 m3
	1 x ballon de 8,5 m3 **- Rechange**
	1 x tuyau de gonflage, 1m, Diam. 19 à 25 mm (embout de gonflage - bouteille d'hélium)
	1 x Embout de gonflage adaptable sur la bouteille d'hélium
	Trépied pour Antenne Directive Equipée avec sangle de fixation
	1 x touret avec minimum 150 m de dynema
	1 x Potence du touret
	1 x jeu de brides pour le touret (fournisseur air shoot)
	vis a bois et à métal (fixation touret sur palette en bois si besoin)
	1 x clé de 10
	1 x tournevis plat court (<10cm) pour fixer la poignée sur touret
	1 x tournevis cruciforme
	1 x bâches de 3mx4m (protection du ballon sur le pont)
	sangles de fixations (pour le treuil/le diable)
	1 x rallonge électrique (10m, étanche)
	1 x multiprise électrique (3 prises, étanche)
	Accessoires de déploiement/récupération : leurre (simulation camera), perche avec crochet

Ailerons/dérives	
	4 x ailerons/dérives tissu
	4 x Tiges pour ailerons/dérives
	4 x ailerons/dérives tissu **- Rechange**
	4 x Tiges pour ailerons/dérives **- Rechange**
	4 x haubans avec 8 colliers plastiques
	4 x Bandes autoadhesives VELCRO avec oeillets
	8 x Clipots (plastique, blancs)
Ailerons/dérives	
	4 x ailerons/dérives tissu
	4 x Tiges pour ailerons/dérives
Valise de l'ordinateur "Station sol GCS" (Pelican 1600 grise)	
	1 x PC portable 14" semi-durci avec logiciel "SurveyCopter weGCS for TOTAL"
	1 x Câble alimentation (210V-230VAC 50-60Hz)
	1 x câble de liaison orange 10m, Antenne Directive Equipée / PC
	1 x plaque avec branchement (Alim. 220V, Alim. 12V., station sol, Vidéo analogique, 2xUSB, Ethernet, VGA)
Valise de la tourelle (Pelican 1650 noire)	
	1 x tourelle gyrostabilisée vidéo bi-capteur (Vidéo et Infra-rouge)
	1 x Joypad USB
	1 x Antenne Directive Equipée (Vidéo: antenne carrée grise et Data: antenne noire)
	1 x Antenne GPS
	1 x chargeur de batterie
	4 x Tubes carbones (fixation tourelle sur ballon)
Valise chargeur (Pelican 1300 grise)	
	2 x chargeurs de batterie (220V ou 12V)

4. INSTRUCTIONS FOR SUBSEA MONITORING

4.1 Instructions for surface submersible fluorometer C3

Equipment is available from TEP Angola and OSRL.

➔Refer to instructions provided with equipment.

4.2 Instructions for deep-sea fluorometer AQUATRACKA 6000

Equipment is available from TEP Angola and directly from manufacturer.

Refer to the specific instructions provided by Total HQ in:

ⓘ *…\ Vol Ops Support\ Op Sup 6 Doc\ AQUATRACKA-Fluorimeter*

ITEMS : FLUOROMETER	
UV Aqua tracka 6000	
	UV Aqua tracka 6000 Unit
	Storage box for UV Aqua tracka 6000 Unit (black)
Interface + Cables	
	Digital Interface unit (yellow PELICAN case)
	Cable for alimentation (black, 220V.FR + EN plugs)
	Cable for data transfer (Red, 10m, W: black adapter, water tight)
	Cable for data transfer (UV Aquatracka - ROV interface)
Laptop	
	RS 232 cable (grey, to laptop) + USB adaptor
	Computer Samsung, with T-Plot 8 Software
	CD-Rom w/ T-Plot 8 software + User manuals

4.3 Monitoring of deep-sea dispersed oil & environment quality

Subsea/ deep-sea monitoring of oil and of water quality is a complex task requiring specific equipment and expertise.

Some special kits were developed after DEEPWATER HORIZON, example below.

Oil Spill Response Water Column Monitoring Kit

Currently owned by BP, in the process of being transferred to OSRL.



Storage location: Houston.

Key features:

- Self-contained kit/lab with storage/maintenance protocols.
- Aircraft-freightable storage and laboratory
- containers (DNV rated).

Capabilities:

- Primary Sensors and Measurements:
- Pressure
- Dissolved oxygen
- Altimeter
- HD video
- Temperature
- Particle size
- Fluorescence
- Sample bottles
- Turbidity
- Conductivity

Deployment:

- Mobilization time: >3-4 days (air freight from Houston)
- No ROV needed.
- No winch needed
- 12 specialized operators (for 12hrs day operation) to 15 operators for continuous 24 hrs operations.

5. INSTRUCTIONS FOR MODELLING

5.1 Instructions for ADIOS® 2 : Surface oil behaviour on 5 days

ADIOS® (Automated Data Inquiry for Oil Spills from NOAA) is a free oil spill response tool that models how different oil weather (undergo physical and chemical changes) when spilled into the marine environment. ADIOS® 2 allows estimating the quantity of product that will evaporate, disperse in the water column and remain at the sea surface (as well as the potential for emulsification), depending on the nature of the product and local MetOcean conditions, and other processes (benzene airborne concentration, etc.).

https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/adios.html

Working from a database of more than a thousand different crude oils and refined products, ADIOS quickly estimates the expected characteristics and behaviour of spilled oil.

ADIOS will make predictions for a maximum of five days. After five days, other processes, such as biodegradation and photo-oxidation, may be important, and the program does not model these processes.

Steps:

1. Estimate oil behaviour.
2. Provide results.

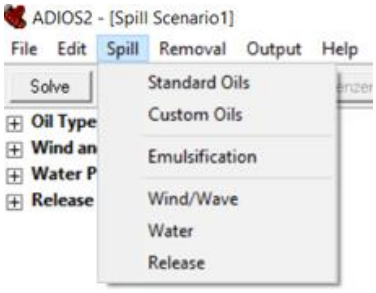
▶ STEP 1: INPUT OF PARAMETERS FOR THE CALCULATIONS

The inputs needed to do an assessment are:

THE OIL SPILLED

Standard oils

ADIOS provides a database of **"standard oils"**. The ADIOS database includes estimates of the physical properties of oils and products. It then uses this information and mathematical equations to predict changes in those properties once the oil has been released (density, viscosity, and water content, evaporation, natural dispersion into the water column…). The database was compiled from a variety of sources, including Environment Canada, the U.S. Department of Energy, and industry.



Custom Oils

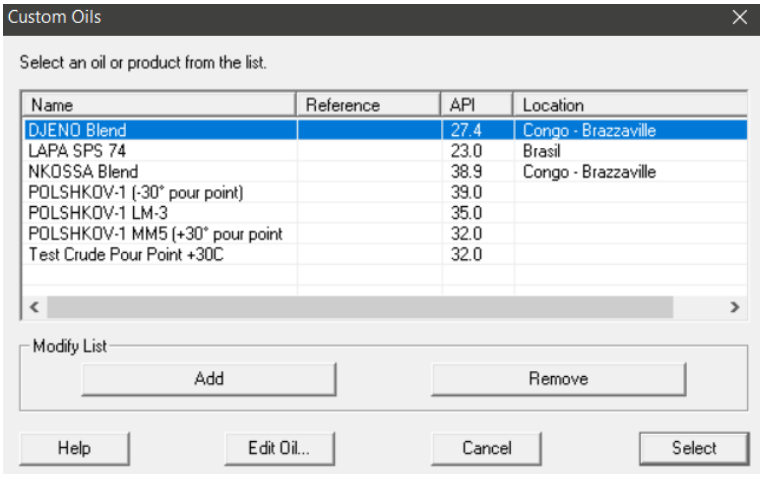
ADIOS® 2 also allows creating "Custom Oils". This can be useful when information from the oil analysis or from oil weathering studies are available.

Note:

When a custom oil is created, ADIOS® 2 keeps its characteristics for further use in a file called CustomLib. This file is in a hidden folder on the computer where it was created. In order to exchange the specific Custom oil with others, it is therefore necessary:

- First to change the settings on the computer to allow View hidden folders
- Then to navigate to the folder which should be in:
  C:\Users*NameofUser*\AppData\Local\VirtualStore\Program Files (x86)\Adios2
- Copy the CustomLib file to that folder.

When this is done, after choosing Custom Oils in the spill tab of ADIOS® 2, Custom Oil will appear and can be selected to make the calculations.



WIND SPEED AND WAVES

This is the second set of parameters that are needed by ADIOS® 2.

Only the wind needs to be entered as it is preferable to let the model calculate the resulting waves.

The wind can be entered as a constant wind (see Figure 1), in which case the same wind speed will be used for the 5 days of calculations.

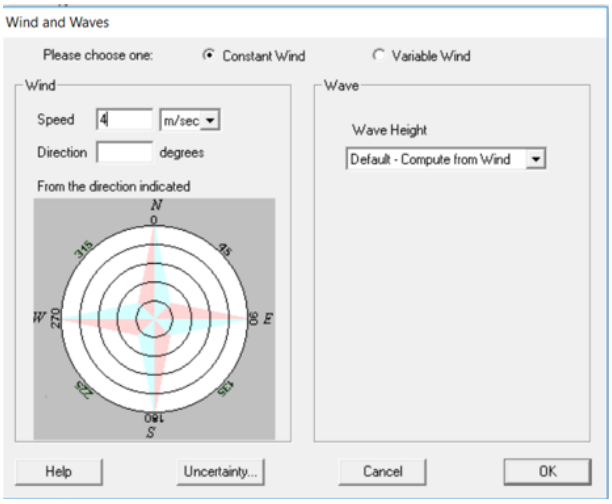


Figure 1: Constant wind in ADIOS

If reliable weather forecast is available, ADIOS® 2 also provides the possibility to enter a variable wind as shown on Figure 2.

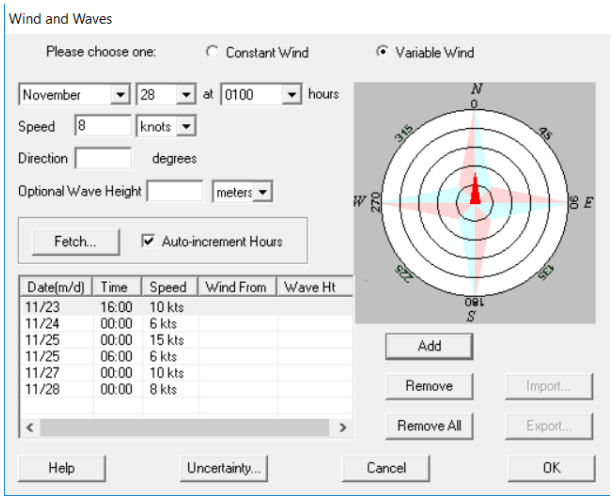


Figure 2: Variable wind in ADIOS

Note:

- *Use wind observation from site and/ or weather forecast.*
- *NOAA has an oil spill trajectory model which can be used in conjunction with ADIOS® 2. That model uses the wind direction. In the standalone version, the direction of the current is not used by ADIOS® 2.*

WATER PROPERTIES

Next, ADIOS® 2requires data on the water properties in the area of the spill.

For PPL576 area, sea water temperatures used offshore is 27°C.

Standard values were used for the salinity and the water sediment load as the area is offshore.

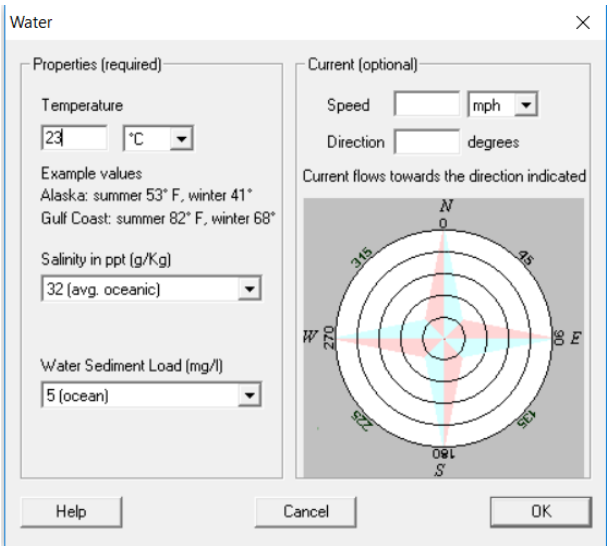


Figure 3: Water properties for ADIOS

RELEASE OF OIL

Finally, ADIOS® 2 requires information about the spill: type of release (instantaneous, continuous), and amount of oil and/or flowrate can be defined (see Figure 4).

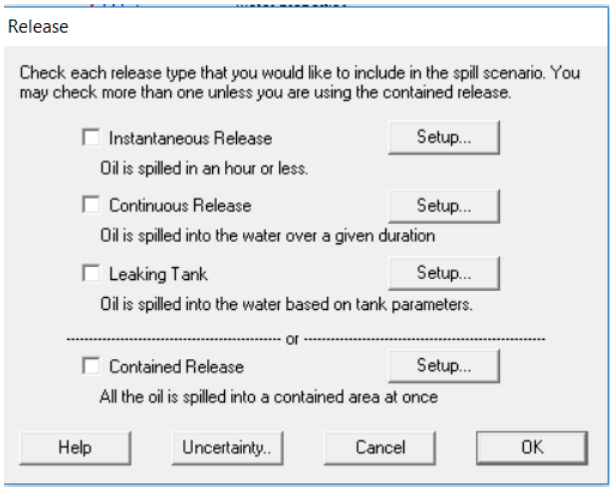


Figure 4: Parameters for the release of oil for ADIOS

▶ STEP 2: CALCULATIONS AND OUTPUTS OF ADIOS® 2

The estimated behaviour of oil modelled with ADIOS® can be summarized with:

- A screen capture of the oil budget – see Figure 5;
- A screen capture of multiple graphs after choosing the relevant graphs.

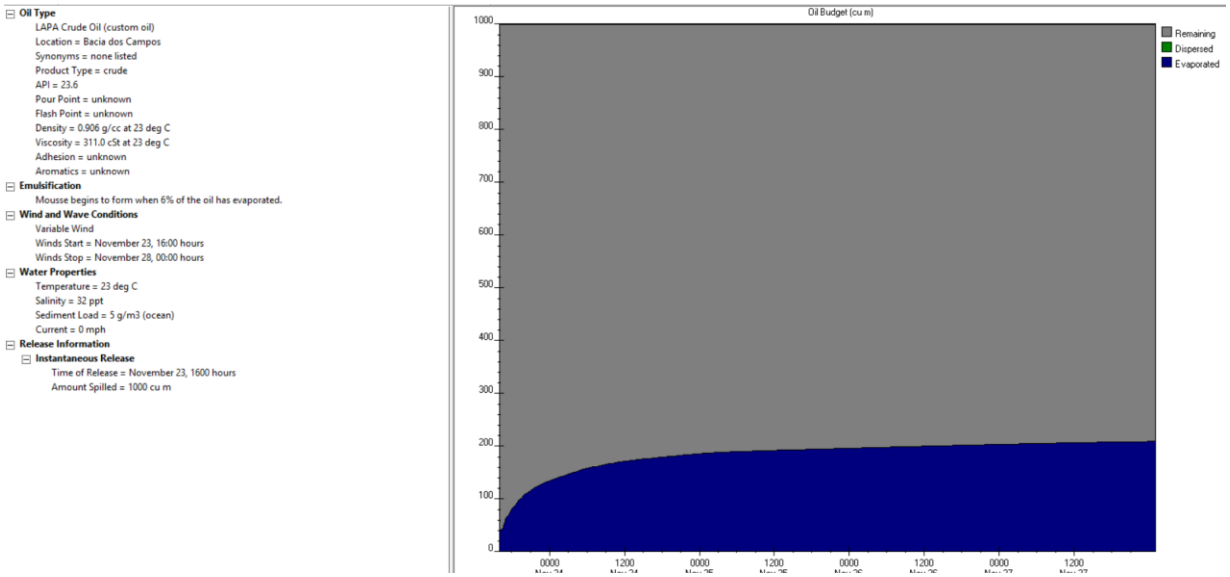
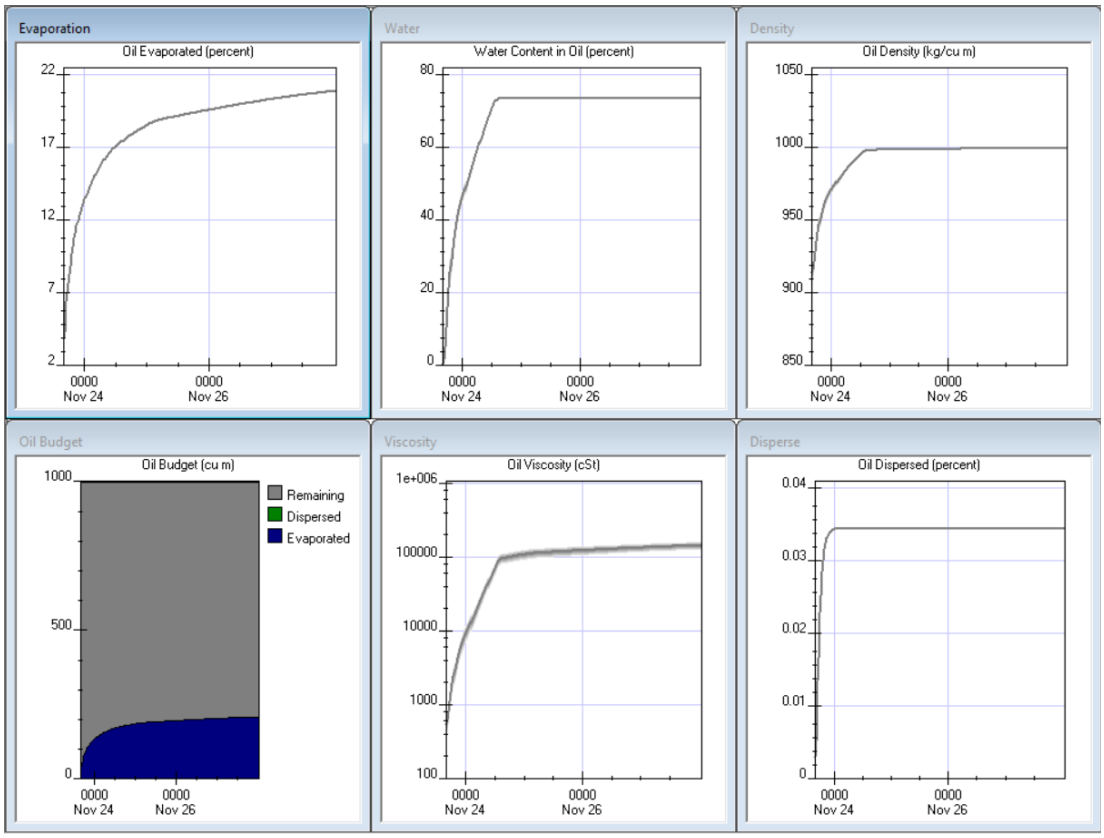


Figure 5 : ADIOS® Report, Oil budget and Increase of viscosity.



It is also possible to output the calculation results into an Oil budget Table, from which the data can be copied into a spreadsheet.

```
Oil Name = LAPA Crude Oil (custom oil)
API = 23.6                                  Pour Point = unknown
Wind Speed = variable windsWave Height = computed from winds
Water temperature = 23 deg C
Time of Initial Release = November 23, 1600 hours
Total amount of Oil Released = 1000 cu m
-------------------------------------------------------------------
Hours Into  Released      Evaporated     Dispersed      Remaining
     Spill     cu m         percent        percent        percent
         1    1,000     -       4      -       0      -       96
         2    1,000             7              0              93
         4    1,000     -      10      -       0      -       90
         6    1,000             12             0              88
         8    1,000     -      13      -       0      -       87
        10    1,000             14             0              86
        12    1,000     -      15      -       0      -       85
        18    1,000             17             0              83
        24    1,000     -      18      -       0      -       82
        30    1,000             18             0              82
        36    1,000     -      19      -       0      -       81
        42    1,000             19             0              81
        48    1,000     -      19      -       0      -       81
        54    1,000             19             0              80
        60    1,000     -      20      -       0      -       80
        66    1,000             20             0              80
        72    1,000     -      20      -       0      -       80
        78    1,000             20             0              80
        84    1,000     -      20      -       0      -       80
        90    1,000             21             0              79
        96    1,000     -      21      -       0      -       79
       102    1,000             21             0              79
```

Figure 6: Oil budget table calculated by ADIOS

5.2 Instructions for ALOHA : atmospheric gas dispersion

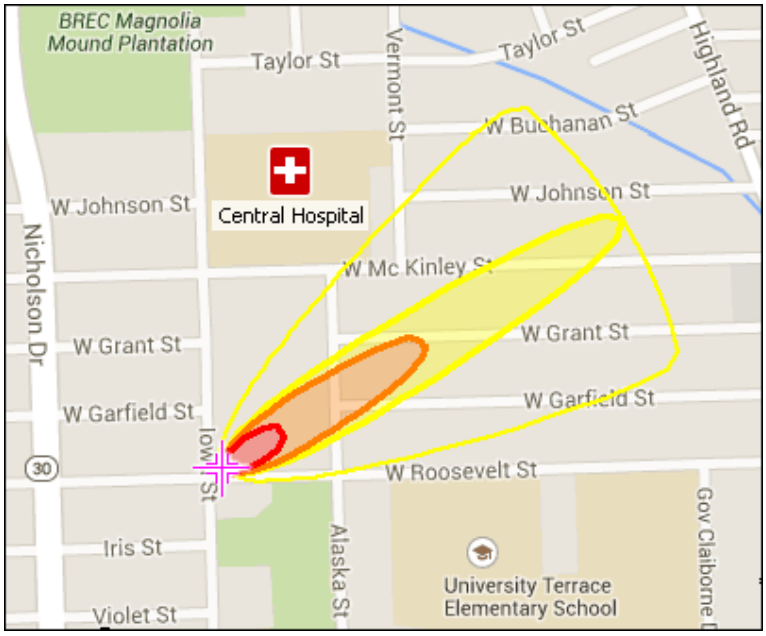
Source:

https://response.restoration.noaa.gov/oil-and-chemical-spills/chemical-spills/response-tools/aloha.html

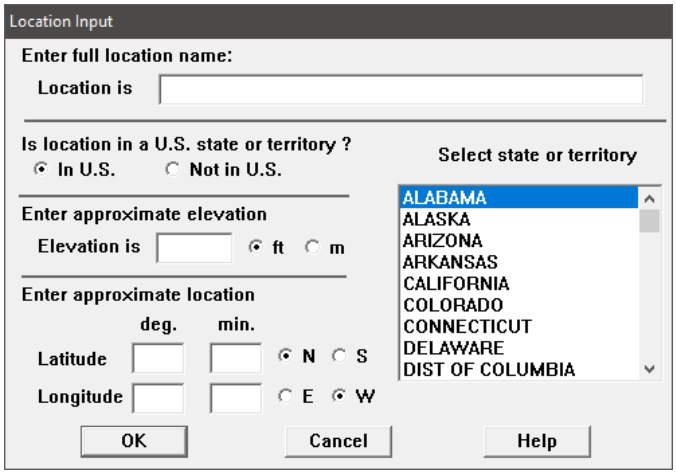
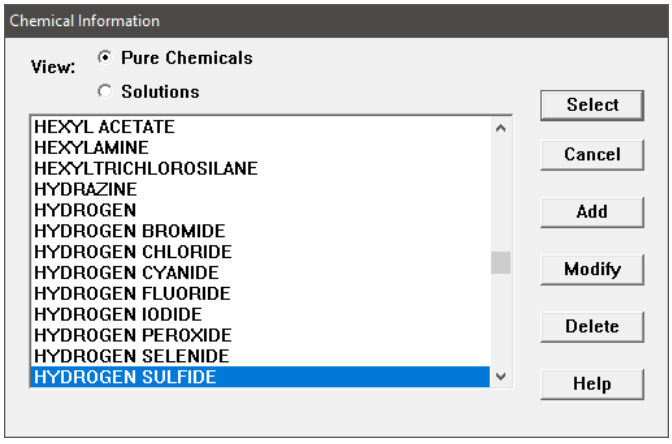
"… ALOHA® is the air hazard modelling program in the CAMEO® software suite (…).

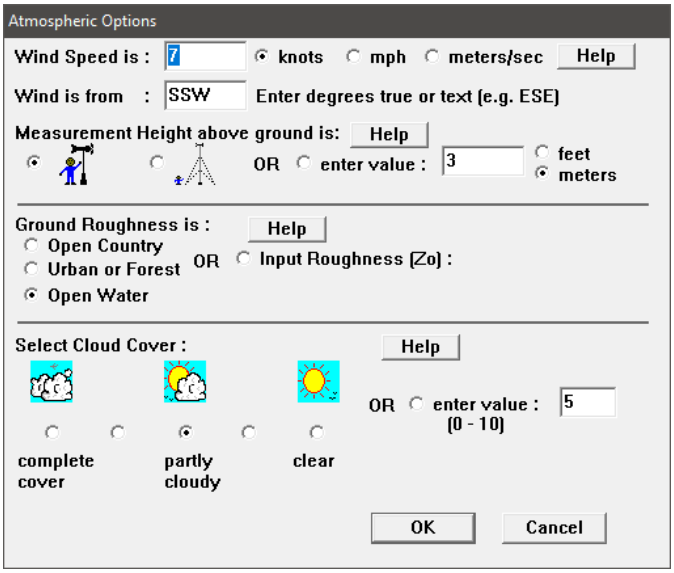
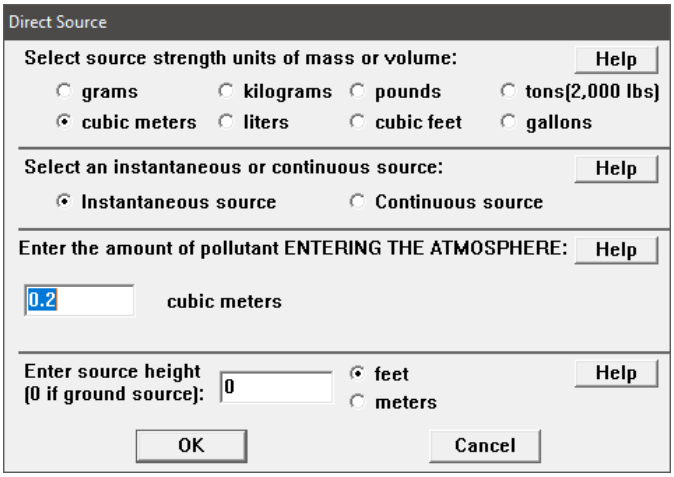
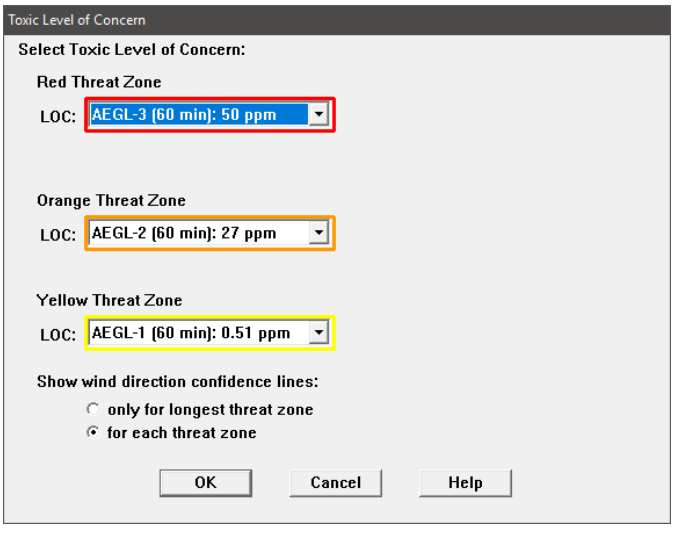
Based on your information about a chemical release, ALOHA's source strength models estimate how quickly the chemical will escape from a tank, puddle, or gas pipeline and form a hazardous gas cloud—and also how that release rate may change over time.

ALOHA can then model how that hazardous gas cloud will travel downwind—including both neutrally buoyant and heavy gas dispersion. Additionally, if the chemical is flammable, ALOHA also models pool fires, BLEVEs, vapor cloud explosions, jet fires, and flammable gas clouds (where flash fires might occur).



ALOHA produces a threat zone estimate, which shows the area where a particular hazard (such as toxicity or thermal radiation) is predicted to exceed a user-specified Level of Concern (LOC) at some time after the release begins.
The threat zone estimates are show on a grid in ALOHA, and they can be plotted on maps in MARPLOT®, Esri's ArcMap (using the ALOHA ArcMap Import Tool), and Google Maps and Google Earth (using ALOHA's KML Export)…"

▶ Add a location.	
▶ Choose a chemical.	

▶ Define atmospheric conditions.	
▶ Define the source.	
▶ Define the threat zones.	
▶ Export results to google earth.	

5.3 Instructions for OSRA "OIL SLICK TRAJECTORY"

To allow rapid evaluation of the volume of oil spilled, the drifting direction of the slick and the planning of dispersant spraying operations from vessels, an Oil Spill Response Application – OSRA, has been developed for Total EP.

This tool is a standalone application, similar to a Portable Application: using web browser and Flash technology, it does not require any installation and can therefore be used from a USB drive, without installing on the host computer.

It was designed to be user friendly, and allows saving and exporting results in a custom format, or saving reports in PDF format, and exporting results of oil slick trajectory calculations to a Google Earth format (*.KML).

Software is provided in:

…\Vol Ops Support\Op Sup 6 Doc\OSRA_TOTAL-OTRA

Click on "index.html"

Four modules are currently included in OSRA.

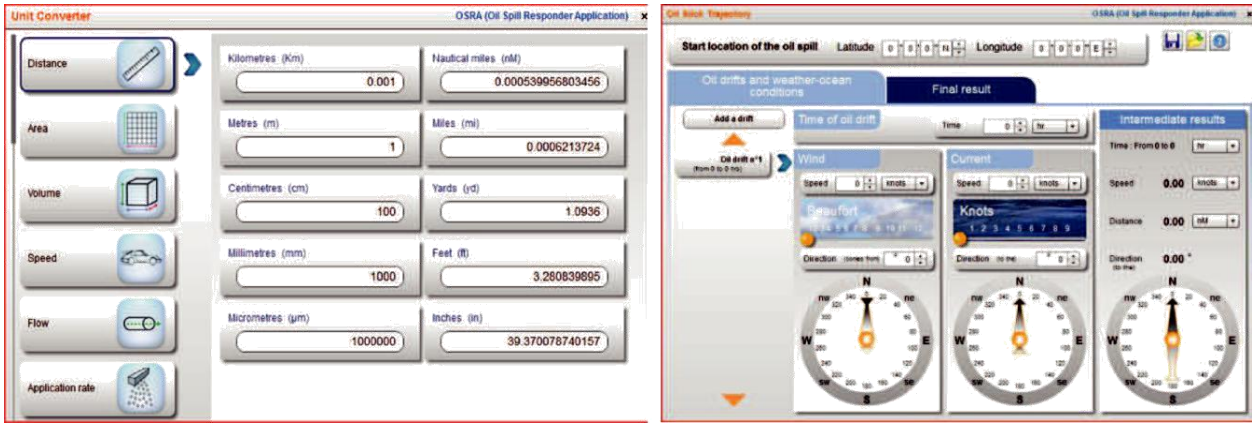


Figure 7 : Unit converter and Oil Slick Trajectory using wind and current, OSRA tools.

Figure 8: Oil Slick Quantification (Bonn Code) and Vessel Dispersant spraying planner code, OSRA.

5.3.1 OSRA: Unit Conversion

The Units Conversion module can instantly convert values either for:

- **Distance**: miles, nautical miles, miles, yards, feet, inches;
- **Surface**: square kilometres square miles, square yards, square feet, acres;
- **Volume**: cubic meters, barrels, gallons, quarts, ounces;
- **Speed**: kilometre per hour, miles per hour, knots, meters per second;
- **Flow**: cubic meters per second per hour per second barrels, gallons per day;
- **Application rate**: cubic meters per square meters, litres per acre, gallons per acre.

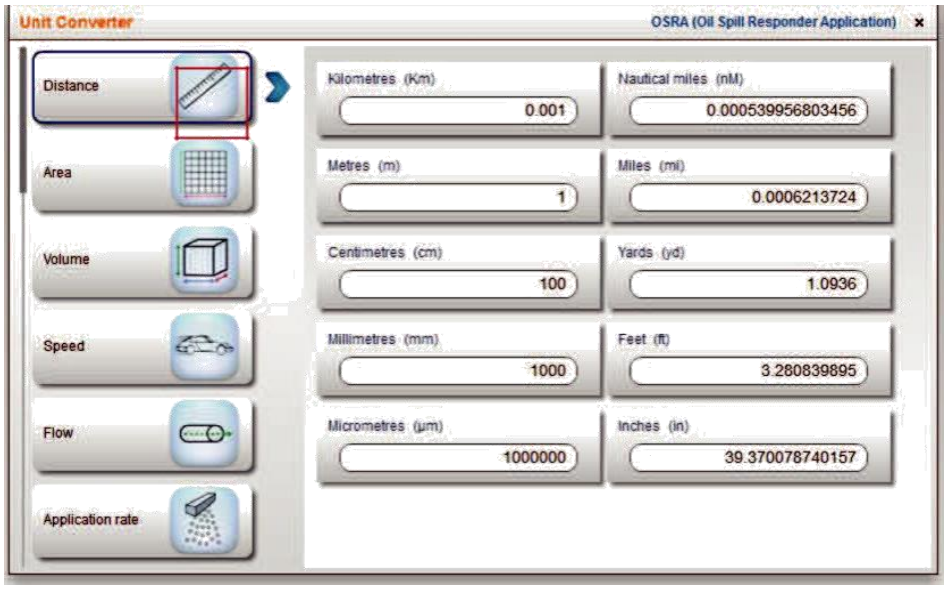


Figure 9: Unit conversion in OSRA.

5.3.2 OSRA: Oil Slick Trajectory

- Collect information (spill location and MetOcean data),
- Estimate oil slick drift speed and direction;
- Saving and sharing results.

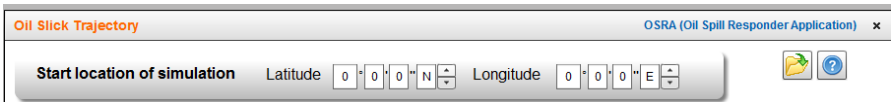
▶ STEP 1: COLLECTING NECESSARY DATA

Position of slick	➔	Information from the site and/ or aerial observer
Wind speed and direction	➔	Weather forecast. See below.
Current speed and direction	➔	Direct observation from the site (vessels) MetOcean data in Block 11 Models available

▶ STEP 2: ESTIMATING THE MOVEMENTS OF OIL SLICKS (SPEED AND DIRECTION)

The tool « OIL SLICK TRAJECTORY » is used to estimate the oil slick drift speed and direction, based on the fact that oil drifts with 100% of the speed of the current and 3% of the speed of the wind.

☐ Enter the **START LOCATION OF THE SPILL**. Check the North/ South Latitude, and East/ West Longitude.



Beware to enter correct Latitude (South) and correct Longitude (East).

By default, Oil Spill Trajectory displays North and East.

☐ Click on tab "OIL DRIFT CALCULATION";

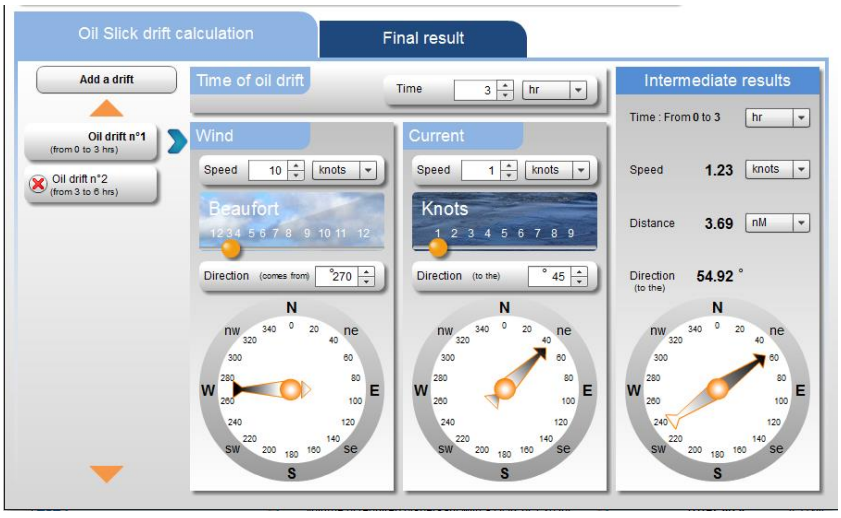
☐ Enter the **TIME** period for which you are estimating the drift. Multiple drift segments can be added;

☐ Enter the **WIND** direction and speed (i.e. the direction where the wind <u>is coming from);</u>

☐ Enter the **CURRENT** speed and direction (i.e. the direction where the current <u>is flowing to);</u>

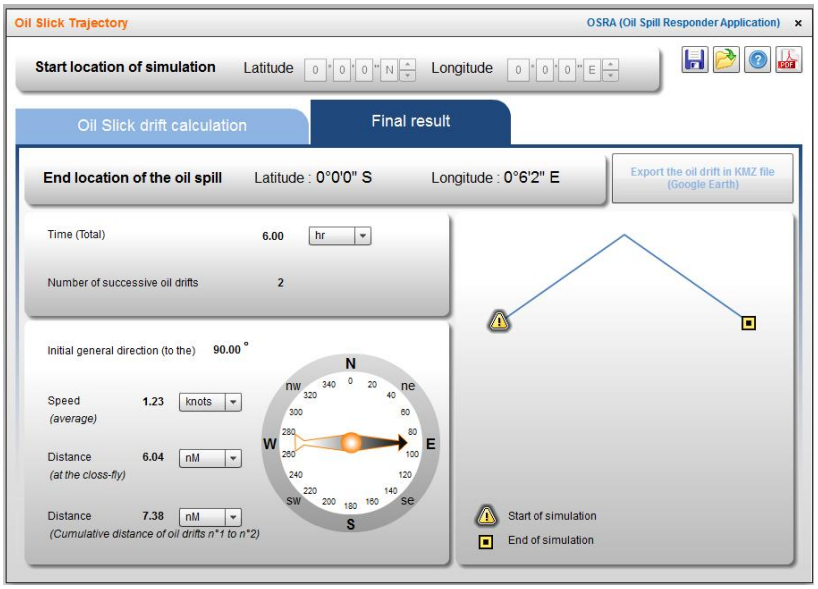
☐ **ADD A DRIFT** if needed.

INTERMEDIATE RESULTS are displayed in the right panel.



▶ STEP 3: SAVING AND SHARING RESULTS

☐ To view the results, click on tab "**FINAL RESULTS**".



To save and share the results, 3 options are available:

☐ Click 	Save the model run in a specific format. Re-open any other previously saved file.
☐ Click 	Save the model run in a PDF format file.
☐ Click 	To view the results in "Goggle Earth" • Launch application. • Open the saved KMZ file from Google Earth (or Drag & Drop KMZ file in Google Earth).

5.3.3 OSRA: Quantification of oil

- Collect information from direct or aerial observation.
- Estimate oil volume spilled for notification and for operations.
- Saving and sharing results.

▶ STEP 1: COLLECTING NECESSARY DATA

Overall size of slick	➔	Information from the site and/ or vessels and/ or aerial observer
coverage of the various appearance of slick	➔	Same as above.

▶ STEP 2: ESTIMATING THE VOLUME OF OIL SPILLED

The tool « QUANTIFICATION OF OIL ON THE WATER » is used to estimate the volume of oil spilled based on the relation between oil appearance, slick thickness and volume per unit of surface. Refer to the Bonn Agreement Oil Appearance Colour Code.

☐ Enter the size of the slick: BREADTH and LENGTH.

Beware of the units (NM, km, m). “SPEED AND TIME” or “LAT/ LONG” are also usable.

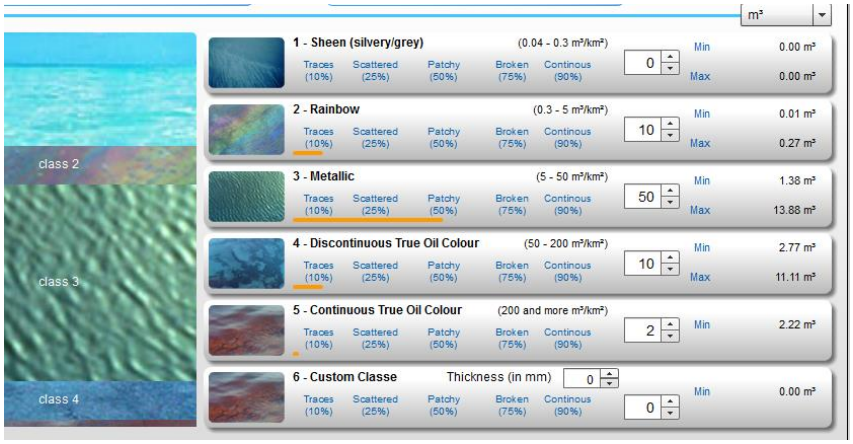
☐ Enter the percentage of the overall surface slick covered by each appearance of oil.

☐ Focus on Code 3, 4 and 5.

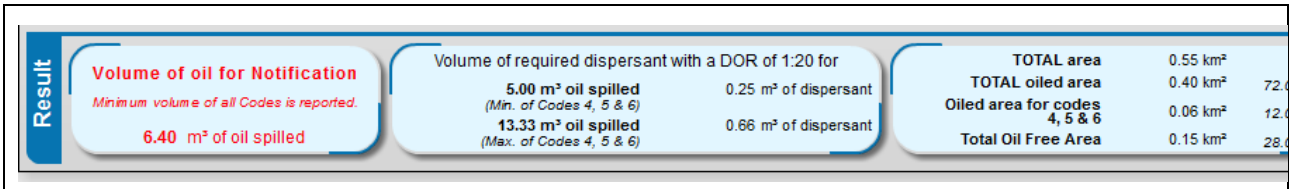
Bonn Agreement Oil Appearance Colour Code are used as reference.

A custom class can be used. User specifies the thickness of the slick.

Unit can be changed (top/ right)



▶ STEP 3: SAVING AND SHARING RESULTS



VOLUME OF OIL FOR NOTIFICATION	**VOLUME OF REQUIRED DISPERSANT WITH A DOR OF 1:20**	**SURFACE**
Minimum of the sum of all classes are used for reporting to MinPet.	Provides minimum and maximum estimation of volume of dispersant based on the Min/ Max volume of oil.	Provides information on total area of slick, and area covered by thick slick (Code 4 and 5).

To save and share the results, 3 options are available:

	☐ Save the model run in a specific format. Re-open any other previously saved file.
	☐ Save the model run in a PDF format file.
	To view the results in “Goggle Earth” ☐ Launch application; ☐ Open the saved KMZ file from Google Earth (or Drag & Drop KMZ file in Google Earth).

5.4 Instructions for SPILLWATCH Activation

In case of Tier 2 or 3, SPILLWATCH is activated (compulsory), service of Total H.Q. combining 3 products:

Product	Delay
Fate and behaviour modelling (OSCAR)	1st report 3 h after data reception, daily update. Estimated costs of Modelling studies : 1000€ / jour
Ocean wind and current model, updated with satellite imagery	Data provided on a webpage 24 hours after mobilization (may be variable depending on concern area). Estimated costs of Metocean data : 5000 € launching the service and 5000€ per week of service
Satellite RADAR Imagery	Image available 24 hours +/- 12 h after mobilization (may be variable depending on concern area and satellite positioning). Estimated costs of Image satellite : 5000€ per image

Activation

▶ STEP 1. Notify TOTAL E&P Head Office experts (France).

Contacts are available in Total E&P Livret d'Urgence.

▶STEP 2. Send the notification form, signed by a call-out authority:

- By FAX, to +33 559 83 63 30
- By MAIL, to the person notified (from the above list).

See form in:

🗎 *Operational Support n°13, section 1.4 "SPILLWATCH Activation form".*

Detailed procedure is in "SPILL WATCH MOBILIZATION BY AN AFFILIATE PROCEDURE", available on the Total Oil Spill SharePoint.

Note on RADAR imagery.

- *Resolution of the RADAR imagery depends on the dimension of the area to be surveyed, but maximum resolution is the range of a meter.*
- *Initial activation and programming of the satellite requires a minimum of 14 hours.*
- *If satellite is not re-programmed (by military or national agencies), 1 to 2 images can be obtained daily.*
- *Image captured early morning can be treated and results provided in the middle of the day.*
- *Interpretation is carried out in Total headquarters (France) and requires approximately 4 hours.*

6. INSTRUCTIONS FOR OFFSHORE BOOM & SKIMMER

At the time of writing, the exact specifications of the containment and recovery equipment are not known. These instructions are based on equipment (RO BOOM 1500-200 & Terminator Skimmer) used in other Total E&P affiliates and stand as an example of what can be done.

They may be adapted once the exact specifications of TEP Liban equipment are known.

Figure 10: RO BOOM 1500-200

This section contains the following:

- ☐ EQUIPMENT TAKE OFF LIST (ROBOOM, PPSKIM & EQUIP UNITS)
- ☐ BEFORE THE LOADING
- ☐ LIFTING GEAR OF THE EQUIPMENT
- ☐ DESCRIPTION
- ☐ POSITIONING AND SECURING OF THE EQUIPMENT ON DECK
- ☐ PREPARATION OF POWERPACK
- ☐ OPERATING THE REEL
- ☐ PREPARATION OF TOWING LINE FOR THE TUG
- ☐ PREPARATION OF TOWING SYSTEM FOR THE MAIN VESSEL
- ☐ LAUNCHING / INFLATION OF BOOM
- ☐ LINES AND WIRES USED FOR ROBOOM DEPLOYMENT
- ☐ INSTALLATION OF TOW BAR AND TOWING LINE
- ☐ RETRIEVAL OF THE BOOM
- ☐ MAINTENANCE AFTER USE OF BOOM

ROBOOM UNIT

DESCRIPTION OF CONTAINER and WINDER

Deployment time : 12 min.

Dimension of boom

- Boom height deflated: 1.50 m
- Boom height deflated: 1.20 m
- Chamber section length: 4.90 m
- Freeboard: 0.50 m
- Draught: 0.70 m

Mechanical properties of boom

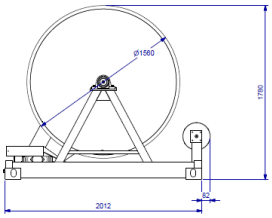
- Weight per m. with chain: 10.5 kg
- Tensile strength chain: 200 kN
- Tensile strength fabric: 315 N/mm
- Max. Pressure in buoyancy chamber: 15 kPa
- Efficient in waves up to : 3.5 m
- Stable in current up to 3 kts
- Maximum in line towing speed: 10 kts

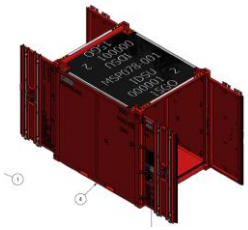
10' ISO/DNV hi-cube container with front & rear doors (MSP078)

- Weight empty: approx. 2 800 kg
- Weight fully loaded: approx. 10 000 kg
- Ext. dimensions: 2,99m (L) x 2.90m (H) x 2.44m (W)

Winder RB1500-200 w Fair lead

- 4 x twist locks
- Hydraulic driven (connection facing back)
- Dim. 2,20m (L) x 1,78m (H) x 2,16m (W)
- Weight: 750 kg





EQUIPMENT

- 1 x reel w/ 250 meters of RoBoom 1500
- 2 x towing bridle assemblies (incl. end pin)
- 2 x tow line assemblies
  - 8 Strand 32mm x 70m with Thimble eye
  - D-Shackle 3.5t
- 1 x stopper assembly
  - Wire with Chain Hook
  - 2m Roundsling Sling 2t,
  - Bow Shackle (4t 3/4)
- 1 x sea anchor assembly
- 2 x spherical buoys
- 2 x cable wires with shackles (attached to reel bar)
- 3 x handling hook w/ allen key
- Set of air valves caps (60 units)
- 10mm polypropylene rope (200m)

POWERPACK AND SKIMMER UNIT (PPSKIM)

DESCRIPTION OF CONTAINER

10' ISO/DNV hi-cube container with front doors (KA)

- Weight empty: approx. 2 800 kg
- Weight fully loaded: approx. 10 000 kg
- Ext. dimensions: 2,99m (L) x 2.90m (H) x 2.44m (W)

Main equipment

- Skimmer and incorporated pump DOP250
- 3 x floating arms + ancillaries
- 50 kW Power pack
- Power pack controls
- Hydraulic and discharge hoses on reel
- 1 x Inflation/deflation hose with 2 branches to inflate/deflate 2 chambers simultaneously.
- Bolts, nuts, gaskets to connect the discharge hose to the TERMINATOR and to the Rec Oil tanks

POWER PACK OF THE TERMINATOR

Dimension

- Length: 2.0 m
- Width: 1.0 m
- Height: 1.25 m
- Weight : 900kg (empty), 1060 kg (with full tanks)

Diesel engine

- Type: air cooled, naturally aspirated 4 cyl., 4 strokes diesel engine
- Power: 47.6 kW at 2600 rpm
- Starting: 12V electric starter
- Starter batteries: 140 Ah
- Fuel tank: 60 litres
- Engine lube oil: 13 litres

Safety: Chalwyn valve (engine over speed protection) + spark arrestor on exhaust

Hydraulic pump

- Max. Cont. pressure: 210 bars
- Max. oil flow: 160 l/ min (at max. speed)

Hydraulic oil tank

- Volume: 115 lites

Type of oil:

- Viscosity: 32 cSt at 40°C

Hydraulic hoses

- Pressure / Return hydraulic hoses
- Drain hydraulic hose

Hose reel

- Dimension: <> 120x90x130 cm
- Total weight: <> 250 kg

DESMI TERMINATOR WITH DOP DUAL PUMP	
Dimension of skimmer + pump • Length: 2.1 m • Width: 2.33 m • Height: 0.93 m • Total weight: 165 kg **Weir skimmer** • Over flow weir skimmer type • Fitted with DOP-DUAL pump	**Pump**: **DESMI DOP-DUAL 250** • DOP-DUAL vertical positive displacement Archimedes' screw type hydraulically powered with cutting knifes • pump flow rate: 100 to 125 m3/ hr • Max. Pump pressure discharge: 10 bars • Max. solid size: 50 mm Max. hydraulic demand: 160 litres per min.

SPARE EQUIPMENT UNIT	
DESCRIPTION OF CONTAINER	
10' ISO/DNV hi-cube container with front doors • Weight empty: approx. 2 800 kg • Weight fully loaded: approx. 10 000 kg • Ext. dimensions: 2,99m (L) x 2.90m (H) x 2.44m (W) **Main equipment** • DOP250 Dual pump spare kit • Desmi Power Pack Spares Kit V12 • RoBoom 1500 Spares Kit • Oil Spill Sampling Kit • Tool box (available) • Hydraulic oil • Diesel Jerrycan • Lube oil • Sorbent material (pa, booms, pillows) • PPE (boots, gloves, overall)	

LOADING OF EQUIPMENT

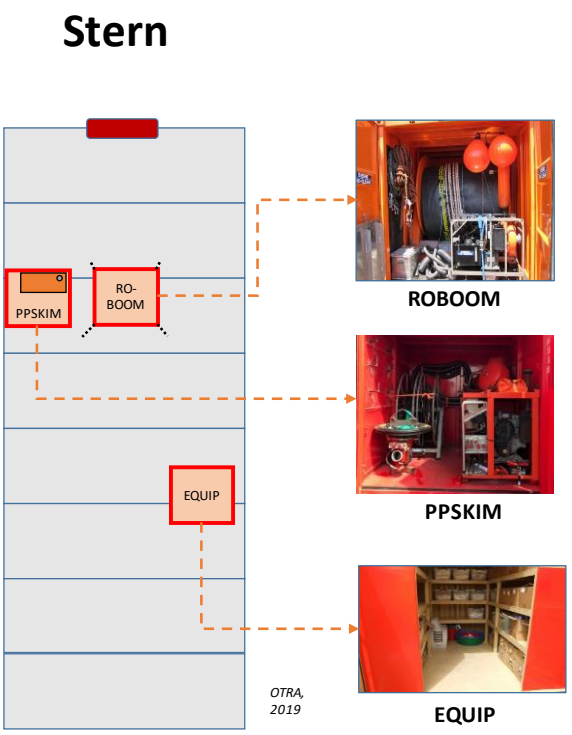
POSITIONING AND SECURING OF THE CONTAINERS ON DECK

⚠ Ensure that **Bow** and **Stern** are clearly identified on the container before lifting.

⚠ No team members on the deck when lifting/moving equipment

Containers

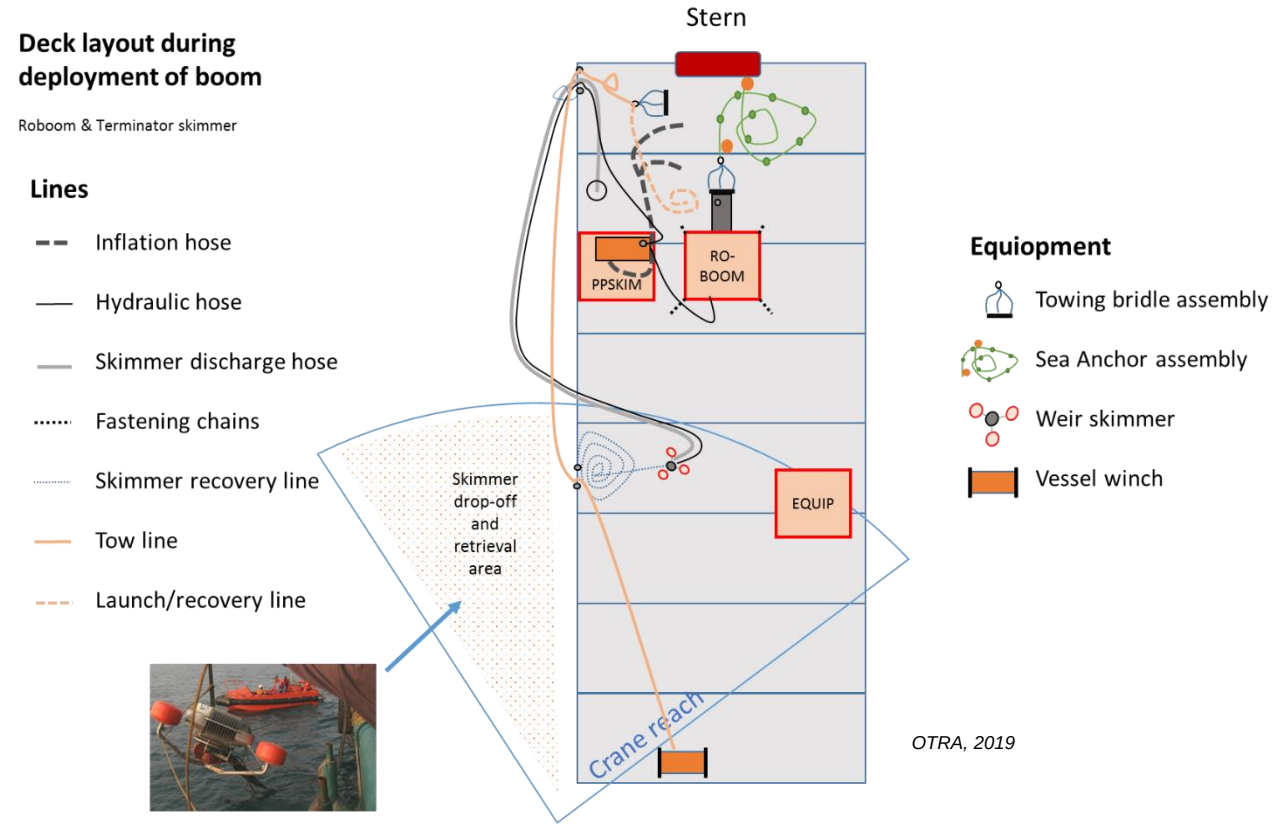
- ☐ Position the ROBOOM container in a central position at 10 m from the stern roller to allow inflation/deflation of 2 chambers.
- ☐ Position the PPSKIM container at the same level. Open side must face ROBOOM container.
- ☐ Position EQUIP container forward to the bow side of the deck (out of the way).
- ☐ Open the doors of the containers, and secure them to the side of the containers.
- ☐ Fastening of the container on deck
  - Necessary for ROBOOM container as tension on line can make it shift or tilt.
  - 4-point fastening (bottom AND top) on side facing the bow of vessel
  - 2-point latching (bottom) on side facing the stern of vessel.



PREPARATION FOR BOOM DEPLOYMENT

⚠ It is the decision of the vessel captain (with advice of the Vessel Recovery Coordinator) to decide if the sea conditions allow a safe deployment. Equipment should not be deployed in rough sea/ strong winds.

SETTING-UP FOR DEPLOYMENT



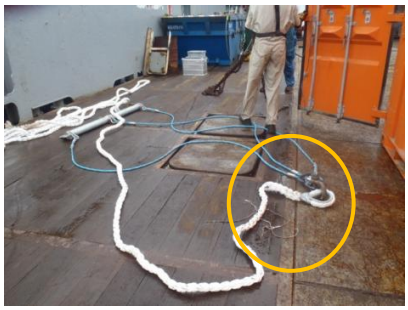
OTRA, 2019

PREPARATION OF THE SEA ANCHOR

- ☐ Attach the sea anchor at the end of the towing line for easy retrieval by tug.

PREPARATION OF TOWING SYSTEM FOR THE MAIN VESSEL

- ☐ Check the shackle connection of the towing bridle to the towing line.
- ☐ Attach a floater on the shackle (between the 3 lines of the towing bridle and the towing line).

Note. A breaking line may be added.	

STARTING UP THE BOOM REEL POWERPACK

START-UP OF THE POWER PACK	
☐ Check reel control is on MIDDLE and air blower is OFF (there is no speed control). ☐ Turn the engine speed control to 75%. ☐ Pull the MAIN SWITCH. ☐ Check control light is GREEN on the power pack. ☐ Start the power pack and let the engine warm up for 2-3 min. ☐ Turn the ignition button ON. ☐ Press down the START button **"8"**. ☐ Let the engine warm up at low speed. ☐ Adjust the speed to the required flow rate of the pump.	 
STOPPING OF THE POWER PACK	
☐ Reset all hydraulic controls levers to MIDDLE position. ☐ Put the speed control in MINI position and let the engine cool down for 3 min. ☐ Push the MAIN SWITCH.	
CHECK-UP OF THE PUMP	
☐ Check that all the hydraulic functions can be operated from the control box. ☐ Check rotation of the pump screw: ○ FORWARD ○ REVERSE	⚠ CAUTION. Never run dry the pump for more than a few seconds, just enough to check direction of rotation. ⚠ Beware of the cutting knifes. ⚠ Beware of the heat of the engine exhaust.

LAUNCHING / INFLATION OF BOOM

PREPARATION FOR BOOM DEPLOYMENT

⚠ All personnel on deck of vessel to wear **Full PPE:** coveralls, goggles, gloves and safety boot and **Life vests** and ear plugs for engine operators.

⚠ Never step on the stern roller

⚠ During launching and retrieval of boom:

- Ensure that the boom is always securely fastened at all time.
- Keep the deck clear during and after launch of the boom.
- Ensure that the vessel heads up current, at very slow speed, to keep the boom aligned with the boat.

TEAM REQUIRED FOR LAUNCHING OF BOOM

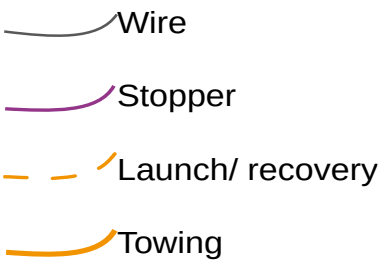
- ☐ 1 x Deck Recovery Team Leader (safety leader)
- ☐ 1 x personnel: operating the power pack
- ☐ 2 x personnel: inflation hoses.
- ☐ 1 x personnel: installation of valve caps
- ☐ 4 x personnel: To pull on the boom, guide it and launch to water.

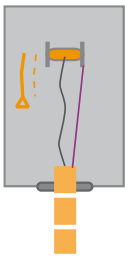
☐ Reel out the first chambers of the boom, and inflate.

Use the caps to close the valves of the chambers.

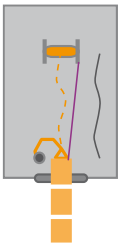
Use the tools provided to tighten the valves.

☐ Guide the boom over the stern roller for launching at sea. ☐ Check the connections. ⚠ Towing line and floaters must not be deployed before the boom, but slide in the water as boom sections are launched.	

LINES AND WIRES USED FOR ROBOOM DEPLOYMENT		
Wires w/ shackles	Used to secure boom on the axis of the reel during winding and unwinding.	
Stopper line 10m - ø 22mm	Used to secure boom while installing / uninstalling tow bar.	
Launch-Rec. line 25m. - ø 26mm	Used to secure boom to reel for launching and recovery of boom.	
Towing line 25m. ø 48 mm	Used by the main vessel and the tug to tow the boom while recovering oil.	

INSTALLATION OF TOW BAR AND TOWING LINE	
☐ Stop the reel when the boom is fully reeled off. It is held by 2 wire lines to the reel.	
☐ Secure the stopper line on boom chain (using the shackle). ☐ Slack the wire lines. ☐ Remove the wire lines from the boom and reel.	
☐ Install the tow bar and the towing line. ⚠ Check if lines are dissymmetric: see colour code.	

- Secure the towing line around the port side towing pin.



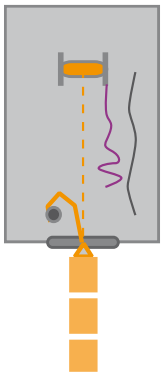
⚠ Leave approximately 10-15 meters of towing line free between the towing pin and the tow bar to allow a safe distance when the boom is fully deployed

- Install the launch-rec. line on the towing bridle.

- Fasten the launch/rec. line to the reel with the method illustrated on the photo (launch/rec. line is used to finish launching of the boom).

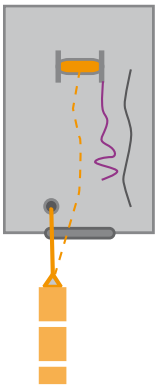
Launching of the last section of boom

- Reel back to put tension on the launch-rec. line.
- Remove the stopper line once it is slack.



⚠ Ensure the towing line is clear for launch and that all other lines are clear and out of the launching area.

- Reel out the launch-rec. line until tension is on the tow line.
- After the boom is launched
  - Tension is on the towing line / fastened around the port side tow pin.
  - Launch-rec. line is slack, fastened to the reel.
  - Stopper and wire lines are unhooked, ready for the retrieval of the boom.
- Instruct the Assistance vessel to secure the line on its stern.



PREPARATION OF SKIMMER

PREPARATION OF THE SKIMMER		
Hoses ☐ Fit the three pipes with floaters on the skimmer. ☐ Check that the clamps on the hopper and the weir lip adapter are secured. ☐ Fit the floating buoys all along the discharge and hydraulic hoses.		**Medium to visous oil: Weir**
Skimmer very light – light oil ☐ Use WEIR configuration. **Skimmer light – medium oil** ☐ Use DISC configuration. ☐ Fit the DISC cassette on the top of the skimmer to recover light oil. **Skimmer medium-heavy-weathered oil** ☐ Use WEIR configuration.		**Light-medium oil: Disc**

START-UP OF THE POWERPACK AND SKIMMER PUMP

CONNECTION OF THE HOSES	(HYDRAULIC AND DISCHARGE)
Hydraulic (power pack control/ skimmer) ☐ **First:** Connect the drain hose to the power pack and skimmer (smallest Diam. hose). ☐ **Second:** Connect the return hose (intermediate Diam. hose). ☐ **Last:** Connect the pressure hose U(largest Diam. hose). ☐ After connection, twist the the sleeves on the couplings to lock them. **Discharge (skimmer / cargo tank)** ☐ Connect the discharge hoses to the weir skimmer and to a cargo tank.	 ⚠ Do not connect the battery until ready for operation.

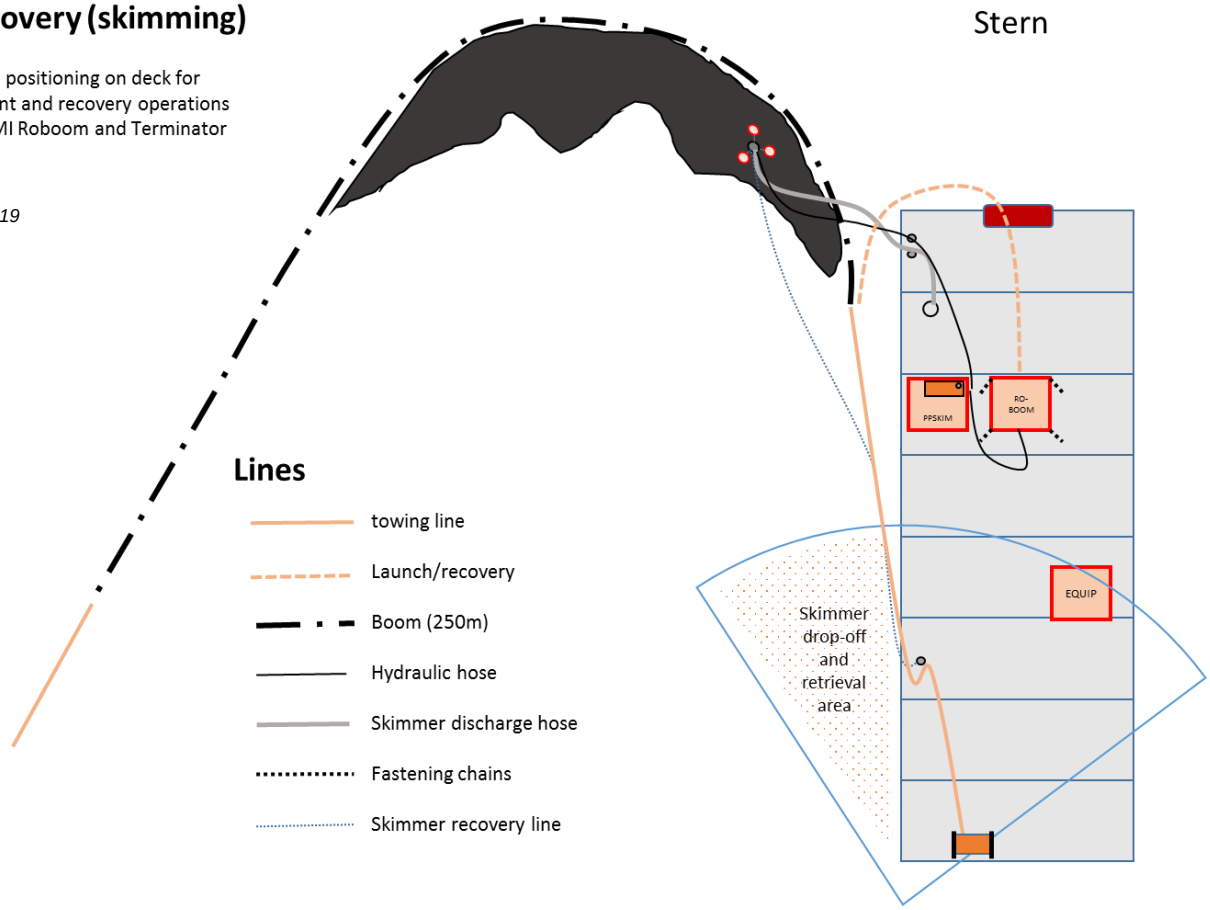
LAUNCHING AND OPERATING THE TERMINATOR SKIMMER

LAUNCHING AND OPERATING

Deck layout during Oil recovery (skimming)

Equipment positioning on deck for containment and recovery operations using DESMI Roboom and Terminator skimmer

OTRA, 2019



Before launching

- ☐ Ensure all hydraulic hoses (with remote control) are connected and discharge hose is connected to the Rec. Oil tank **free of twist**.
- ☐ Secure the remote control as close to the stern as possible.
- ☐ Attach the sling of the crane to the metal frame of the pump of the skimmer and a handling line on one tow point of the skimmer (which will be close to stern of SV).
- ☐ Request an operator to control the handling line form the back of the vessel.

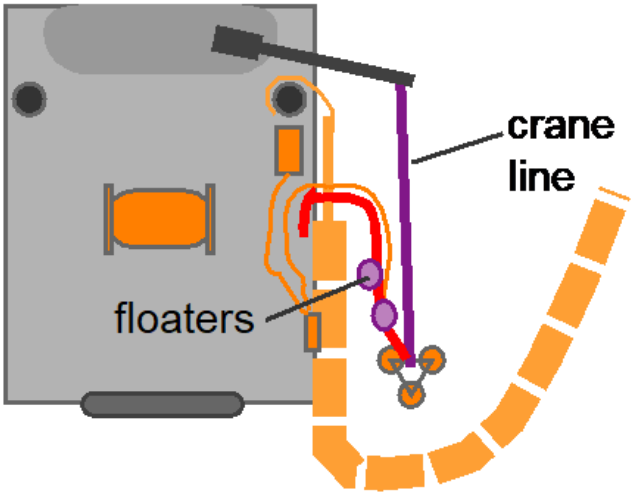
Launching

- ☐ Reduce speed dead slow. Keep the vessel upwind/ up current.
- ☐ Launch the skimmer and let it drift towards the apex of the boom (where the oil is concentrated in thick layers.

Skimming

- ☐ Start skimming operations **when the skimmer is in the thickest slick**.

⚠ **Beware** of drifting of hydraulic / discharge hoses towards the propellers.



Weir

- ☐ Always start at low revolutions and adjust the speed of the pump depending on product viscosity and thickness.
  - ○ Thin layer of oil: lower the speed of the pump to have the weir level very close to the sea surface.
  - ○ Thick layer of oil: increase the speed of the pump to lower the weir level.

CONTROL OF THE SKIMMING OPERATIONS

⚠ Ensure constant watch of skimmer by the skimmer operator (located at the remote control).

⚠ Too high revolutions may result in the high uptake of water (with very little oil).

⚠ Always check the following:

- ☐ Positioning of the skimmer in the slick
- ☐ Pump revolutions
- ☐ Hydraulic oil pressure and temperature.

BEFORE RETRIEVING FROM OIL SLICK

- ☐ Move the skimmer in an area of clean water and pump some sea water to flush the bulk of the oil from the floating hose (<>20 sec at medium speed).
- ☐ Prepare sorbent / plastic lining on the deck to store the oiled skimmer.

RETRIEVING THE SKIMMER

- ☐ Let the engine cool down and stop the power pack.
- ☐ Store the skimmer on sorbent/ plastic mat on the deck.
- ☐ Rinse / remove thick accumulations of oil.

DISCONNECTION

Discharge hose

- ☐ Place more sorbent pads beneath the skimmer.
- ☐ Disconnect the discharge hose from the Rec Oil tank and from the skimmer.

Hydraulic hoses

- ☐ Disconnect the pressure hose **first**.
- ☐ Then disconnect the return hose.
- ☐ Disconnect the drain hose **last**.
- ☐ Replace the dust caps/ plugs.

RINSING OF THE TERMINATOR (AFTER AN EXERCISE)

- ☐ Run the pump few seconds and flush it with fresh water.
- ☐ Rinse all the TERMINATOR with fresh water, using small high pressure cleaner.
- ☐ Raise the weir to extend the skirt and rinse the plastic fabric of the weir skirt.
- ☐ Drain the pump of the skimmer.
- ☐ Oil/ grease the pump.
- ☐ Grease all nipples and moving parts.

⚠ Fill in the maintenance tracking sheet and inform HSEQ of any requirements for maintenance or repair.

FOR THE NEXT USE OF THE TERMINATOR

- ☐ Refill the fuel tank.
- ☐ Check the lube oil and hydraulic oil level.
- ☐ Check for wear, tear and leakages.

RETRIEVAL OF THE BOOM

TEAM REQUIRED FOR RETRIEVING THE BOOM / 10-12 PERSONNEL

- ☐ 1 x Deck Recovery Team leader
- ☐ 1 x safety officer (also assists during the recovery of the boom)
- ☐ 1 x personnel to operate the power pack
- ☐ 1 x personnel for rinsing of the boom with fresh water (low pressure)
- ☐ 2 x personnel for deflation
- ☐ 4 to 6 x personnel to guide the boom. (3 on chain side of boom / 3 on other side)

⚠ Always remove the tow bar and line from the section going first on the reel before re-storing the boom.

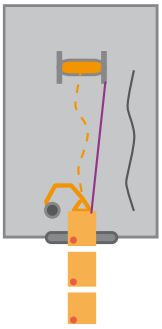
⚠ Instruct the vessel to head up current at slow speed to maintain the boom in the axis of the vessel.

- ☐ Prepare stopper and wire lines.
- ☐ Ensure the launch-rec. line is fastened on the reel as illustrated on the picture (no knots required).

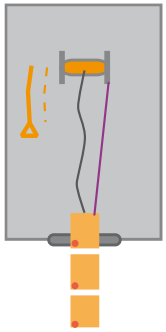
- ☐ Bring back the tow bar on the deck with the launch-rec. line.
- ☐ Recover the towing line at the same time as the boom.

⚠ Ensure valves are facing upwards, ready for deflation (chain port side).

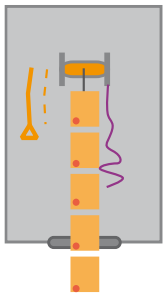
- ☐ Install and secure the stopper line on the boom chain.
- ☐ Reel out the launch-rec. line to put tension on the stopper line.



- Remove the tow bar, towing bridle, launch-rec. and towing lines (when tension is on the stopper line).
- Install the 2 wire lines on the boom and reel.
- Remove the launch-rec. line from the reel.



- Reel in using the wire lines to slacken the stopper line
- Remove the stopper line when slack.
- Continue reeling in and deflating the boom.
- Rinse the boom while rewinding and oil the connection.
- Check for damage and repair.



⚠ do not deflate manually the chamber (by pressing the valve) else it is difficult to fix the deflation line. Prefer to fix directly the deflation line.

⚠ Ensure the boom chambers are completely deflated and the boom is positioned slowly from left to right on the reel in a “W” figure, so the chain does not overlap.

⚠ Ensure there is no slack boom on the reel when reeling in.

At the end of the retrieval:

- Tighten the boom using the towing line to finish.
- Let the power pack idle for 2-3 min.
- Stop the power pack.
- Disconnect the hydraulic lines.
- Close the fuel cock.
- Disconnect the “-“ from the battery.

Duration of retrieval: approximately 1.5 hours.

MAINTENANCE AFTER USE OF BOOM

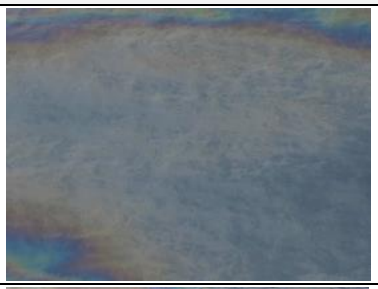
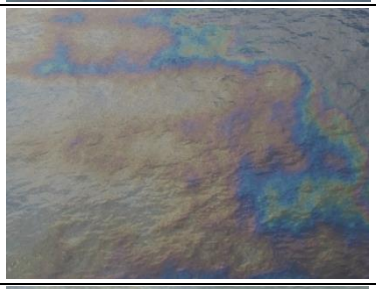
- Rinse with FRESH WATER power pack + reel + inside base of container.
- Spray an anti-corrosion agent in the air intake of the power pack (when the power pack and air blower are ON).
- Ensure the power pack, reel and inside of container is completely dry before closing the container.
- Clean with GASOIL or similar any oiled outside metal part of the engine with oil resistant gloves.
- Spray OIL (WD 40) on all screwed and mobile part of power pack.
- Oil all metal part of engine and frame not painted.
- Refill the fuel tank.
- Check the lube oil and hydraulic oil level.
- Fill in the maintenance tracking sheet and inform HSEQ of requirements for maintenance or repair.

7. APPENDIX

7.1 Bonn Colour Appearance Code

BONN COLOUR CODE: SLICK APPEARANCE, THICKNESS AND ASSOCIATED VOLUME

NOTE: The codes used in the present guidelines to qualify oil according to its appearance on the sea surface result from the Bonn Agreement Oil Appearance Code. See the Bonn Agreement web site for further information: http://www.bonnagreement.org

Code	Description	Appearance	Thickness (µm)	Quantity
1	**Sheen (silvery / grey)** Appearance is due to their thickness		**0.04 to 0.30** Very thin films of oil which reflect the incoming light slightly better than the surrounding water	**0.04 – 0.3 m^3 / km^2** (40 - 300 litres)
2	**Rainbow** Rainbow oil appearance is independent of oil type		**0.30 to 5.0** Oil films with thicknesses near the wavelength of different coloured light exhibit the most distinct rainbow effect	**0.3 – 5 m^3 / km^2** (300 - 5,000 litres)
3	**Metallic** The appearance of the oil in this class is oil type dependent		**5.0 to 50** Metallic will appear as a quite homogeneous colour that can be either blue, brown, purple or another colour	**5 -50 m^3 / km^2**
4	**Discontinuous true colour** The broken nature of the colour is due to thinner areas within the slick		**50 to 200** For oil slicks thicker than 50 µm the true colour will gradually dominate the colour that is observed	**50 – 200 m^3 / km^2**
5	**Continuous true colour** Homogenous colour can be observed with no discontinuity as described in Code 4		**> 200** The true colour of the specific oil is the dominant effect in this category. This category is strongly oil type dependent	**200 m^3 and more / km^2**

7.2 Beaufort Wind Scale

See next page.

FORCE	DESCRIPTION	WIND SPEED IN KNOTS	WIND SPEED IN KM/H	WIND SPEED IN M/S	LAND CONDITIONS	SEA CONDITIONS (AT 10M HEIGH, FLAT & OPENED LANDSCAPEA 10 M DE HAUTEUR)
0	Calm	< 1 knot	< 1km/h	< 0.3 m/s	Sea like a mirror.	Smoke rises vertically.
1	Light air	1 to 3	1 to 5	0.3–1.5 m/s	Ripples with appearance of scales are formed, without foam crests.	Direction shown by smoke drift but not by wind vanes.
2	Light breeze	4 to 6	6 to 11	1.6–3.3 m/s	Small wavelets still short but more pronounced; crests have a glassy appearance but do not break.	Wind felt on face; leaves rustle; wind vane moved by wind. Wind vanes begin to move.
3	Gentle breeze	7 to 10	12 to 19	3.4–5.5 m/s	Large wavelets; crests begin to break; foam of glassy appearance; perhaps scattered white horses.	Leaves and small twigs in constant motion; light flags extended.
4	Moderate breeze	11 to 16	20 to 28	5.5–7.9 m/s	Small waves becoming longer; fairly frequent white horses.	Raises dust and loose paper; small branches moved.
5	Fresh breeze	17 to 21	29 to 38	8–10.7 m/s	Moderate waves taking a more pronounced long form; many white horses are formed; chance of some spray	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	Strong breeze	22 to 27	39 to 49	10.8–13.8 m/s	Large waves begin to form; the white foam crests are more extensive everywhere; probably some spray	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	High wind, moderate gale, near gale	28 to 33	50 to 61	13.9–17.1 m/s	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind; spindrift begins to be seen.	Whole trees in motion; inconvenience felt when walking against the wind.
8	Gale, fresh gale	34 to 40	62 to 74	17.2–20.7 m/s	Moderately high waves of greater length; edges of crests break into spindrift; foam is blown in well-marked streaks along the direction of the wind.	Twigs break off trees; generally impedes progress.
9	Strong/severe gale	41 to 47	75 to 88	20.8–24.4 m/s	High waves; dense streaks of foam along the direction of the wind; sea begins to roll; spray affects visibility.	Slight structural damage (chimney pots and slates removed).
10	Storm, whole gale	48 to 55	89 to 102	24.5–28.4 m/s	Very high waves with long overhanging crests; resulting foam in great patches is blown in dense white streaks along the direction of the wind; on the whole the surface of the sea takes on a white appearance; rolling of the sea becomes heavy; visibility affected.	Seldom experienced inland; trees uprooted; considerable structural damage.
11	Violent storm	56 to 63	103 to 117	28.5–32.6 m/s	Exceptionally high waves; small- and medium-sized ships might be for a long time lost to view behind the waves; sea is covered with long white patches of foam; everywhere the edges of the wave crests are blown into foam; visibility affected.	Very rarely experienced; accompanied by widespread damage.
12	Hurricane force	Equal or above à 64	Above 118	≥ 32.7 m/s	The air is filled with foam and spray; sea is completely white with driving spray; visibility very seriously affected.	Devastation.

7.3 Conversion scale

Système impérial/U.S.	Imperial/U.S. system			Système international	International system
Distance	**Length**				
Pouce	Inch	1	2,54	Centimètre	Centimeter
		0,394	1		
Pied (0,333 yard)	Foot (0,333 yard)	1	0,305	Mètre	Meter
		3,28	1		
Yard (3 pieds)	Yard (3 feet)	1,093613	1	Mètre	Meter
		1	0,9144		
Mile (1760 yards)	Mile (1760 yards)	1	1,609344	Kilomètre	Kilometer
		0,621371	1		
Mile nautique (ou marin)	Nautical mile	1	1,852	Kilomètre	Kilometer
		0,539957	1		
Surface	**Surface**				
Acre	Acre	1	0,405	Hectare	Hectare
		2,47	1	(10 000m²)	(10 000m²)
Poids	**Weight**				
Once	Once	1	28,3495	Gramme	Gramme
		0,035274	1		
Livre	Pound	1	0,4536	Kilogramme	Kilogram
(16 onces)	(16 onces)	2,204586	1		
Stone	Stone	1	6,35	Kilogramme	Kilogram
(14 livres)	(14 livres)	0,15748	1		
Tonne imperiale	Imperial ton	1	1,016064	Tonne	Ton
		0,98419	1		
Volume	**Volume**				
Gallon Imp. ou GB	Gallon Imp. or UK	1	4,5461	Litre	Liter
		0, 2199687	1		
Barril Imp. ou GB	Barrel Imp. or UK	1	205	Litre	Liter
		0,004878	1		
Barril U.S.	Barrel U.S.	1	159	Litre	Liter
		0,006289	1		
Débit	**Flow**				
Gallon Imp./ minute	Gallon Imp./ minute	1	3,671	Mètre cube/ heure	Cubic meter/ hour
		0,272405	1	(16,7 l/ min)	(16,7 l/ min)
Gallon Imp./ minute	Gallon Imp./ minute	1	0,0757	Litre/ seconde	Litre/ seconde
		13,21	1	(2,119 m3/ min)	(2,119 m3/ min)
Vitesse	**Speed**				
Nœud	Knot	1	1,852	Kilomètre/heure	Kilometer/hour
		0,539957	1	(0,2777 m/s)	(0,2777 m/s)
Autres	**Others**				
Pression	**Pressure**				
Bar	Bar	1	0,069	Psi	Psi
		14,49275	1		
Bar	Bar	1	100000	Pascal	Pascal
		0,00001	1		
Bar	Bar	1	0,980665	Atmosphère	Atmospher
		1,01325	1		
Force	**Strength**				
DecaNewton (daN)	DecaNewton (daN)	1	1,02	Kilogramme	Kilogram
		0,980392	1		
Puissance	**Power**				
Cheval	Horsepower	1	0,7457	KiloWatt	KiloWatt
		1,341022	1		
Concentration	**Concentration**				
Milligramme/ litre	Milligram/ liter	10000	1	Pourcentage	Percentage
(= Parties Par Million ppm)	(= Part Per Million ppm)	1	0,0001		
Viscosité	**Viscosity**				
Viscosité (Centipoise)		=		Viscosité (CentiStoke) x Density	
Viscosité (Centipoise) / Density		=		Viscosité (CentiStoke)	
Température	**Temperature**				
Température (Fahrenheit)		=		(Température (Centigrade) x 1,8) + 32	
(Température (Fahrenheit) - 32) / 1,8		=		Température (Centigrade)	

OIL SPILL CONTINGENCY PLAN

OPERATIONAL SUPPORT N°7:

SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	**Date**	**Description**
00	01/10/2019	First published
01	12/02/2020	Update of section 5

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

The client will use the present document if and when needed, under its sole responsibility. The client will modify, complete, update etc. the present document under its sole responsibility.

OTRA company will not be held responsible for any use of any part of the present document.

/!\ Present guidelines are relevant for TEP Liban to manage shoreline intervention and/or to provide assistance and resources to Lebanese authorities.

Considering the non-persistent nature of MGO and condensates, the location of Block 4 and prevailing drift to the North, the likeliness of large oil groundings is limited. However, residual condensates and potentially MGO from spills in block 4 may reach the coast with unfavourable conditions.

An incident involving a vessel (collision/ damage/ grounding of a PSV inside the port of Beirut or close to the coast) could also lead to oil groundings.

/!\ The area North of Beirut is at risk (based on modelling carried out by TEP Liban). Accordingly, this document considers the coastal area **from Beirut port to the North border**.

/!\ TEP Liban will consider **3 days as the shortest time for coastal protection, and 4 days for first clean-up operations**. Modelling studies show that the shortest times are in the range of 4 days[1].

Present guidelines consider that **TEP Liban manages the shoreline operations** to provide the full scope of actions to TEP Liban.

/!\ **However, it is reminded that:**

- **intervention at the Logistics base (inside Beirut port) is led by Logistics base manager;**
- **intervention in Beirut port perimeter is led by Beirut Port Authorities;**
- **intervention on Lebanese shores is led by the Governorate (for a medium spill) and with an overall coordination of National authorities for Tier 3 events:** "*The most appropriate shoreline clean-up strategy will be developed by the Incident Management Planning section with guidance from the Ministry of Environment and other national and local environmental experts*." (NOSCP, Rev 0, 2017).

TEP Liban will provide resources required and manage operations on site. But, the exact level of involvement of TEP Liban for the coordination of shoreline intervention is difficult to anticipate.

Markings

/!\ Warning

Link to other documents of the TEP Liban OSCP

Link to external document or information, not part of the TEP Liban OSCP

[1] Shortest possible time is 2 days but only for one "6,000 m3 MGO spill" scenario model run with very unfavourable conditions

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1. LEBANESE SHORES & OPERATIONS ONSHORE – OVERVIEW

1.1 Northern Lebanon coasts

Geomorphological characteristics of Lebanese coasts are briefly presented below[2].

Coast stretches over 190 km from Nakoura in the South to the North border (Nahr-El-Kabir-Al-Chimali river).

The narrow coastal area is limited by high mountains in the East (over 3,000 m high).

- Various rocky caps alternate along the coast with small bays and sandy beaches. Rocky coasts cover >70% of the shorelines (with possibly some pebbles &/ or gravel). Ras Nakoura in the South of the country is a rocky cap of 80m altitude. Other caps follow from South to North: Ras-El-Dreijate, Ras El-Bayada, Ras Sakhri, Ras Nabi-Yunès, Ras-Ell-Saadiyat, Ras-Beyrouth, RasTabarja. They are made of limestone. Other caps, more North, are Ras-El-Tayr, Ras-Chekka and Ras El-Natour.
- Small coastal plains were formed by alluvial deposits, disseminated close to valleys and rivers, near Ras-El-Bayada, Ras-Sakhri, Damour, Jdeidet-El-Matn, Jounieh, Jbeil, Batroun, Chekka and Akkar.
- Rocky cliffs exist all along Lebanese shore, the highest usually not exceeding 30m height, generally made of soft limestone, not resistant to marine erosion which creates wave-cut platforms 75 to 100m wide. The resulting shapes are little crevices and depressions becoming larger basins, irregular and jagged shaped.
- Sandy beaches (and gravel/ pebble beaches) represent nearly 25% of Lebanese shorelines. The longest ones are found on the last 16 km of shores in the North, 5 km North and 8 km South of Beirut, 11 km North of Sidon and 6 km South of Tyr. In addition to these areas, there are approximately 20 km of small sandy beaches disseminated often close to the river outlets.

Main shoreline types in Lebanon , as per the Environmental Sensitivity Index[3] (used in NOSCP 2017) are[4]:

Over 70% of Lebanese coastline 	***Cliffs and rocky coves (ESI 1 and 2):*** *Access is often a challenge. Areas can present an extremely hazardous working environment.*
	Ports and harbours/ man-made structures*: Exposed, solid man-made structures* ***(ESI 1)****, exposed rip-raps (****ESI 6****), sheltered solid man-made structures* ***(ESI 8)****. (…).*
Less than 25% of Lebanese coastline 	***Sandy/ gravel Beaches****: Exposed fine to medium-grain beaches* ***(ESI 3)****, coarse grain beaches****(ESI 4)*** *and mixed sand and gravel beach* ***(ESI 5)****. While oil can more easily penetrate into coarse, dry sand fine grained sands form wet hard packed beaches less likely to permit oil penetration. On exposed shorelines, particularly in rough sea conditions, oil may become buried.*
	Shingle and Cobbles*: Exposed or sheltered* ***(ESI 6)****, includes rip-raps. They are a most difficult shoreline to clean because oils, particularly lighter oils, will readily penetrate deep into the substrate.*
Few % of Lebanese coastline 	***Wetlands****: Include tidal flats (exposed:* ***ESI 7*** *and sheltered:* ***ESI 9****), marsh lands (****ESI 10****). In general oil does not penetrate into the substrate as the sediments are fine preventing percolation and the water table is often high enough to provide a barrier against the downwards migration of oil. However, it is possible that oil will become stranded after high tide in areas largely inaccessible by personnel or equipment. Oil may also become associated with marsh vegetation or become buried following a storm event. (…).*

[2] Source : BIODIVERSITÉ MARINE ET RESSOURCES VIVANTES DES EAUX LIBANAISES ET DU BASSIN LEVANTIN. GUIDE ILLUSTRÉ DES ALGUES AUX MAMMIFÈRES, Sami Lakkis Professeur Émérite,Université Libanaise, En collaboratiom avec Dr.Vanda Novel-Lakkis, Biologie marine, Phycologie et Raymonda Zeidane, Biologie marine, Planktonologie, 2018, Publications de l'Université libanaise - Beyrouth-Liban

[3] *« Environmental Sensitivity Index – ESI », p.62*

[4] Source : Lebanon NOSCP, 2017, Document D « Supporting documents », V. 1, Rev 0, Feb 2017

1.2 Shoreline intervention – Overview

The steps to develop and implement an Incident Action Plan for spills onshore are based on the same steps as for a general Incident Action Plan detailed in:

Vol 1.1 "Action Plan for TEP Liban Tier 2 & 3 spills", section 4: "Management of oil spill response"

- **COLLECTION OF FACTS ON SITUATION**
- **ASSESSMENT OF SITUATION & PREDICTIONS**
- **IDENTIFICATION OF IMMEDIATE & POTENTIAL IMPACTS** according to PEARL
- **MAPPING OF STAKEHOLDER / EMERGENCY ORGANIZATION**
- **DEFINITION OF RESPONSE OBJECTIVES** addressing the impacts
- **DEFINITION OF STRATEGIES** to achieve the objectives
- **DEFINITION OF TACTICS** to implement the strategies
- **VALIDATION OF INCIDENT ACTION PLAN**

The "Incident Action Plan" steps are adapted to the shore:

- First survey can be aerial, but most surveys are carried out by foot (sometime with small boats).
- Assessment is a key step. Predictions are not required compared to offshore as most grounded oil does not move.
- Stakeholder mapping (i.e. mapping of the whole response incident management organization by the IMT) is a key step as there are many stakeholders involved compared to offshore response (authorities, communities, private companies etc.).

Strategies and tactics are defined in logical steps, for the key response areas on the shore – see next page:

- Protection of sensitive sites;
- Intervention Phase 1 : recovery of gross accumulations of oil;
- Intervention Phase 2 : clean-up of oiled areas;
- Oiled wildlife management;
- Oily waste management.

PROTECTION OF SENSITIVE SITES	
▶ Delineate the areas of shore at risk (based on observations & drift predictions). ▶ Locate the sensitive sites and resources. ▶ Identify the sites and resources to protect in priority & validate with the authorities. ▶ Visit the sites & validate the protection tactics (e.g. type & length of boom, positioning, anchoring etc.). ▶ Mobilize personnel, specialized equipment and logistical support. ▶ Deploy the equipment. ▶ Check daily and maintain/ adapt the protection system as needed. **/!** The sensitivity of the Lebanese coast is mapped, and sensitive sites and areas located, in NOSCP Rev 0, Feb 2017, Vol D “Supporting documents”.	*Sensitive sites are detailed in the present document.* *Sensitivity maps are in Operational Support n°10: “Coastal sensitivity maps”.* *Knowledge of coastal environment and MetOcean conditions is critical.*
“PHASE 1” INTERVENTION : RECOVERY OF GROSS ACCUMULATIONS OF OIL	
▶ Remove “clean” waste and stranded vegetation from the shore before oil grounding. ▶ Identify coastal areas with large oil accumulations (aerial or rapid terrestrial survey). ▶ Carry out a terrestrial survey to confirm the accumulations of oil. ▶ Identify the priority sites for Phase 1 intervention & validate with the authorities. ▶ Organize visit of the sites to prepare the work & validate the tactics. ▶ Mobilize personnel, specialized equipment and logistical support. ▶ Deploy teams, competent supervisors, equipment and logistical support to recover a maximum of oil.	*Phase 1 intervention to carry out as soon as possible to recover as much oil as possible.* *Choice of techniques is limited.*
“PHASE 2” INTERVENTION : CLEAN-UP OF OILED AREAS	
▶ Carry out a complete survey of the area with remaining oil to locate the oiled sites to clean, identify possible clean-up techniques & confirm other areas are clean. ▶ Identify the sites to clean-up in priority (Phase 2 intervention), approve the clean-up techniques & validate with the authorities. ▶ Visit the areas to prepare the set-up of the working sites and consolidate clean-up techniques. ▶ Set-up an Incident Management Organization to coordinate the shoreline clean-up. ▶ Mobilize competent supervisors, personnel, equipment and logistical support. ▶ Carry out the clean-up without creating more damage to the environment or activities. ▶ Carefully limit and manage the oily waste generated by the operations.	*Phase 2 intervention <u>only</u> after Phase 1 is completed.* *Large choice of clean-up techniques available, with different specialized equipment.* *Choice of clean-up techniques with advice of competent spill responders (and environment specialists in sensitive sites).*
OILED WILDLIFE MANAGEMENT	
▶ As needed.	
OILY WASTE MANAGEMENT	
▶ Minimise, sort out, temporarily store on site the oily waste. ▶ Evacuate, store in intermediate sites and finally treat and dispose of the collected waste and oiled PPE, sorbent, etc.	

1.3 General considerations & recommendations for shore intervention in Lebanon

There are **currently no "Governorate shoreline response plans" developed** (as advocated in the NOSCP). Local organizations are outlined in the National OSCP for the management of shoreline interventions. Shoreline response will be supervised by the head of governorate, under the supervision of the NOSIC if the NOSCP is activated.

Working in relation with the local communities is essential. Local communities can be contracted for the surveys and clean-up, if correctly briefed, trained, supervised and equipped. It is also critical to understand the structure of the local communities involved, and local sensitivities.

Shoreline response involves numerous stakeholders (communities, authorities, representatives of various ministries, NGO's, fishermen, tourist facility owners, journalists etc.) with varying level of authority, competence and involvement. As such they are complex to manage. Responsibilities of each ministry and agency are outlined in the National OSCP.

Precise shoreline response tactics cannot be defined in advance, because of:

- the very diversified types of shores from Beirut to the North border;
- the unknown nature of condensate, and unknown volume & level of weathering of oil coming ashore (whether it is MGO or condensates);
- MetOcean conditions in coastal areas;
- Logistical constraints: access (land, sea) etc.

Consequently, the type and amount of equipment, personnel and logistical support needed cannot be anticipated. Some indicative lists are provided, for information, in the Operational Support n°8 (Appendices).

Oiled shoreline surveys are critical; and must be carried out with TEP Liban representatives, oil spill responders (contractors), environmentalists and representatives of authorities.

Protection and clean-up priorities are defined on a case-by-case basis, considering the specifics of the incident. Protection priorities are proposed in the Operational Support n°10 "Coastal sensitivity atlas".

Shoreline response, while not technically complex, must be carefully planned to **avoid creating additional damage to the coastal environment** (particularly during phase 2 operations). Specific care will be taken when cleaning beaches close to **sea grass meadows** (to avoid washing effluents running off at sea) and cleaning rocky shores to avoid damaging the **vermetid terraces** specific and endangered habitat usually located immediately above the mean sea level.

Competent personnel is critical to supervise the clean-up work sites, and may not be available in Lebanon.

Shoreline response requires **logistical support**. Access to the shores is possible most time by land. However, the clean-up of some rocky shores may require maritime access and difficult-access rope workers.

Clean-up equipment and logistical support can be sourced in Lebanon (building/ road works company, transport company, service company etc.). However, some specific clean-up equipment may have to be outsourced (e.g. some pumps/ skimmers, etc.).

Shoreline response may generate a **large volume of oil spill waste**. Sand removal must be limited only to very heavily oiled sands. The use of selective in-situ clean-up techniques allows minimizing the volume of waste (e.g. surf washing, re-use sorbents; and PPE as sorbents, portable incinerator for oiled PPE etc.).

2. PROTECTION – PLANNING OPERATIONS

IMT provides security, safety and operational clearance before any operations or visit.

This section presents the preparation of protection operations by teams on site and the IMT, carried out before any oil arrives on the coast. Lebanese authorities would supervise or directly manage the operations.

According to modelling studies, shortest time for oil groundings is usually 4 days. The major scenario "Blow-out" and "6,000 m3 MGO spill" result in significant oiling of **+/- 10 km of coast**, representing at least **3 to 4 sites to protect in the first days of the spill** (based on the average number of sensitive sites mapped between Beirut and the North border within 10 km of coastline).

Most sites (>80%) require less 100m of floating boom for an effective protection. Boom deployment is the most used protection technique. General protection principles are detailed in:

TEP Liban OSCP Vol. 2.

Following figure summarizes the key management steps of protection operations.

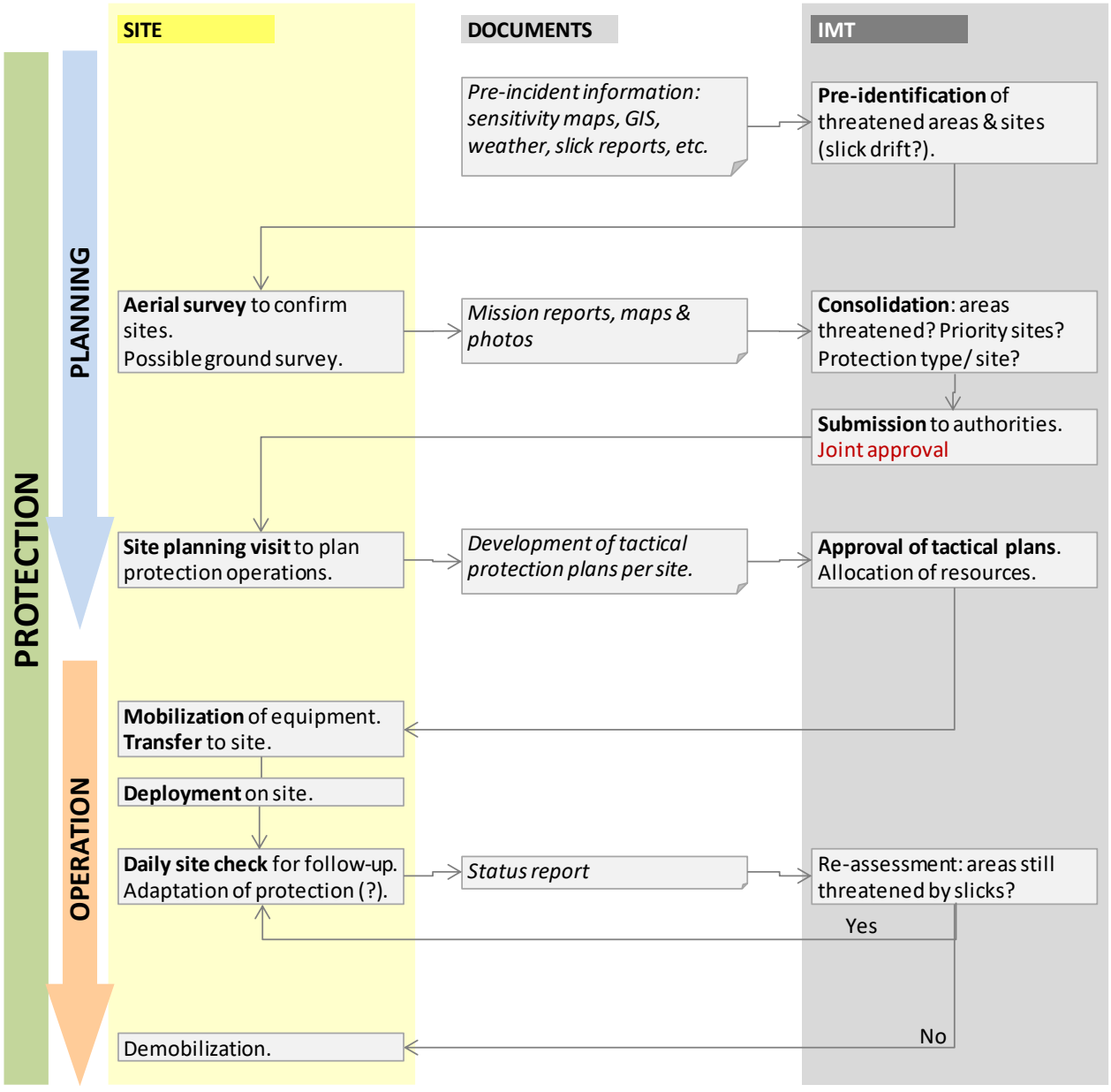


Figure 1 : Decision process for sensitive sites protection

2.1 Sensitive sites and resources in Lebanon

For the maps of coast types and sensitivity, biological and socio-economic resources, see:

TEP Liban OSCP Operational Support n°10 "Atlas of coastal oil spill sensitivity"

Sensitive sites that cannot be efficiently protected are considered "**clean-up priority**", e.g. tourist beach.

2.1.1 Sensitive sites from NOSCP 2017

The Lebanese NOSCP (Vol D "Supporting documents", Rev 0, Feb. 2017) lists the sensitive sites to consider in priority for protection:

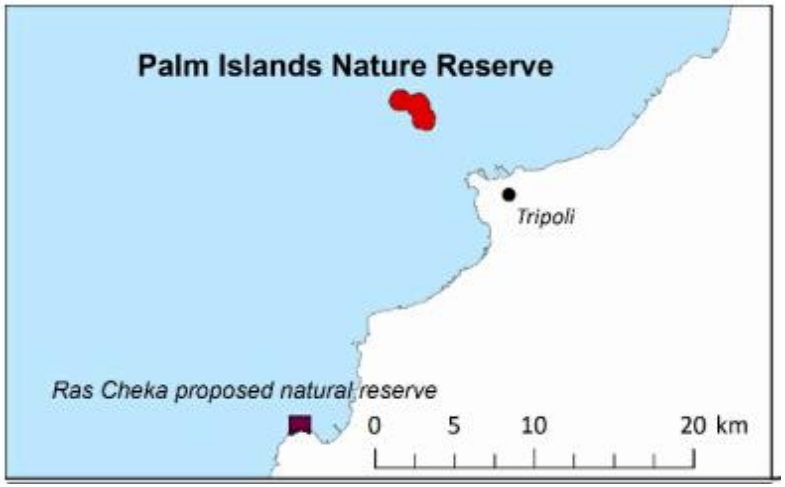
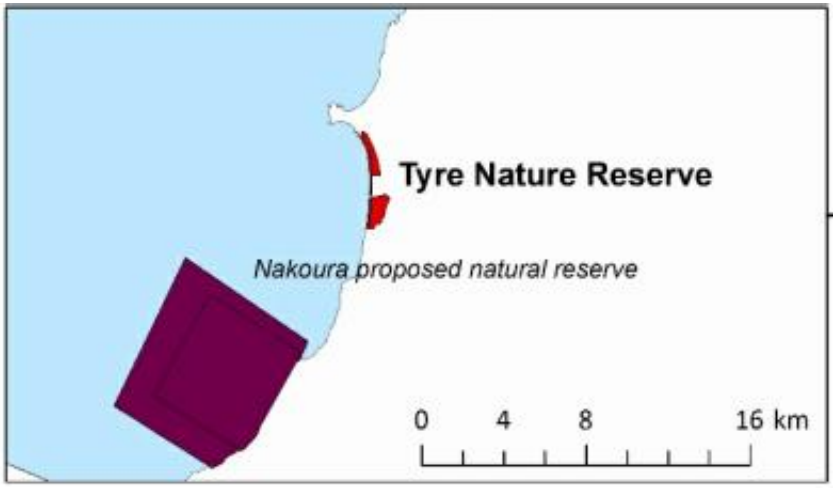
A – 1 Marine Protected Areas MPA <u>in force</u> north of Beirut	*MPA are also RAMSAR sites and Specially Protected Area of Mediterranean Importance - SPAMI.*
B – 8 Marine Protected Areas MPA <u>proposed</u> north of Beirut	
C – 81 Priority protection sites (in all Lebanon) **15 sites high priority sites** **20 sites medium priority sites** **46 sites low priority sites**	*Identified in the NOSCP, based on geographical, biological and cultural features, the potential and existing stresses and current conservation status.*
D – Socio-economic sensitive sites and areas (in all Lebanon)	*Located on a map but not detailed. Unknown number.*

Marine Protected Areas (in force and proposed) and sensitives sites from Beirut port to the North border (identified in the NOSCP, 2017) are located in the table below.

Description of Marine Protected Areas, photos (Google Earth) and proposals of protection strategy are provided in the appendix:

"Marine Protected Areas in force and proposed from NOSCP, 2017", p.48

/! Efficient protection of all the territory of a MPA (e.g. with floating booms) is often not possible because the surface of a MPA is too large compared to the area that can be effectively protected.

A – 1 MARINE PROTECTED AREAS <u>IN FORCE</u> NORTH OF BEIRUT (all items from NOSCP 2017)	
Palm Island Nature Reserve in North Lebanon  No information in NOSCP	Reminder. The only other Coast Nature Reserve in Lebanon is Tyre in South Lebanon. **/!** Not at risk from Block 4 activities.  No information in NOSCP

B – 8 MARINE PROTECTED AREAS PROPOSED FROM BEIRUT PORT TO NORTH BORDER (all items from NOSCP 2017)

- Estuary of Areeda river
- Enfeh Peninsula
- Ras El Chekaa cliff
- Batroun Phoenician wall
- Medfoun rocky area
- Byblos
- Estuary of Nahr Ibrahim river
- Beirut port outer platform

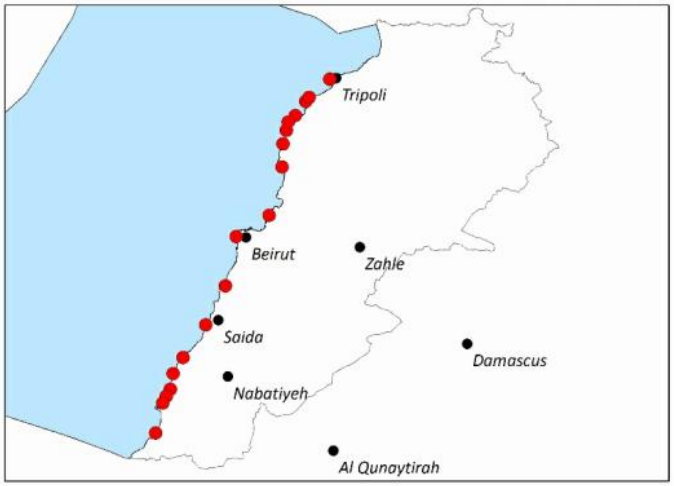
Note. Raoucheh cliff (proposed MPA) is shown but not at risk.

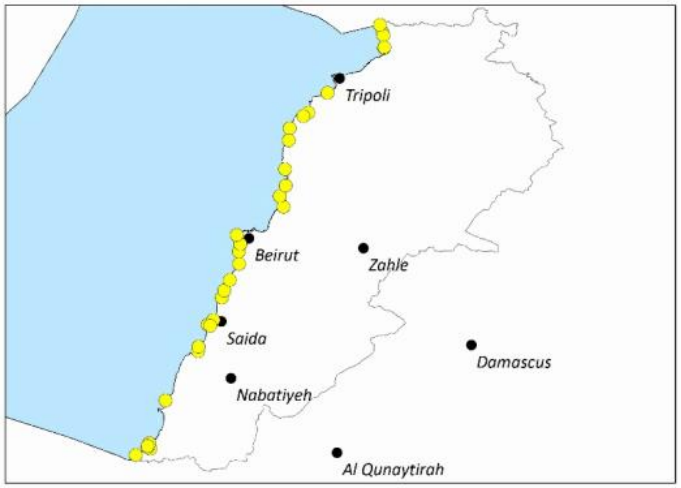
C - SENSITIVE SITES FOR ALL LEBANON (all items from NOSCP 2017)

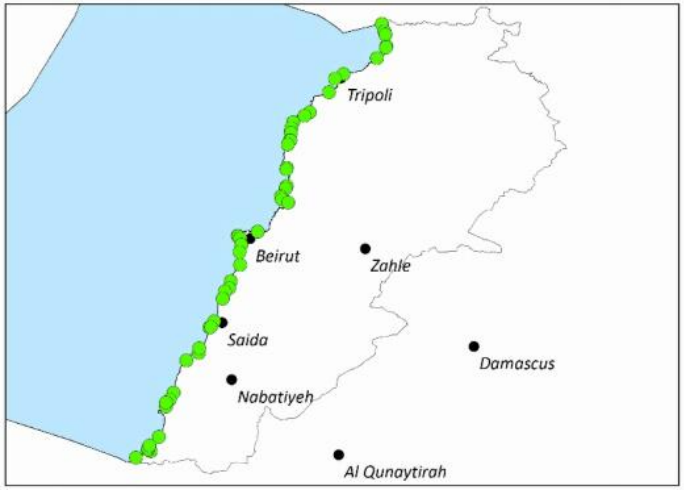
15 sites high priority sites + 20 sites medium priority sites + 46 sites low priority sites

Priority Areas as proposed in the Environmental Resources Monitoring in Lebanon report 2012, based on geographical, biological and cultural features, the potential and existing stresses and current conservation status.

No location, name, or detailed information in the NOSCP 2017.



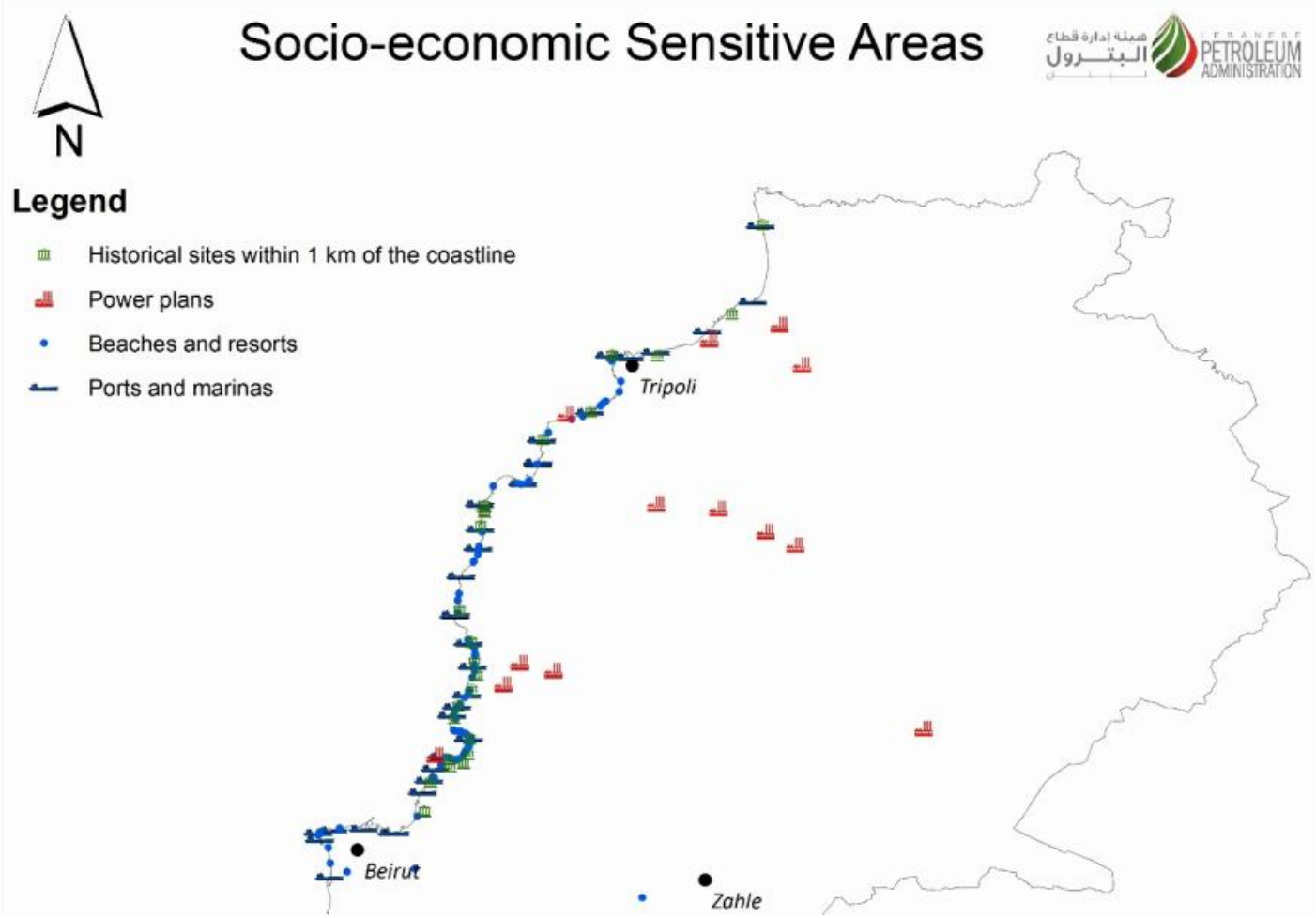




D - SOCIO-ECONOMIC SENSITIVE AREAS - FROM BEIRUT TO NORTH BORDER (all items from NOSCP 2017)

Socio-economic sensitive sites, identified in the NOSCP, Rev 0, Feb 2017

No location, name, or detailed information in the NOSCP 2017.



2.1.2 Sensitive sites identified by OTRA, from Beirut port to North border

OTRA has identified **24 sensitive sites** between Beirut port and the North border.

- **25 marina &/ or fishing ports;**
- **4 large tourist resorts;**
- **1 river entrance;**
- **2 industrial/ commercial port (Tripoli and Selaata large vessel berth);**
- **1 power station (Zouk);**
- **1 archaeological site (Enfeh).**

Identification was based on available satellite imagery (Google Earth and bing.com/map).

One area may combine various sensitive sites (e.g. port area with fishing port, marina and commercial port).

The results are presented in the table next page.

/!\ The list focuses on ports and marinas with an internal larger dimension of at least 100m, large tourist resorts, industrial facilities, river entrances, coastal communities etc. that could be effectively protected (mainly using floating booms).

/!\ This list - indicative only - reflects the large number of sensitive sites to protect in the area.

/!\ Toponyms may not be accurate (collected from Google Earth, bing.com/map, International Travel Maps).

Brief descriptions of sites, satellite imagery (Google Earth) and width of entrance are provided in the appendix:

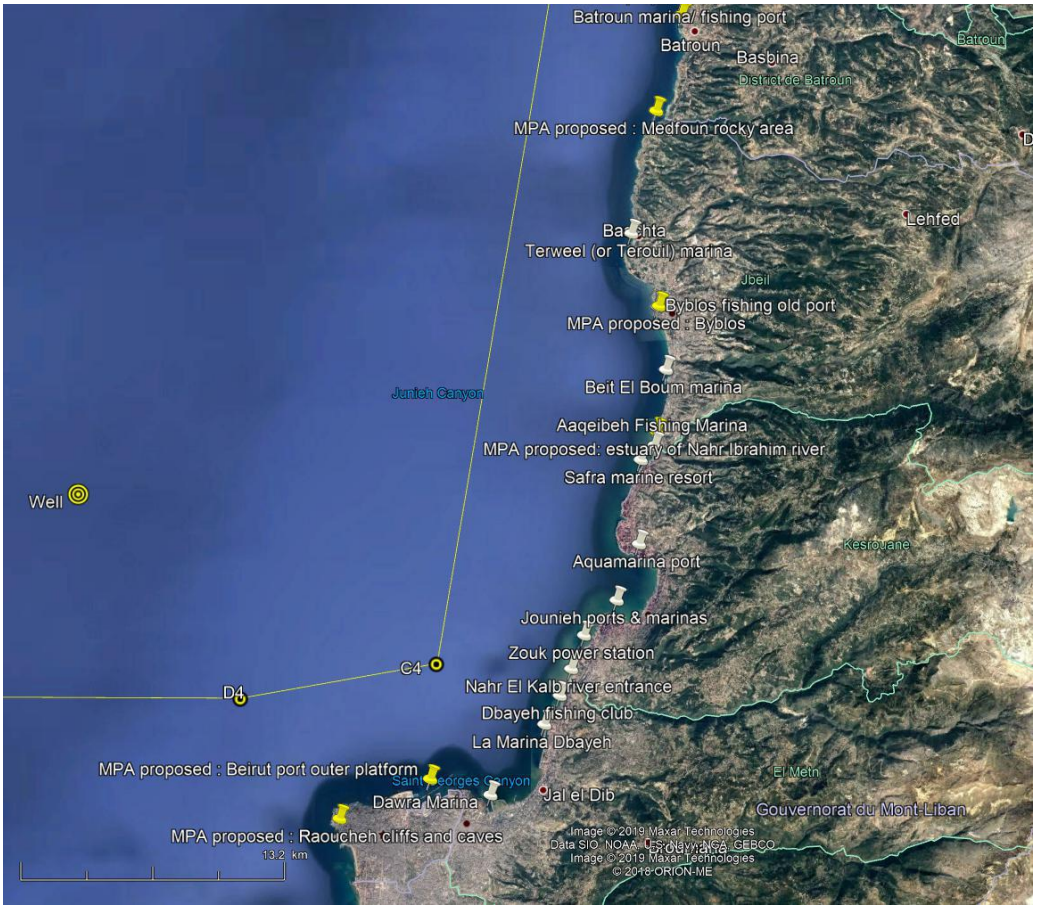
"Sensitives sites identified by OTRA, 2019 ", p.54

11 AREAS FROM BATROUN TO NORTH BORDER

- El Aabde fishing port
- Tripoli commercial, industrial & fishing port
- El Mina small fishing port
- Palma beach marina & tourist resort
- Manara beach resort
- Miramar marina & tourist resort
- Al Qalamoun fishing port & marina
- Last Salinas tourist resort & marina
- Enfeh Phenician trench and close houses
- Chekka marina/ fishing port
- Selaata industrial & fishing port

12 AREAS FROM BEIRUT TO BATROUN

- Batroun marina/ fishing port Terweel (or Terouil) marina
- Byblos old fishing old port
- Beit El Boum marina
- Aaqeibeh fishing marina
- Safra Marine Resort
- Aquamarina ports (4)
- Jounieh ports & marinas
- Zouk power station
- Nahr El Kalb river entrance & Marina
- Dbayeh fishing club
- La Marina Dbayeh
- Dawra Marina



2.1.3 Sensitive resources in Lebanon

For a summary of key physical, biological and socio-economic sensitivity, refer to:

ⓘ *Section "5 - DESCRIPTION OF THE SURROUNDING ENVIRONMENT" Total Exploration and Production Liban Sal, Block 4 (Lebanon) offshore exploration drilling Environmental impact assessment, 80754, June 2019*

2.1.4 Coastal communities, from Beirut port to North border

Lebanese coast is very populated, with coastal communities living close to the shore (and often few meters from the sea). Tourist resorts, restaurants, public and private beaches are also very frequent along the shore.

Frequentation and activities would all be affected by a spill, even limited groundings of residual hydrocarbons from MGO or condensate spill.

/!\ Protection of coastal communities is not realistic. In case of oil groundings:

- Coastal communities are informed by the Authorities (TV, radio, internet, social networks etc. and information signposts on the shore) and provided information on "Do/ Don't do" and who to report to.
- Access to oiled shorelines should be restricted.
- High frequentation beaches and resorts will be closed and considered as clean-up priorities.

TEP Liban will provide all needed information on the characteristics of the product spilt, and recommended health & safety measures.

2.2 Confirmation of sensitive sites, resources and areas at risk

IMT/ Planning:

- Defines the overall coastal area exposed to oil groundings;
- Identifies the sensitive sites, areas or resources within the coastal area at risk;
- Identifies the sensitive sites, areas or resources that can be protected successfully.

▶ Definition of the overall coastal area exposed to oil groundings

Slick monitoring and drift predictions are used to define the coastal area at risk.

Caution is necessary:

- Extent of coastline at risk is always "prudently over-estimated", due to the drift uncertainty. The further at sea the slick, the bigger the uncertainty, the larger the coastal area to consider.
- Modelling results do not account well for nearshore/ tidal currents and local winds, as well as coastal eddies that can move slicks from North to South (against the general current);
- Tidal currents are non-significant offshore; but increase nearshore (even if they remain weak in Lebanon).
- Slicks usually do not enter rivers, due to outgoing currents, particularly during rainy seasons. However, combination of weak currents (summer season), rising tide, counter currents and offshore winds may force some oil into the rivers.

▶ Identification of the sensitive sites, areas or resources within the coastal area at risk

Sensitive sites and resources in the area at risk are identified using the sensitivity maps.

🗎 *Operational Support n°10 "COASTAL SENSITIVITY ATLAS".*

Sensitivity may vary seasonally mainly for biological and socio-economic resources (e.g. migration of birds and marine mammals, seasonal activities such as tourism).

Satellite imagery can be used to re-assess the morphology of the sites, e.g.:

ⓘ https://www.bing.com/maps/ (Microsoft) – high-resolution coverage of all Lebanese shore;

ⓘ https://www.google.com/maps (or Google Earth) – high-resolution coverage of all Lebanese shore;

/!\ However, satellite imagery is always outdated. For "natural" sites with changing morphology (e.g. river mouth), the survey will confirm its current state, sensitivity and need for protection. Built sites may also be more or differently developed.

▶ **Identification of the sensitive sites, areas or resources that can be protected successfully**

IMT/ Planning confirms the sensitive sites to protect with reasonable chances of success.

Other sensitive areas or resources that cannot be protected by floating booms but may be protected by other techniques (e.g. remove all fishing boats and gear from the sea) are identified.

Authorities may have specific requests.

Other sites that cannot be protected are listed as "clean-up priorities".

2.3 Priority protection choice and approbation of Authorities

In the event of a major spill, the amount of protection equipment (e.g. floating boom and ancillaries), of competent teams and logistical support may initially be limited compared to the number of sites to protect.

Protection high priorities (sites to protect first) are selected based on:

- Features and sensitivity of site (ecological and/or socio-economical) and level of sensitivity;
- Seasonal effects;
- Type & amount of immediately available resources vs. Type & amount of equipment required;
- Chances of success of each operation, according to the local conditions (currents, wave exposure etc.);
- Ease of clean-up of the site if not protectable (&/ or self-cleaning capability).

Protection priorities are approved by the authorities.

2.4 Dimensioning & sourcing equipment and personnel for protection operations

National authorities have some protection equipment, some ports and private companies also.

🗎 *TEP Liban OSCP Operational Support n°11: "INVENTORY OF OIL SPILL RESPONSE RESOURCES"*

The Lebanese Armed Forces and Civil defence hold the main stockpile of equipment.

2.5 Site visits prior to protection operations

Site visits are necessary to:

- understand the site morphology, dynamics (currents), to re-assess challenges and constraints at the time of the incident for the protection operations.

- allow collecting all relevant information to prepare the protection operation – see below.

IMT/ Planning defines the site visit program.

IMT/ Operations/ Shoreline coordinates site visits and transport etc.

IMT/ Logistics provides all needed support.

After the visit, the team reviews the equipment and ancillaries needed and defines the deployment procedure.

/! When preparing protection operation, oil recovery, storage on site and evacuation are always anticipated.

2.5.1 Preparation of site visit: team & equipment

The site visit team should include (indicative):

- 1 Security officer;
- 1 Community Liaison Officer;
- 1 Oil spill response specialist, preferably the one in charge of protection once approved;
- 1 Environmentalist (for sensitive areas);
- 1 TEP Liban representative (if not included in the above);
- One representative of the authorities (if possible).

Transport will be by land for most sites (small vessels may be required for some sites, usually available from close marinas or fishing ports).

Material take-off list for site visit should include (indicative):

- **Means of communication:** GSM/ mobile phone, VHF (to communicate on site), and Satellite Phone;
- **Documents:**
  - Topographic maps, electronic maps,
  - Location, description of site and nature of sensitivity, sensitivity maps, copy of relevant OSCP sections;
  - Contacts on &/ or close to site (local communities, authorities, landowner, private stakeholders etc.);
  - Anticipated types of protection operations to review on site;
  - Weather forecast, tide timetables, etc.;
- **Tools**:
  - Camera, GPS, laser telemeter, measuring tape (10m);
  - Note pad, survey forms;
- **Standard PPE** and, for any rocky platforms, river or marshes: waterproof boots, waders, life vests.
- **If risk of oil already on site**:
  - Oil resistant PPE: plastic boots, over-boots, nitrile gloves, disposable overalls, etc.;
  - Sampling kits;
- **Safety & security procedures**.

2.5.2 Carrying out site visit

Table below presents the information to collect during the site visit to prepare protection operations. Table focuses on protection of river mouths, inlets or port/marina entrances.

/!\ In all cases, contacts and discussions with local communities and fishermen are essential to gain knowledge of sites, dynamics and dangers.

GENERAL MORPHOLOGIC INFORMATION	• General morphology: site size and configuration (ex : river/port entrance width). Natural/man-made? Stable/Varying? • Sediment accumulation characteristics: particle size, slope, width? • Sensitivity: population in close vicinity? Environmental? Socio-economic? Activities to consider (e.g.: marine traffic, fish farms)?
GENERAL DYNAMIC INFORMATION	• Wind: direction? Speed? Day/ Night variations? • Average and maximum currents: coastal? Tides? • Waves: exposed/sheltered? Wave height? • Shoreline drift: depending on the season?
SITE & TIDE SPECIFIC INFORMATION *Note. tidal range in Lebanon: 0.4m max*.	• Marking of low & high tide levels (= maximum upper shore extension of boom) • Sedimentary nature of shore and foreshore (if possible). • Identification of anchoring points of boom. • Assessment of slope and width of shore (area between low and high tide levels = evaluation of length of shore sealing boom needed); • Identification of obstacles & hazards: isolated rocks, concrete blocks, steep slope, quick sands, wildlife, strong currents or waves etc. • Identification of suitable area to prepare and launch equipment etc. • Identification of suitable area to access site and stage equipment (out of reach of the sea and waves).
PROTECTION	• Feasibility of boom deployment; • Boom deployment configuration; • Boom type recommended (foam filled/ inflatable/ shore sealing) & height required; • Boom angle compared to current + position + length + anchoring; • Location of oil recovery equipment (skimmer), oil storage on site, and evacuation process of recovered oil etc. See next section for the process to define a boom deployment plan.
HEALTH, SAFETY AND SECURITY	• Natural hazards: fauna, waves/currents, unstable cliffs, others? • Operational hazards: transfer, deployment and use of equipment? • Other possible hazards? • Security threats ?
OPERATIONAL AND LOGISTICS CHARACTERISTICS For protection and oil recovery and site clean-up	• Phone network: available? Quality: GSM/ GPRS/ Edge/ 3G? • Terrestrial &/or marine access to the site? Land- or maritime-based deployment? • Boom & vessel launching area. • Traffic and circulations on and around the site. • Nearby activities? Nearby communities, villages, urban areas? • Consumables and equipment staging and preparation areas. • Temporary waste storage area on the site and evacuation (land/ sea?).

Note. Survey team will fill the Shoreline Oiling Survey form (SOS), even if there is no oil on the shore, to provide a baseline survey in case of a later pollution.

See:

Operational Support n°9: "SHORELINE CLEANUP & ASSESSMENT TECHNIQUE (SCAT)"

2.6 Development of site protection boom deployment plans

Following figure summarizes the key points to confirm during the site visit and process to prepare protective boom deployment (in river mouth, port entrances or any other water entrance).

Items are detailed next page.

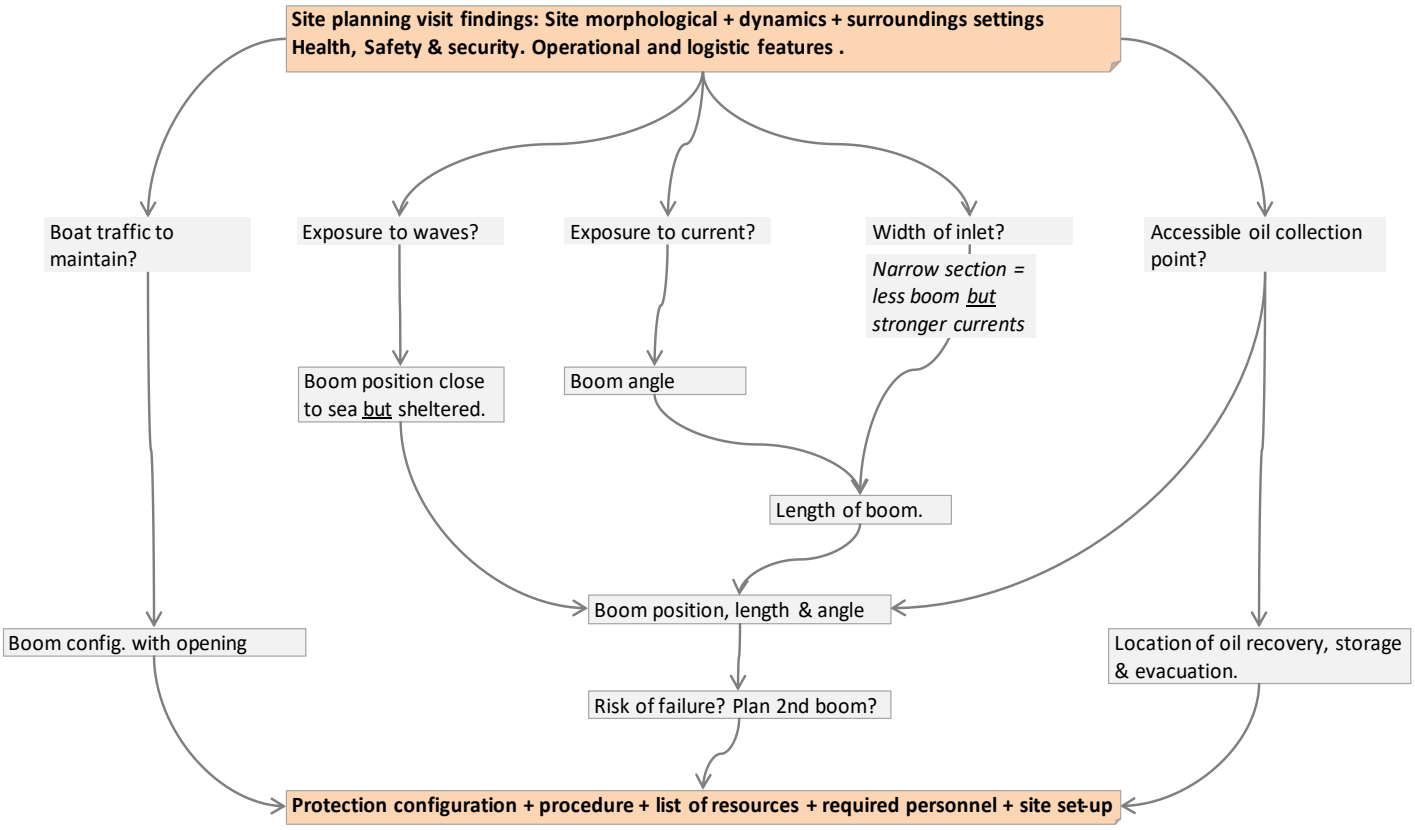


Figure 2 : Development process of site-specific protective boom deployment

Protection techniques, boom launching guidelines, technical instructions and information are proposed in:

Operational Support n°8, Appendices

Elements to consider include:

- **Boom configuration**. Booms must remain in place for several days or more. They can be deployed in several sections, in a cascade or chevron pattern to allow boat traffic. In strong currents, deployment in several sections allows for better anchorage, limits the efforts on one section and facilitates boom orientation with an angle to the current.
- **Boom location**. Boom must be deployed to protect the site and to contain and recover oil.
- **Boom position**. Boom is deployed close to the entrance of waterways (to protect upstream areas) but protected from offshore waves and preferably not in the narrowest part of the entrance (where currents are stronger).
- **Boom type**. Cylindrical inflatable booms are preferably used, as they withstand better the current and follow wave movement. Foam filled booms are used in sheltered areas with very weak currents (less than 0.2 – 0.4 kts) and port areas where punctures are frequent. Shore-sealing booms are used on beaches to seal the area between high and low tide.
- **Boom height**. Boom height depends on wave exposure. Indicative guidelines:
  - very sheltered (<0.5 m),
  - harbour (0.5 to 0.9 m),
  - semi-sheltered coastal area (0.9 m),
  - offshore (>1,3 m).
- **Boom angle and length.** Waterway width and angle required is considered, depending on the strongest currents (even if appearing weak).
- **Boom anchorage.** Applied forces on the boom (or on each anchored section) by the current and the wind is evaluated (by calculation). Anchorage is dimensioned accordingly, also considering the type of substrate (rock, sand, mud…).

IMT/ Planning consolidates the site-specific protection tactics (boom deployment or other) based on proposed site protection plans and visit of the sites in liaison with IMT/ Operation.

IMT/ Operations/ Shoreline branch prepares the personnel, type and amount of protection equipment and logistical support to implement the proposed protection plan.

IMT/ Planning consolidates the protection plan for each site including:

Site	• Name, location, short description
Health & Safety	• Risks related to the site &/ or operations? Mitigating measures? • MedEvac arrangements?
Illustration(s) of deployed boom(s)	• With oil skimmer/ recovery, currents, winds, day/night etc.
List of allocated resources	• Type and quantity and all ancillaries (anchorage etc.)
List of support resources	• Land transport? • Boats? Technical specs and horsepower for each boat, according to length and height of boom, current, environmental conditions etc.
Procedure	• Defined for each phase of deployment and anchoring
Transport of equipment & personnel	• Quantity? Volume? Weight? Packaging?

	• Pick-up truck? Truck? Trailer or lorry? • Boats? • Helicopter?
Access to the site, staging area, equipment preparation and deployment	• Quantity? Volume? Weight? Packaging? • Pick-up? Truck? Trailer or lorry? Boats?
Team and personnel to mobilize, defined according to	• Operations complexity and dimensions/quantity of equipment, • Required skills: operators, mechanic, safety, 1st aid, security etc. • Potential support of local communities?
Contacts on site	• If any, or closest communities.
Surveillance	• Frequency: daily? More? • Personnel & support needed?

3. PROTECTION – IMPLEMENTING OPERATIONS

IMT provides security, safety and operational clearance before any operations or visit.

See Operational Support n°8 "SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION".

3.1 Mobilization, transfer, deployment & follow up

The transfer of all equipment on site is done after notification and approval of authorities. If needed, police/law enforcement representatives facilitate the transport and secure the site.

Implementation of protection operations starts after approval of the IMT and of local authorities.

The operations are followed by the IMT on a daily regular.

The IMT establishes the daily follow up procedure for the deployed boom and appoints the team in charge of the daily visits.

3.2 Demobilization of protection resources

After approval of the authorities, and on a site-by-site basis, the IMT instructs to demobilize the protection.

4. SURVEY OF OILED SHORELINE

IMT provides security, safety and operational clearance before any operations or visit.

Shoreline surveys are systematically carried out, before each intervention phase and repeated (every 2-3 days or weekly depending on the situation and its evolution) as long as necessary (depending on the duration of operations and risk of oil stranding).

Surveys are always terrestrial. They can also be aerial (initial large coverage) and/ or completed by maritime surveys.

Crude oil is easy to identify on the shore (usually black, viscous and sticky). However, MGO or condensate is more difficult to identify (fluid and transparent).

Different types of surveys are carried out depending on the incident:

- Survey of oiled shoreline – systematic.
- Survey of shallow seabed, in front of beaches and other shores, to assess the presence of sunken oil (heavier than water when mixed with sediments) – Highly unlikely with light/ refined products.
- Sediment quality in case of oil dispersion in the water column or sinking (mixed with sediment).
- Seawater quality, especially in areas where quality of water is critical: nautical activities, water intake, fishing, etc.

4.1 Baseline maps for shoreline survey

Surveys are conducted using topographic maps, and the sensitivity maps with the ESI shore segmentation, as reference location.

See Operational Support n°10 COASTAL SENSITIVITY & RESPONSE ATLAS.

4.2 SCAT method & tools

Shoreline Clean-Up Assessment Technique (SCAT) is used to describe and evaluate oil on the shore, propose clean-up techniques, follow the operations, and documents their closure.

SCAT is based on the following principles:

- Systematic assessment of the coastline in the threatened area;
- Division of the coast into referenced segments (divided at each change of ESI nature, and of a length generally less than 2 km);
- Use of standardized terms to describe stranded oil (to limit the subjectivity of field observations and to homogenize reports);
- Availability of competent staff (assistance and contractors), with representatives of local and national authorities (if possible) and land managers or owners as required.

Use of SCAT is recommended in the NOSCP (Vol D, Rev 0, 2017):

"*Guiding principles for shoreline clean up: (…) Adopting a standardized protocol for reporting shoreline oiling (Shoreline Clean-up Assessment Technique—SCAT)*".

Key SCAT steps and corresponding forms are:

STEPS	FORM	FORM TITLE
Description of the extent and type of oil on the shore. Summary of results in database and GIS to produce “Shore oiling conditions maps”.	**SOS**	**Shoreline Oiling Survey**
Recommendation of clean-up techniques for Phases 1 and 2.	**STR**	**Shoreline Treatment Recommendations**
Shoreline inspection reports and closure of clean-up operations for each working site after Phases 1 and 2	**SIR**	**Shoreline Inspection Report** (with signed copies provided to the authorities)

See Operational Support n°9 for SCAT forms, most recent versions (2017) from NOAA.

See section « Calculating Degree of Oiling » p.53 à 54, in NOAA. (2013). Shoreline Assessment Manual. 4th Edition. U.S. Dept. of Commerce. Seattle, WA: Emergency Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 73 pp + appendices.

4.3 Program and personnel for oiled shoreline survey

IMT/ Planning defines the SCAT program, manages all SCAT forms & data and mobilizes competent staff.

IMT/ Operation coordinates the SCAT activities on the field in liaison with the Local IC’s (if they are already mobilized on site) and with the local authorities.

Shoreline survey operations are discussed for phases 1 & 2 in:

“Phase 1 Overall survey of oiled coast & identification of large oiled areas”, p.33

“Phase 2 Overall survey of coast & identification of sites to clean”, p.35

5. SHORELINE CLEAN-UP – PLANNING OPERATIONS & FOLLOW-UP

IMT provides security, safety and operational clearance before any operations or visit.

See Operational Support n°8 "SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION".

This section presents methods to plan and implement shoreline clean-up intervention.

According to modelling studies, oil groundings may be possible after 4 days (shortest usual time). The major scenarios "Blow-out" and "6,000 m3 MGO spill" result in oiling of **+/- 10 km of coast** (deterministic results).

Guidelines are provided to adapt to the volume and level of weathering of residual hydrocarbons grounding.

Proposed guidelines are in line with the ones advocated by the NOSCP Rev 0, 2017 (Section 4.7 "Shoreline Clean-up" of Vol D).

/!\ LPA is notified and local authorities informed before any operation, upon their discretion. Lebanese authorities could supervise or directly manage the operations, while TEP Liban executes the clean-up work with contractors.

/!\ Prior to start, all **shoreline operations must be approved by LPA in conjunction with any relevant local authorities** should they interfere with local usage, activities and communities.

/!\ External expertise will be mobilised as soon as possible when the risk of potential shoreline oiling has been identified to plan and supervise shoreline response.

Clean-up operations usually involve 3 to 4 phases:

- Survey (repeated before Phases 1, 2 and 3).
- Phase 1. Recovery of gross/ floating accumulation of oil – when needed.
- Phase 2. Clean-up of remaining oil stranded on the shore, only after phase 1 is completed.
- Optional Phase 3 is a high-level clean-up (e.g. for aesthetic reasons).

In the present case, with non-persistent oil spilled, Phase 1 intervention may probably not be required.

Following figure illustrates the key management steps for shoreline intervention.

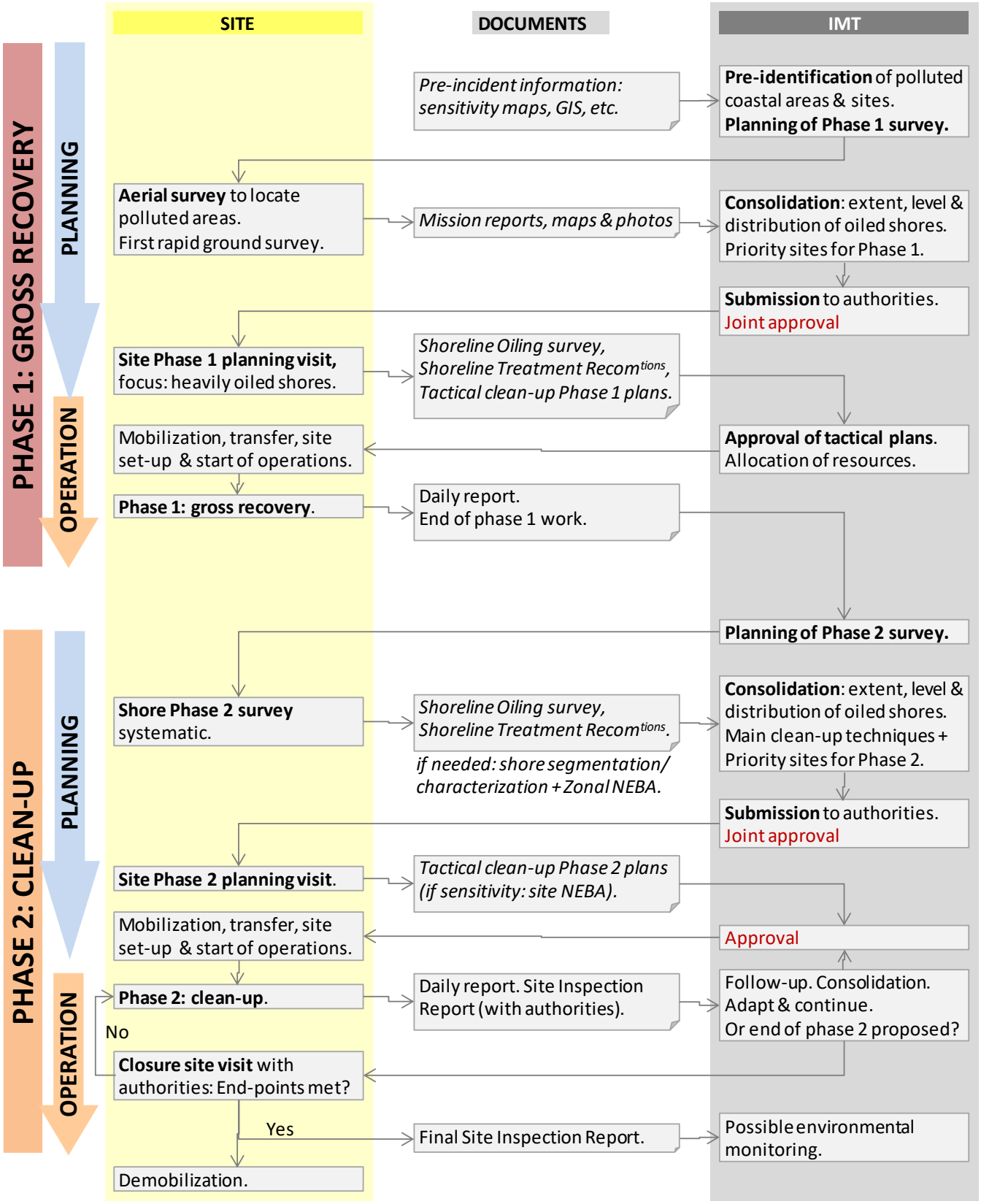


Figure 3: key steps for developing and implementing shore clean-up action plans

5.1 Identification of impacts, objectives & clean-up priorities

Objectives (examples) to adapt to each incident (according to the observed and possible impacts) are:

- Ensure the health and safety of responders and local communities.
- Avoid damage to the environment, sensitive sites/ resources and coastal activities and human-use.
- Limit the duration and effects of the spill on the environment, activities and human-use, through an appropriate clean-up effort.
- Limit the impact on TEP Liban reputation, through an effective response and appropriate communication.
- Manage the responsibilities of TEP Liban (compensation, penalties, insurance, etc.).

Priority areas for the clean-up are decided on a case-by-case basis in liaison with the authorities, balancing the level of oiling, environmental and socio-economic priorities, seasonal effects and capacity of each type area to naturally clean-up. Available personnel and resources as well as logistical constraints (particularly difficulty to access the sites) will also guide the priorities.

5.2 Choice of response techniques & layout of worksites

Clean-up techniques depend mainly on the type of shore and type of oil.

/!\ It is impossible to anticipate the volume, nature and weathering of hydrocarbons arriving at one location, as well as the MetOcean conditions. Accordingly, clean-up techniques and level of clean-up for a given location and incident cannot be anticipated.

However, recommendations can be provided depending on the type of shore, phase of intervention (1 & 2) and type of oil (light vs. heavy).

Lebanese ESI Shoreline types are grouped into 3 main types of shore with **Synoptic guidelines** (recommending clean-up techniques for phases 1 & 2 from Cedre) and into four **Worksite layouts** (layouts of shore clean-up sites with recommended techniques for phases 1 & 2, OTRA):

ESI	**ESI shoreline types in Lebanon** (ESI maps)	Worksite layouts	**Synoptic guidelines** (Cedre)
1A	**Exposed rocky shores / cliffs**	**Rocky shores & platforms**	Rocks & infrastructures
1C	**Exposed rocky cliffs with boulder talus base**		
2A	**Exposed wave-cut platforms in bedrock**		
8A	**Sheltered scarps in bedrock, mud, or clay**		
1B	**Exposed, solid man-made structures**	**Quayside & rip-raps**	
6B	**Exposed riprap**		
8B	**Sheltered, solid man-made structures**		
8C	**Sheltered riprap**		
3A	**Fine- to medium-grained sand beaches**	**Sandy beaches**	Sand
4	**Coarse-grained sand beaches**		
5	**Mixed sand and gravel beaches**		
6A	**Gravel beaches (granules and pebbles)**	**Pebble beaches**	Pebbles & cobbles

Note. Marshes and tidal flats are only present in very little areas, and not considered at risk.

See Lebanese **ESI Shoreline types** in

"Operational Support n°10: "COASTAL SENSITIVITY ATLAS"

See **Synoptic guidelines** (Cedre) in:

"Shore clean-up synoptic guidelines, p.67

See **Worksite layouts** in:

Operational Support n°8, Appendices: "Shore clean-up worksite layouts & equipment".

Note. Clean-up techniques are summarized per phase & shore types (according to Synoptic Guidelines) in:

"Phases 1 & 2 recommended shore clean-up techniques per types of shore", p.81

Note. Shoreline clean-up techniques (Cedre) are detailed in specific datasheets:

Operational Support n°8, Appendices.

5.3 Stakeholder mapping & incident management organization

Numerous stakeholders are involved during shoreline interventions and may interact with TEP Liban. It is essential to carry out a complete mapping of the TEP Liban incident management organization, with all external stakeholders involved in the coordination, supervision and management of operations and their interfaces with TEP Liban at all levels (field, province, IMT and CMC).

5.4 Dimensioning & sourcing resources for clean-up

TEP Liban can have access to shoreline resources:

- Tier 2 with:
  - Stockpile of equipment from authorities (Lebanese Armed Forces and civil defence)
  - local support companies, etc.
- Tier 3 through access to:
  - OSRL (closest base in Southampton),
  - Other international equipment and service providers.

/! There are no standards detailing the type and amount of equipment, personnel, support etc. required for shoreline clean-up. This is defined for each worksite on a case-by-case basis, depending on the incident, area to clean, level of oiling and clean-up technique(s) to use.

Indicative lists (to adapt) are proposed in the Appendices of the Operational Support n°8:

"Indicative equipment list for Phase 1 on beaches (& rocky platform)"

"Indicative equipment list for Phases 1 & 2 in port & rocky areas"

5.5 Phase 1 Gross recovery of large oil accumulations

The coastal sites with the larger oil accumulations to recover in priority are identified. Phase 1 applies for significant spills with large accumulation of free-floating oil close to/ onto the shore.

/!\ Time is critical.

For limited oiling (stranded oil onto the shore), Phase 1 is un-necessary. Refer directly to Phase 2.

5.5.1 Phase 1 Overall survey of oiled coast & identification of large oiled areas

Rapid survey of the entire coast at risk is carried out to **1) locate oiled areas and 2) identify areas with large oil accumulations**; requiring phase 1 priority intervention.

For large spills, and difficult access areas, aerial surveys provide a global vision; and allow recognizing areas inaccessible by land (small/ difficult access beaches, cliffs, etc.).

/!\ Light weathered hydrocarbons will be difficult to spot close to/ on the shore, particularly in small rocky bay, inside rip-raps etc.

The extent of the oiled or potentially oiled coast is estimated.

Terrestrial (and maritime) surveys are organized to confirm the aerial observations and locate oil un-identified during the aerial survey.

SURVEY	AERIAL	TERRESTRIAL	MARITIME
ROCKY SHORE	**Yes** (overall)	**Yes**	*If needed*
QUAYSIDES & RIP-RAPS	*If needed*	**Yes**	**Yes** (external quaysides & rip-raps)
SANDY BEACHES **PEBBLE BEACHES**	*If needed*	**Yes**	No

IMT/ Planning consolidates the results:

- Location of oil accumulations on the shore;
- Dimension and extent of oiling:
  - Extent of oiled areas;
  - Type of deposits (massive/ diffuse, continuous/ scattered slicks, surface/ buried oil, etc.);
  - Presence of solid waste (oiled or not);
- Characteristics of pollutant:
  - Type of hydrocarbons and weathering;
  - Estimated volumes to recover.

IMT/ Planning proposes the priority sites, to visit as soon as possible to prepare the phase 1 intervention.

5.5.2 Phase 1 Priority intervention sites & authorities' approval

Based on the first survey, priority sites for Phase 1 operations are identified, e.g. sites:

- With large oil accumulations which could be re-mobilized by the sea and affect close sensitive sites;

- With environmental/ socio-economic issues;
- Where oil recovery/ pumping operations are feasible with a reasonable chance of success;
- Where safe access and intervention is possible;
- Where available equipment and staff will be the most effective.

Examples of clean-up priority sites are marinas/ port areas, tourist beaches etc.

Priority sites are approved by the authorities.

5.5.3 Phase 1 Choice of clean-up techniques & worksites layout

For each priority site, tactics to recover oil, store and evacuate oil are defined, based on the survey results.

▶ Confirm the type and level of oiling for each location and need for Phase 1 intervention.

▶ Confirm the shoreline type and logistical constraints (access and work).

▶ Choose adequate clean-up technique(s) for the type of shore and Phase 1 from the **Shore clean-up synoptic guidelines** (Cedre):

🗎 *"Shore clean-up synoptic guidelines, p.67*

And consider possible adaptations of **techniques to light oil**:

🗎 "*Shore clean-up - Choice matrix (Cedre, 2004)*", p.81.

▶ Outline the **worksite layout** depending for the type of shore for Phase 1 and define the needed resources.

See examples in:

🗎 *Operational Support n°8, Appendices: "Shore clean-up worksite layouts & equipment".*

Worksite layouts are developed for the main types of shores considering logistical constraints: access of equipment and personnel on site (by land, sea or air), clean-up support and evacuation of waste, and working mode (terrestrial or maritime).

5.5.4 Phase 1 Site visit to prepare the intervention

Once priority sites are approved and work planned, preparation visits are timely carried out to:

- Confirm the access routes (land/ sea/ air) and Job Risk assessment;
- Confirm the adequate personnel, equipment, consumables, logistical support etc. needed to recover oil.

Preparation visits are carried with oil spill response specialists (managing the intervention), representatives of TEP Liban and authorities (as for protection preparation) as well as the Local IC of the area (or a delegate).

🗎 See "*Site visits prior to protection operations*", p.20.

5.5.5 Phase 1 Development & validation of intervention plans

Intervention sites are precisely located by the IMT/Planning section.

Local Incident Command Posts are not always set-up for Phase 1, as time is critical.

IMT/ Operations (with assistance of Planning) in the Intervention plan:

- Confirms the intervention techniques, defines a general layout of the site.
- Confirms the type and quantity of resources to mobilize, needed logistical support for operations and waste storage;
- Confirms for each site the work/ support/ access modes (terrestrial, maritime or aerial).

Once Intervention plan is approved by the IC and authorities, IMT/ Operations:

- Mobilizes resources (with IMT/ Logistics);
- Implements and coordinates the operations with the local IC on site.

Note. Above work is usually carried out by a specialized contractor and approved by the IMT.

5.5.6 Phase 1 Work follow-up & assessment of need for Phase 2 clean-up

A daily report from each site is sent to the IMT and consolidated. Governor and national authorities are kept informed of the progress of the operations.

The completion of Phase 1 for each site is proposed by the team or Local IC; then validated by an IMT representative and the authorities after a site visit.

The validation of end of clean-up work for phase 1 is documented by a "Shoreline Inspection Report - SIR", signed by TEP Liban and the authorities. Need for phase 2 clean-up is documented in the SIR form. See:

Operational Support n°9 "USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT".

5.6 Phase 2 Clean-up of remaining/ stranded oil on the shore

Phase 2 clean-up plans are developed with a different approach compared to Phase 1:

- Phase 1: Significant floating oil which can drift and pollute other sites ➔ Need rapid intervention.
- Phase 2: Stranded oil with low risk of remobilization ➔ Need to define clean-up method and level adapted to the site, to avoid creating further damage to the environment with an inadequate clean-up.

5.6.1 Phase 2 Overall survey of coast & identification of sites to clean

Objective is to survey all the shore in the area potentially oiled to:

- Locate all sites with remaining oil;
- Locate all sites possibly requiring Phase 2 clean-up, and define for each:
  - level and type of oiling;
  - local environmental, economic and social sensitivities;
  - exact area to clean;
  - appropriate clean-up techniques & end-points.
- Confirm all other shores are free of oil and/ or require no clean-up if natural clean-up is a better option.

While Phase 1 survey focuses directly on areas with large oil accumulations, all shores are surveyed for Phase 2 to confirm sites to clean, and areas free of oil.

Overall area to survey may be extensive and is delimitated according to results of:

- aerial surveillance at sea;
- satellite RADAR imagery if available;

- phase 1 intervention report;
- other surveys – if available.

The survey is planned by segments of shores, based on the shore segmentation of the ESI maps.

Phase 2 survey requires specific environmental advice for sensitive sites or fauna and flora species etc. and oil spill clean-up specialists. Representatives of TEP Liban and authorities must also participate.

Surveys are organized by the IMT similarly as for protection operations and coordinated locally by the Local IC, when present.

See "*Site visits prior to protection* operations", p.20.

Survey teams provide results to the IMT/ Planning:

- "Shoreline Oil Summary" (SOS);
- "Shoreline Treatment Recommendations" (STR) proposing the best oil recovery technique and required personnel, equipment and logistical support;
- GPS tracklogs & waypoints, photos, notes etc.

See Operational Support n°9 for SCAT forms.

IMT/ Planning consolidates the results of the survey and recommendations for clean-up and integrated into the database and GIS.

5.6.2 Phase 2 Priority clean-up sites, techniques, end-points & authorities' approval

For all sites

Sites to clean-up in priority are chosen with a similar approach as for phase 1 intervention.

Priorities are approved by the local (governor) and national authorities.

For each site

Site to clean is delineated precisely, with the starting point, and progress direction of the work.

Clean-up technique, key equipment required, work modes (terrestrial, maritime or aerial), waste management procedure are confirmed.

The level of cleaning is confirmed for each site e.g. the end-points:

- 1: No intervention (or Natural Monitored Restoration);
- 2: Minimum cleaning;
- 3: "Standard" cleaning;
- 4: Cleaning to return to original condition;
- 5: Thorough cleaning (which will require phase 3, fine cleaning).

Whenever possible, a quantifiable level is agreed with the authorities before starting operations.

A first version of Phase 2 Clean-up Plan is submitted to the IC, then to the authorities, with a summary of above information. The approved version is the reference for the evaluation of the clean-up results at the end of phase 2 operations.

5.6.3 Phase 2 Choice of clean-up technique & worksites layouts

Similar approach as for Phase 1 intervention is used:

"*Phase 1 Choice of clean-up techniques & worksites layout*", p.34.

5.6.4 Phase 2 Site visit to prepare clean-up

Once phase 2 clean-up plan is approved, preparation visits are organized on each site with the objectives to:

- Confirm the access routes (land/ sea/ air);
- Define precisely the extent of the area to clean, starting point of the work, direction of progress and the general set-up of the work site, and the waste storage on site;
- Identify all constraints and risks (Job Risk assessment), and provide security measures as needed;
- Confirm the needed personnel, equipment, consumables, logistical support etc.

Teams include environmentalist and oil spill response specialists (in charge of the clean-up operations), and representatives of TEP Liban and national authorities as well as the Local IC of the area (or a delegate).

Preparation visits are prepared and conducted similarly as for protection operations.

"*Site visits prior to protection operations*", p.20.

5.6.5 Phase 2 Development & validation of clean-up plans

IMT/ Planning, for each site:

- Summarizes the technical recommendations (clean-up technique, equipment, end-points, waste management etc.);
- Evaluates possible negative effects of the chosen clean-up techniques;
- Considers alternative techniques in case of fluid or viscous oil and/ or specific environmental conditions.

Above work may be carried out by the specialized contractor and approved by the IMT.

IMT/ Planning consolidates the clean-up plans per site, to be validated by TEP Liban.

Work is implemented by specialized contractors, coordinated by TEP Liban and supervised by the authorities.

5.6.6 Phase 2 Work follow-up & site closing proposal

IMT consolidates the daily activity reports of Phase 2 operations.

When the level of clean-up achieved is in line with the end-points defined, IMT/ Planning proposes to the IC to end operations, and organize the site closure visit with the authorities.

The quantities of equipment and especially consumables (absorbents, combinations, etc.) used by private companies is followed precisely by TEP Liban supervisors.

If the end of operation is approved, the validation of the end of phase 2 clean-up is documented by a "Shoreline Inspection Report", signed by the authorities, contracted clean-up companies and TEP Liban.

In some cases, phase 3 clean-up or "polishing" (marina, tourist beach) or a program to monitor the environmental and / or socio-economic impact may be required.

6. SHORELINE CLEAN-UP – COORDINATING OPERATIONS

IMT provides security, safety and operational clearance before any operations or visit.

6.1 Coordination and working with authorities

6.1.1 Liaison with national authorities

Liaison with the national authorities for shoreline clean-up is established as soon as oil groundings are possible, to prepare the surveys, protection of sites and clean-up operations.

Objectives are:

- Inform the Authorities and relevant Ministries, and obtain contacts of locals and provincial authorities;
- Inform local authorities of the risk of oil groundings and planned/ in place measures (or ensure they are informed);
- Ensure communities are informed;
- Facilitate the arrival of the teams in charge of survey, protection, then clean-up;
- Validate with the authorities the protection &/ or clean-up action plans;
- Define the location of the Local IC Post(s), staging area for equipment, intermediate waste storage etc.

6.1.2 Liaison with local authorities and communities

The national/ provincial authorities should inform officially local authorities and communities.

TEP Liban appoints:

- one (or more) Local Incident Commander(s) to manage the shoreline clean-up operations;
- one (or more) Community Liaison Officer (CLO's) to assist the Local IC(s) to maintain contact with the local communities.

TEP Liban informs and involves the local authorities at each stage: protection, survey, clean-up, final site etc.

6.2 Local IC Post, base camp and worksite set up – IMT

TEP Liban will implement an adequate organization in the affected coastal area to manage shoreline clean-up. Most personnel will be contracted: supervisors from specialized response companies, support personnel from logistical companies, security companies etc. and workers from local communities.

Details of the Local IC Post members and team to set-up, with corresponding job tickets, are in:

See TEP Liban OSCP Vol. 1.1 for the organization of teams on site and job tickets.

Provision of resources to each Local IC Post, base camp, staging area, cleaning site, temporary waste storage area etc. is managed by IMT/ Logistics.

Once delivered and received on site, resources are under the responsibility of the Local IC.

Implementation of the Local IC Posts, base camp, etc. is supervised by the Local IC.

6.3 Worksite and personnel coordination

Site supervisors report daily to the Local IC of the area, who reports in turn to the IMT/ Operation.

Site supervisors ensure that:

- All operators are informed of health and safety issues;
- Appropriate PPE are provided;
- Staff is organized in a manageable hierarchy (e.g. 1 supervisor - 10 team leaders - 100 workers);
- Rotations are set up for the most difficult tasks/ harsh environment;
- Liaison is maintained with the local communities.

6.4 Decontamination

Decontamination instructions are provided by IMT/ Planning; and enforcement supervised on site by the Safety Officer.

See Operational Support n°8 for detailed instructions.

6.5 Security

A Security Advisor always assists the IMT/ Operations/ Onshore branch to identify security risks, plan and implement onshore operations.

6.6 Demobilisation and closing worksite

The equipment is demobilized and the waste storage and equipment staging areas are cleaned.

The equipment is returned to the assistance or replaced.

If the clean-up extends in time, it may be more beneficial to purchase the equipment rather than rent it, as most companies charge a daily rental rate.

7. SUPPORT TO OPERATIONS

7.1 Employment of local personnel

TEP Liban may employ local populations for cleaning because e.g.:

- Fisheries may be suspended; and fishermen are without activity and income;
- Local people are familiar with the area to be cleaned etc.

To clean-up a specific area, TEP Liban will preferably employ local communities of that area; and will pay special attention to local context and sensitivities (political, religious, other).

TEP Liban would contract local companies to hire and manage workers from local communities for shoreline clean-up.

TEP Liban will ensure that workers have:

- Initial training on health and safety issues during clean-up operations;
- Daily briefing on the work to be performed;
- Adequate PPE for the performance of their duties, regularly replaced;
- Food and water, access to sanitary facilities, etc.;
- First-aid kits available on-site, presence of a first-aid responder on site and emergency medical evacuation procedure;
- Fair and reasonable wage paid regularly (weekly for example or daily if needed).

TEP Liban will also consider guidelines provided in the NOSCP Rev 0, 2017, section 12 “Management of volunteers” (in Vol D).

7.2 Logistics support and out-sourcing of resources

The assistance of competent personnel in the IMT and on the field is critical.

See Operational Support n°11 “INVENTORY OF OIL SPILL RESPONSE RESOURCES”.

See Operational Support n°12 “EMERGENCY DIRECTORY”.

Following resources can be mobilized:

Local service companies

- **Team Leader and Operators.** Specialized workers, local communities.
- **Logistic for the workers** (on site transport, water, food ...).
- **Accommodation** (hotels and others).
- **Waste evacuation** to intermediate storage sites, with appropriate trucks / boats.

Oil spill specialized companies (international)

- **Supervisors** for the clean-up teams.
- **Specific equipment:** skimmers, pumps, etc. (rental or acquisition).
- **Sorbent:** booms, sheets, pom-poms, specific geo-textile, nets, etc.

Consumables in country, external if necessary

- **PPE**: boots, disposable suits (e.g. TYVEK), PVC / nitrile gloves, under-gloves, etc.
- **Manual tools**, e.g. spades, rakes / forks, shovels, buckets, garbage cans (80-100 litres).
- **Waste storage**, e.g. thick plastic bags (100 litres), big bags (1 m3).
- **Protection** floor, access, waste storage: plastic cover / tarpaulin, lightweight geo-textile.
- **Decontamination kits** for operators, etc.

7.3 External assistance mobilisation

Procedures for the mobilization of external assistance and expertise are similar to offshore (and its later demobilization), and detailed in

See *Operational Support n°4 OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION.*

8. OIL SPILL WASTE MANAGEMENT

TEP Liban will consider guidelines provided in the NOSCP Rev 0, 2017, section 7 “Waste management” (in Vol D).

8.1 Lebanese framework for oil spill waste management

The key instruments related to oil spill waste management are outlined below (identified in 2007).

A) Decision number 1/191 dated from 8/10/1997, for cement industry and environmental pollution:

The main issues addressed are air pollution and emission of NOX, SOX, Co, and hydrocarbon. The contamination of water by various elements should be monitored:

- Polycyclic Aromatic Hydrocarbon,
- metals,
- organochloride,
- organophosphate.

The production process should be developed under adequate ventilation and suspended particles should be monitored. In this regulation there are no standard concentration values mentioned.

B) Law number 387, dated from 4/11/1994, concerning the implementation of Basel Convention for dangerous wastes:

This convention is related to the moving of dangerous wastes abroad. In this situation, the authorities should be consulted to assure the movement of theses wastes and to avoid any accident during transport. Any information should be written about the choice of treatment abroad and strategies employed to decrease Health Hazard. In this law no strict values are provided (see chapter 7).

C) Stockholm convention signed by Lebanon number 432 for organic pollution:

This convention intends to reduce the utilisation of chemical organic compounds having a negative impact on health. In this convention no strict values were mentioned.

D) Environmental decisions concerning atmospheric emissions dated from 1/03/2001:

This regulation classifies the pollutants depending on their nature into three groups:

- Group I: Cd, Hg, mass flux should not exceed 5 g/ h
- Group II: As, Co, Ni, se, Te, etc.
- Group III: Sb, Pb, CN, Mn, Pt, Rh.: mass flux should not exceed 50 g/ h.

Concerning waste landfill, no other regulation could be found.

E) Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal adopted on the 22nd March 1989, ratified by Lebanon in 1994

8.2 Oil spill waste management

Oil spill waste will be managed accordingly to applicable regulations in country, and in line with TEP Liban procedures.

Guidelines to minimize, sort and store waste on site are provided in:

Operational Support n°8, section "WASTE MINIMIZATION, SORTING AND STORAGE ON SITE".

Oil spill waste management is defined on a case-by-case basis depending on the type and amount of waste.

TEP Liban will also consider:

- the recommendations of the "MEDITERRANEAN OIL SPILL WASTE MANAGEMENT STUDY AND DECISION SUPPORT TOOL" (from REMPEC);
- the findings of the "Study for the management of oily wastes generated by the cleaning operations of the Lebanese coast following the oil spill of JIYEH"[5], which identified oil spill waste treatment streams in Lebanon.

8.3 Oil spill waste storage

Recovered oil offshore is offloaded at a suitable port facility.

Oil spill waste recovered onshore are stored in temporary waste storage sites, close to the clean-up sites.

See:

Operational Support n°8, section "WASTE MINIMIZATION, SORTING AND STORAGE ON SITE"

Oil spill waste can then be transferred to intermediate waste storage site, awaiting rapid transfer to the treatment facility, or in a long-term waste storage site if treatment facilities are not defined.

"Waste storage sites", p.87

8.4 Oil spill waste treatment & disposal facilities in Lebanon

The table below summarizes the possible and existing treatment facilities identified (or not) in Lebanon for oil spill waste, and the methods that could be implemented in Lebanon.

Treatment	Existing	Existing in Lebanon	Required external input
Settling / centrifugation / emulsion breaking	✗	No facilities identified.	Site, equipment and expertise.
Washing (solid waste)	✗	There are no existing washing facilities in Lebanon for the washing of oiled solid waste.	Site, equipment and expertise.
Washing of pebbles (using washing units or hot water/ high pressure for bigger pebbles)	✗/ ✓	There are no existing washing units or hot water and high pressure washing facilities in Lebanon for the washing of oiled pebbles.	Site to implement the operations. Expertise to setup the facility. Equipment could be found in Lebanon (concrete mixer, high pressure cleaner, sorbent, decanter, etc.)
Surf washing (sand and pebbles on site)	✓	Surf washing has already been used successfully (2006 oil spill, sand beaches of Beirut and south of Beirut).	Expertise to manage the operations. *Performed on site.* *Equipment consists in earth moving machines, booms and sorbent which can be acquired in Lebanon.*

[5] Study funded by the French Ministry of Finances and Industry, executed by Cedre and Antea, final report, Dec 2007, Report n° A 47825/A

Treatment	Existing	Existing in Lebanon	Required external input
Stabilisation using quicklime (semi-solid and oily sands)	✗/ ✓	There is no existing stabilisation site in Lebanon.	Site to implement the operations. Expertise to manage the operations. Quicklime is used to stabilize the waste. Available earth moving machines can be used to mix the waste and quicklime.
Bio-treatments (lightly polluted waste)	✗	There is no existing bio-treatment site in Lebanon.	Site to implement the operations. Expertise to manage the operations. *Equipment consists mainly in earth moving machines.*
Incineration in domestic incinerators	✗	There are no domestic incinerators in Lebanon.	Site, equipment and expertise.
Incineration in hazardous waste collection centre/ incinerator	✗	There are no hazardous waste collection centres / incinerators in Lebanon.	Site, equipment and expertise.
Incineration in cement works/ industrial furnace as Raw Alternative material	✓	The following cement works in Lebanon: Holcim, Sibline and Cimenterie Nationale could use oily waste as Alternative Fuel and Raw material.	None for the treatment. Expertise (and equipment) may be required for the pre-treatment of the waste to ensure a correct incineration.
Low Temperature Thermal Desorption	✓	There is one Low Temperature Thermal Desorption unit in Lebanon (Beirut).	Expertise, maintenance, manpower and energy.
Burning of lightly oiled vegetation	✓	Burning has already been performed for lightly oiled vegetation recovered on beaches (2006 oil spill).	None.

The table below summarizes the possible and existing final disposal or recycling facilities identified in Lebanon, and the methods that could be implemented in Lebanon.

Treatment	Existing	Existing in Lebanon	Required external input
Incineration in cement works/ industrial furnace as fuel source	✓	The following cement works exist in Lebanon: Holcim, Sibline and Cimenterie Nationale. Glass industry Soliver has also a furnace. Electric Power Plant EDL in Jyeh also has furnaces.	None for the treatment. Expertise (and equipment) may be required for the pre-treatment of the waste to ensure a correct incineration.
Return of clean sediment on site	✓	Clean sediments have already been returned on site during clean-up operations.	None.
Discharge in natural environment	✓	Water from clean-up operations has already been discharged in the environment during clean-up operations after decantation (2006 oil spill).	None.
Storage (controlled containment and/ or landfills)	✗/✓	The following landfills were identified: Naameh and Bsalim landfills serving Beirut and Mount Lebanon, and Zahle landfill located in the Bekaa valley.	Expertise for long term storage of waste. Equipment for storage (cells).
Re-use as road work material	✗	There is no example of re-use as road work material in Lebanon.	Road work site.
De-ballasting station	✗	There are no de-ballasting stations in Lebanon.	Site, equipment and expertise.
Evapo-incineration	✗	There are no existing evapo-incineration facilities in Lebanon.	Site, equipment and expertise.

9. OILED WILDLIFE MANAGEMENT

TEP Liban will consider guidelines provided in the NOSCP Rev 0, 2017, section 9 “Wildlife response” (in Vol D).

Principles for oiled wildlife management are provided in:

See TEP Liban OSCP Vol. 2.

Specialists will be mobilized to manage oiled wildlife if needed, with the support of specialized networks, e.g. SeaAlarm.

10. ENVIRONMENTAL IMPACT MONITORING

See:

Operational Support n°4, section "ENVIRONMENTAL IMPACT MONITORING"

11. APPENDICES

11.1 Environmental Sensitivity Index – ESI

The Environmental Sensitivity Index (ESI) is used to classify the coastlines types and their sensitivities from 1 - low sensitivity, to 10 - very sensitive, as follow.

ESI	Shoreline type	Oil persistence *
1A	Exposed rocky shores / cliffs	Few weeks
1B	Exposed, solid man-made structures	
1C	Exposed rocky cliffs with boulder talus base	
2A	Exposed wave-cut platforms in bedrock, mud, or clay	Few months
3A	Fine- to medium-grained sand beaches	1 - 2 years
4	Coarse-grained sand beaches	1 - 3 years
5	Mixed sand and gravel beaches	3 - 5 years
6A	Gravel beaches (granules and pebbles)	3 - 5 years
6B	Exposed riprap	
7	Exposed tidal flats	> 5 years
8A	Sheltered scarps in bedrock, mud, or clay	> 5 years
8B	Sheltered, solid man-made structures	
8C	Sheltered riprap	
9A	Sheltered tidal flats	> 5 years
10A	Salt- and brackish-water marshes	> 10 years

(*) Indicative duration without intervention.

Source: NOAA Technical Memorandum NOS OR&R 11. Environmental Sensitivity Index Guidelines, Version 3.0 - March 2002. Jill Petersen, Hazardous Materials Response Division, Office of Response and Restoration, NOAA Ocean Service, Seattle, Washington 98115 With Jacqueline Michel, Scott Zengel, Mark White, Chris Lord, Colin Plank, Research Planning, Inc. Columbia, South Carolina 29202

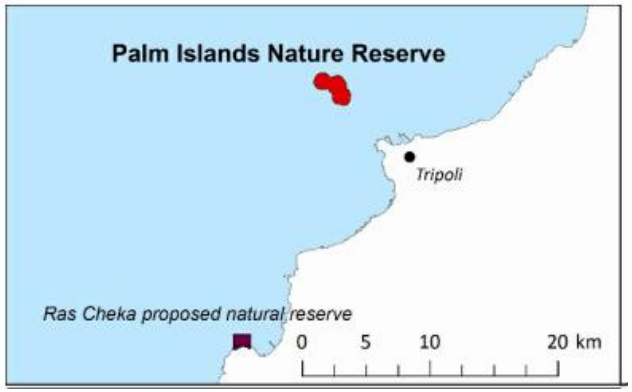
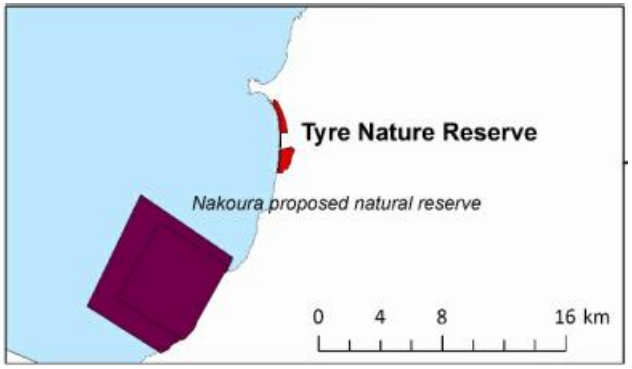
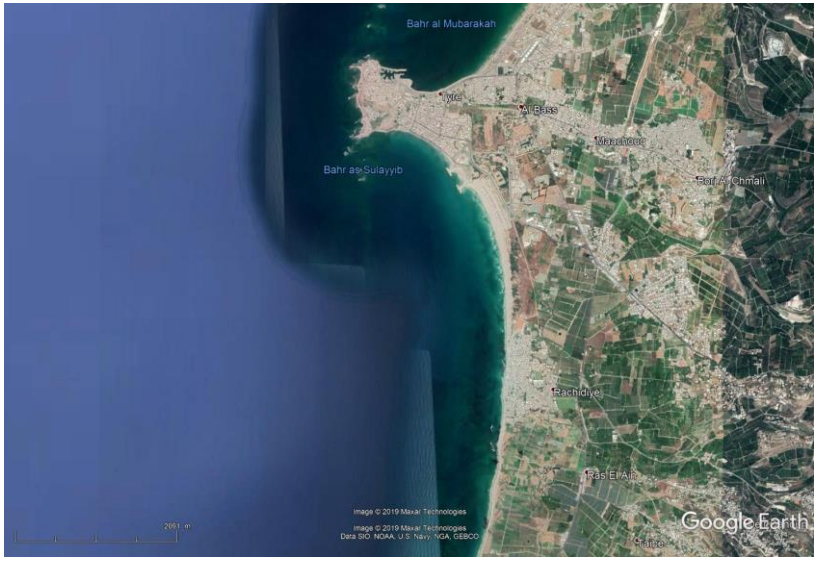
11.2 Sensitive sites

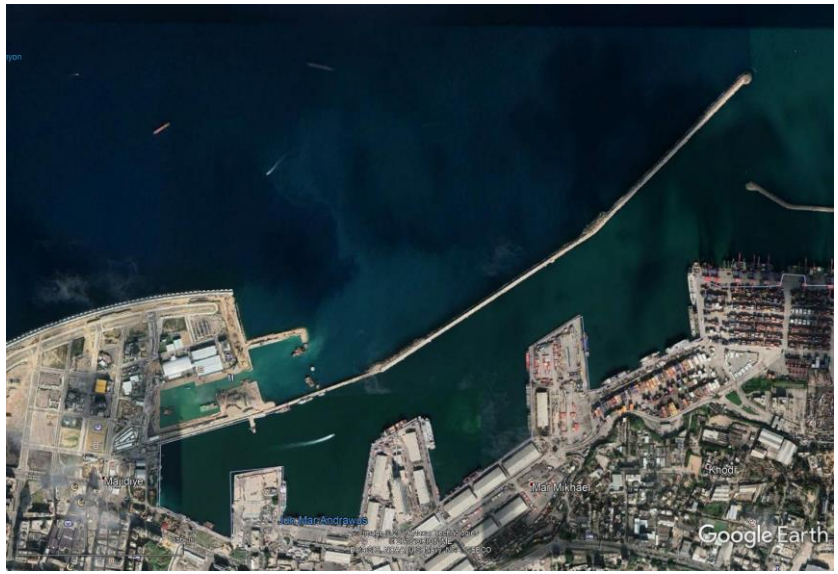
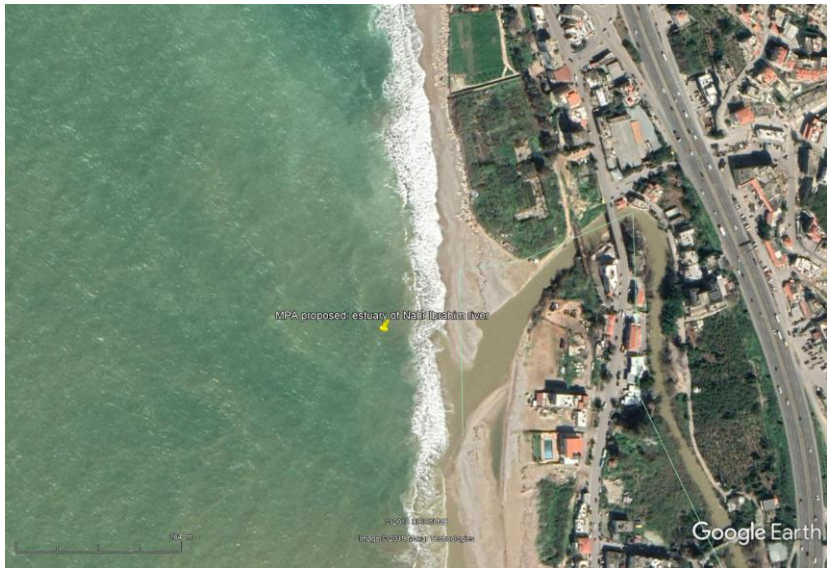
11.2.1 Marine Protected Areas in force and proposed from NOSCP, 2017

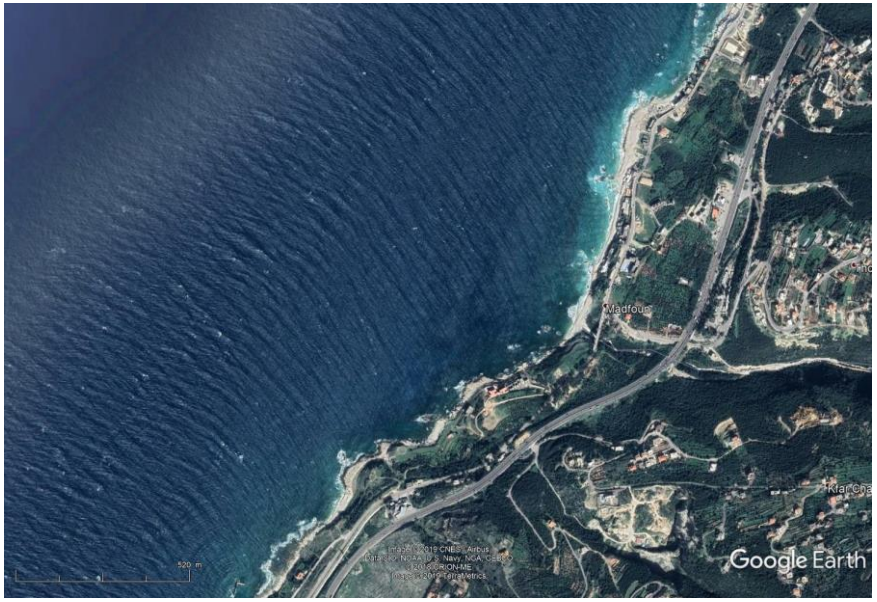
See next page.

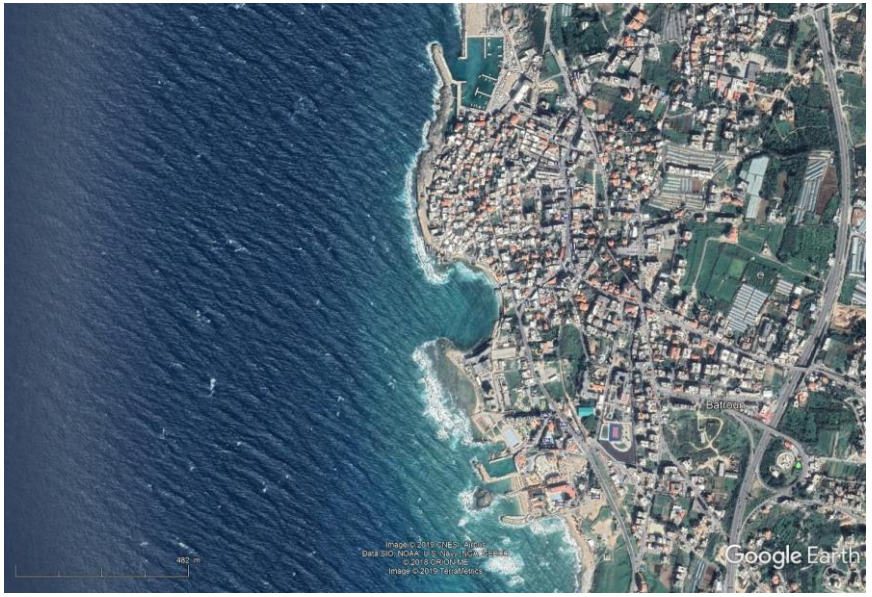
Description of Marine Protected Areas in force and proposed (in italic) is from the NOSCP, 2017.

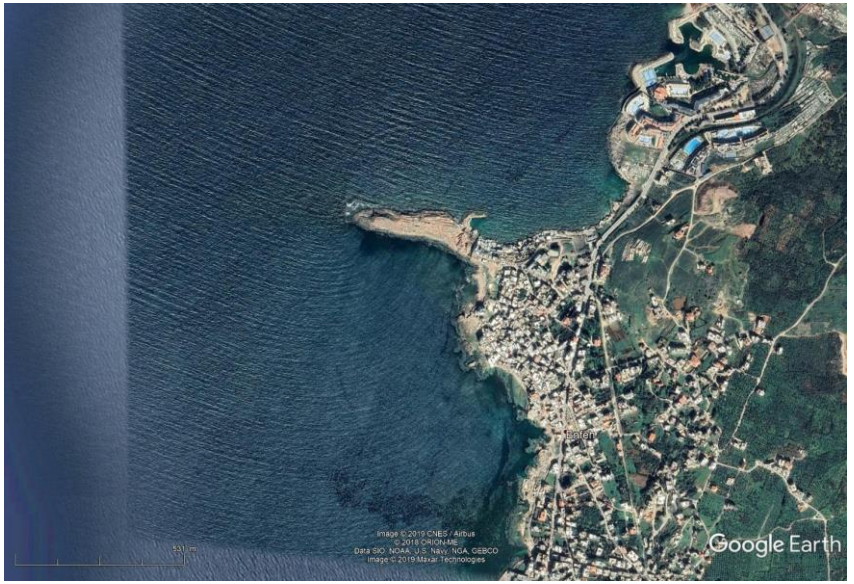
Screenshots are from Google Earth. Proposed strategies are from OTRA.

MARINE PROTECTED AREAS MPA IN FORCE, also RAMSAR sites and Specially Protected Area of Mediterranean Importance SPAMI (all items from NOSCP)		
Palm Island Nature Reserve in North Lebanon	No information in NOSCP  **Protection tactics**: favour offshore and coastal response at sea. Protection is difficult/ not feasible.	
Tyre Coast Nature Reserve in South Lebanon	No information in NOSCP. Not at risk from TEP Liban activities.  **Protection tactics**: favour offshore and coastal response at sea. Protection is difficult/ not feasible.	

MARINE PROTECTED AREAS (MPA) SITES <u>PROPOSED</u> - FROM BEIRUT PORT TO NORTH BORDER (all items from NOSCP)		
Proposed MPA Beirut port outer platform	*Located in Beirut city, in the Governorate of Beirut. This is an artificial site composed of a long jetty (>2km) that protects the port of Beirut. Consisting of concrete structures as well as rocks and boulders of various sizes it creates artificial caves and crevices which act as an artificial reef*. **Protection tactics**: - Protection of commercial port (410m + 500m entrance between the wave breakers) if possible. - Favour offshore and coastal response at sea in front of long jetty.	
Proposed MPA Ibrahim River	*Ibrahim River is a small river in the Mount Lebanon Governorate in Lebanon.* *It passes through the town of Nahr Ibrahim before emptying into the Mediterranean Sea. The town takes its name from the river. Today, it is one of the tourist attractions in Lebanon.* *The site is characterized by a sandy bottom, with seagrass meadows in patches. The estuary is a nursery, spawning and feeding ground for numerous species. The green turtle (Chelonia mydas) has been recorded here.* **Protection tactics**: - Protection of river (20m width at the level of the two road bridges).	

Proposed MPA Byblos	*This site is located in the city of Byblos, in the Governorate of North Lebanon, 40 km N. of Beirut. It consists of large vermetid reefs with significant ponds.* *A beach composed of gravel is found north of the area and the Byblos historic port lies to the south. Hard bottom is found in shallow areas and soft bottom with a seagrass meadow dominates deeper waters. There are archaeological and historic features*. **Protection tactics**: - Protection of old port (<50m entrance). - Favour offshore and coastal response at sea in front of beaches North & South.	
Proposed MPA Medfoun rocky area	*Located in the North Lebanon Governorate, 50km from Beirut. It consists of a rocky area with moderate cliffs, hard underwater bottoms with occasional soft bottom patches. This area could be considered as partly protected since it lies within a military area*. **Protection tactics**: - Favour offshore and coastal response at sea in front of coast.	

Proposed MPA Batroun Phoenician wall	*Located in the Governorate of North Lebanon, 55km from Beirut. It is a rocky area with important vermetid reefs and hard underwater bottoms. Shallow hard underwater bottoms extend over most of the area. Soft bottoms are found at greater depths.* *It is an archaeological and historic site and a popular tourist destination. A historic wall is believed to have been erected by the Phoenicians for protection from waves*. **Protection tactics**: - Protection of port (<50m entrance) in the North. - Favour offshore and coastal response at sea in front of beaches.	
Proposed MPA Ras El Chekaa cliff	*Located in the North Lebanon Governorate, 60km from Beirut.* *There is pressure on vermetid platforms, with fishing activities, harvesting activities, spearfishing, blast fishing (capsoon), agricultural runoffs, sewage/industrial runoffs*. **Protection tactics**: - Favour offshore and coastal response at sea in front of coast.	

Proposed MPA Enfeh Peninsula	*Located in the North Lebanon Governorate, 63km from Beirut. Consists of Limestone rocks and vermetid reefs forming a peninsula. There are shallow hard underwater bottoms; soft bottom in deeper waters.* *It is an archaeological and historical site*. **Protection tactics**: - Protection of coast with housings (+/-250m length) on North of peninsula. - Protection of tourist resort (<50m entrance) in the North. - Favour offshore and coastal response at sea in front of area.	
Proposed MPA Estuary of Areeda river	*The Areeda River is located in north Lebanon near the boundary with Syria.* *The site is characterized by a sandy bottom, with seagrass meadow in patches. The estuary is a nursery, spawning and feeding ground for numerous species. The green turtle (Chelonia mydas) has been recorded here.* **Protection tactics**: - Protection of river (20m width at the level of the two road bridges).	

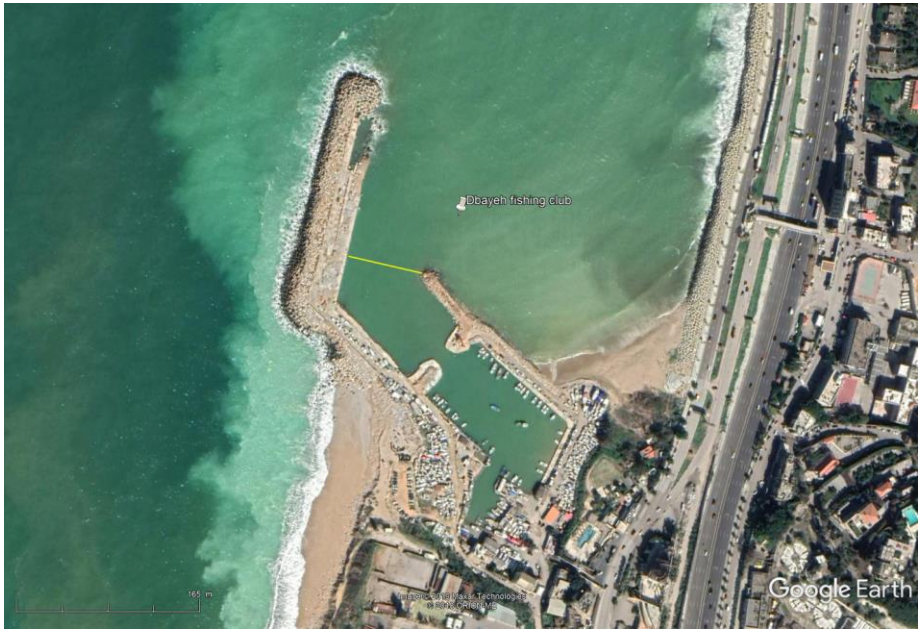
11.2.2 Sensitives sites identified by OTRA, 2019

See next page.

/!\ Distance provided are indicative, represent usually the width of the entrance.

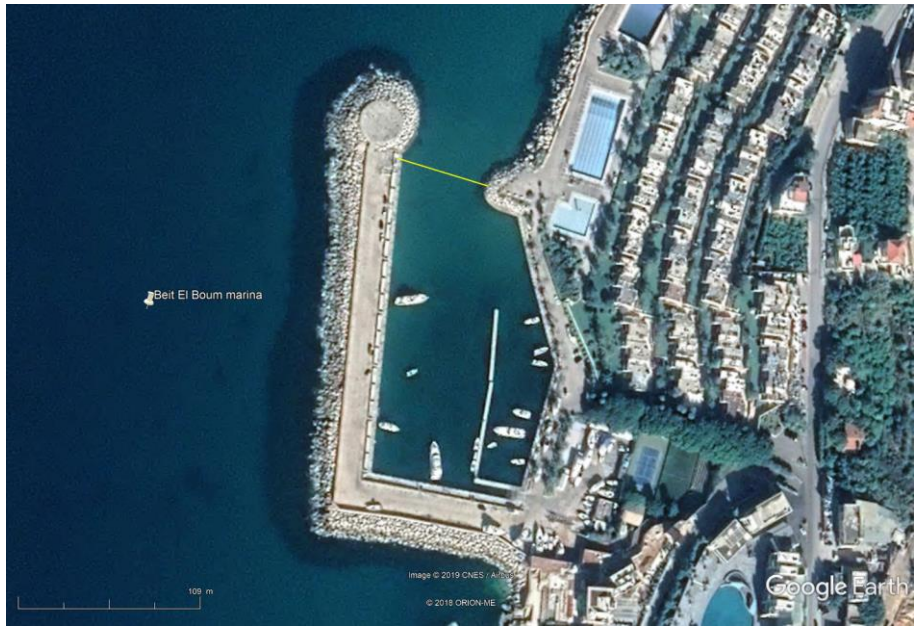
/!\ Yellow lines do not represent a boom deployment but measure the entrance/ inlet width.

Site	Area & tactics	Screenshot (Google Earth)
Dawra Marina	Located 1.5 km east of Beirut port. **Protection tactics**: - Protective booming (width between the 2 polder areas +/- 250m).	
La Marina Dbayeh	Dbayeh area. **Protection tactics**: - Protective booming (entrance width <100 m).	

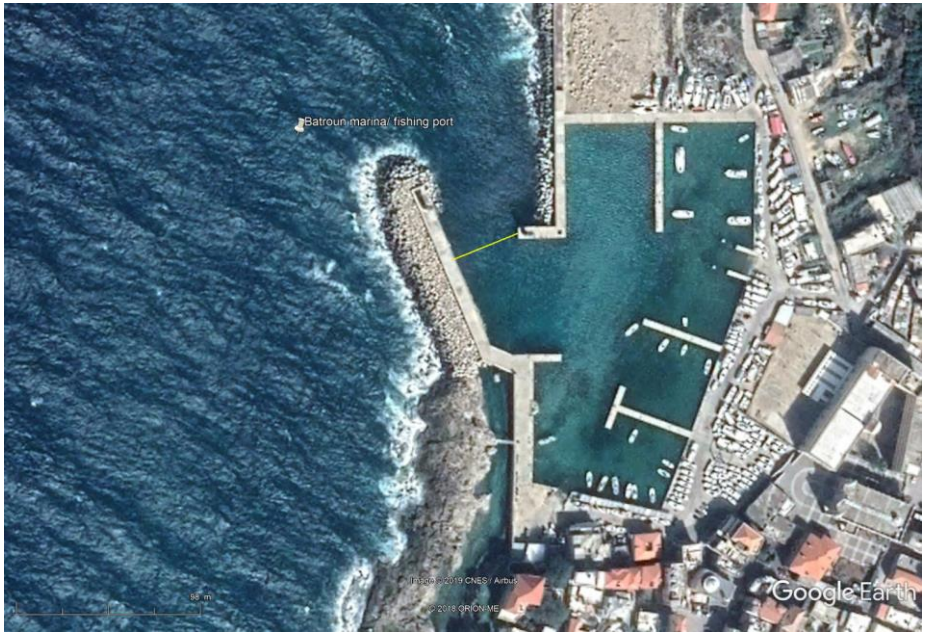
Dbayeh fishing club	Dbayeh area. **Protection tactics**: - Protective booming (entrance width: 70 m).	
Nahr El Kalb river entrance & Marina	Nahr El Kalb area. **Protection tactics**: - Protective booming of river (entrance width: 40 m). - Port entrance booming or sand bar building (width: 40 - 50m).	

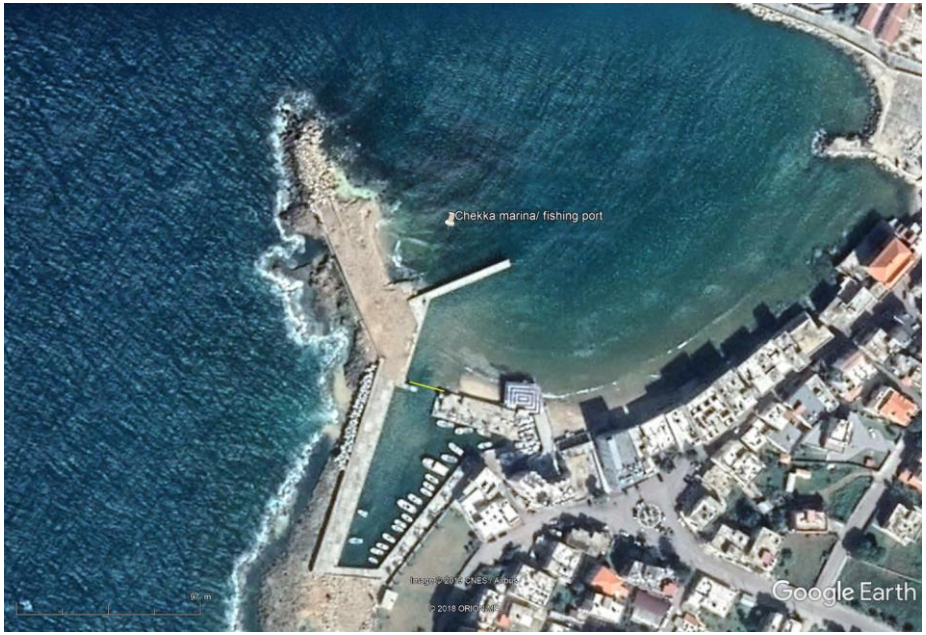
Zouk power station	Adonis Kesrouane area. **Protection tactics**: - Protective booming of river (width: 100m + 100m).	
Jounieh 4 ports & marinas	Jounieh area. **Protection tactics**: - Protective booming of entrance (width: 80m + 80m + 70m + 80m).	

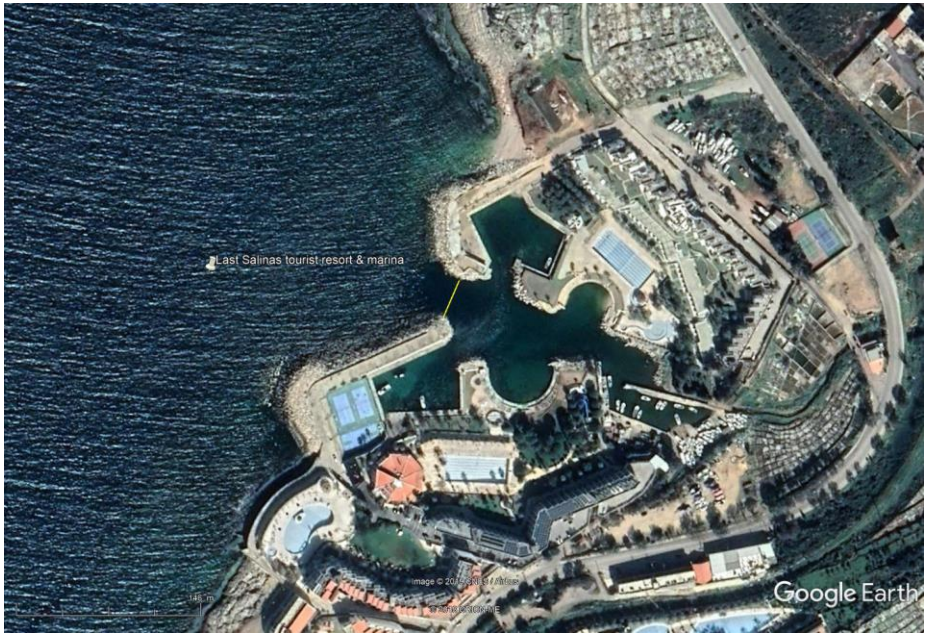
Aquamarina 2 marinas	Tabarja area **Protection tactics**: - Protective booming of entrances (width: 20m + 30m).	
Safra Marine Resort	Tabarja area **Protection tactics**: - Protective booming of entrance (width: 40m).	

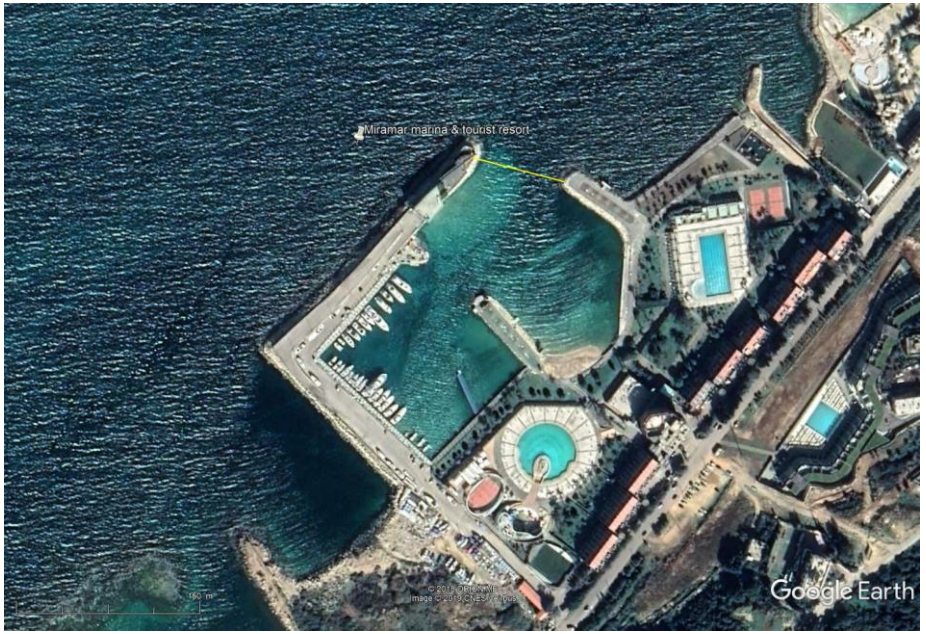
Aaqeibeh fishing marina	El Aaqeibeh area **Protection tactics**: - Protective booming of entrance (width: 40m).	
Beit El Boum marina	Beit El Boum area **Protection tactics**: - Protective booming of entrance (width: 60m).	

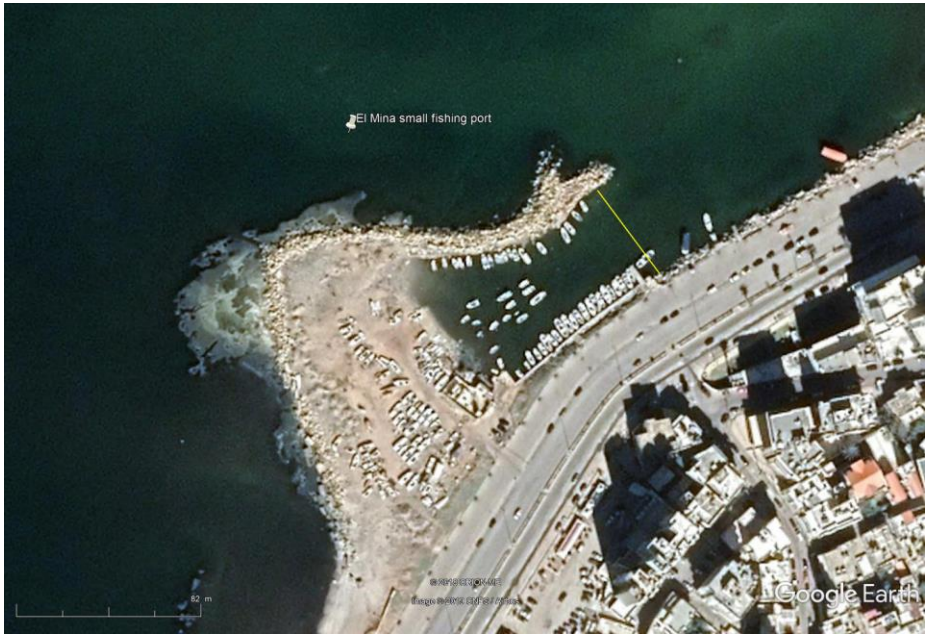
Byblos old fishing old port	Byblos area **Protection tactics**: - Protective booming of entrance (width: 30m).	
Terweel (or Terouil) marina	Amchit area **Protection tactics**: - Protective booming of entrance (width: 70m).	

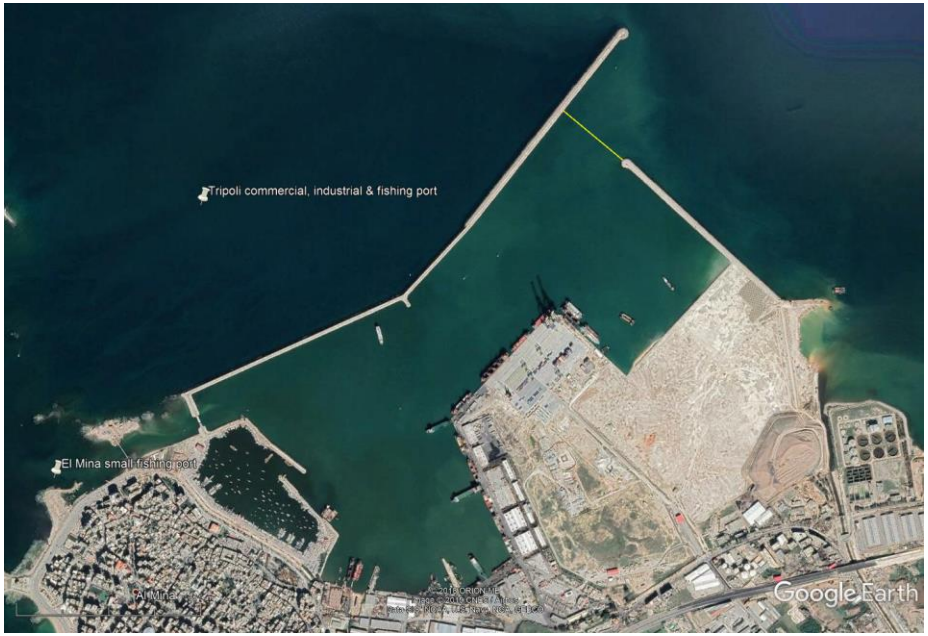
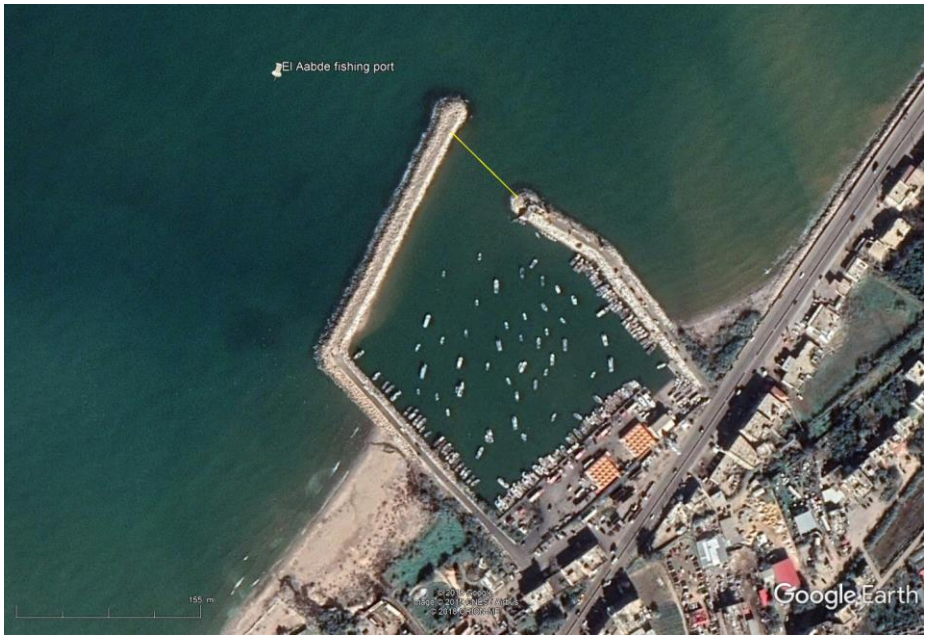
Batroun marina/ fishing port	Batroun area **Protection tactics**: - Protective booming of entrance (width: 40m).	
Selaata industrial & fishing port	Selaata area (Batroun) **Protection tactics**: - Protective booming of entrance (width: 200m).	

Chekka marina/ fishing port	Chekka area **Protection tactics**: - Protective booming of entrance (width: 20m).	
Enfeh Phenician trench and close houses	Enfeh area **Protection tactics**: - Protective booming of trench and close houses (length: 200m).	

Last Salinas tourist resort & marina	Enfeh area **Protection tactics**: - Protective booming of entrance (width: 40m).	
Al Qalamoun fishing port & marina	Al Qalamoun area **Protection tactics**: - Protective booming of entrance (width: 60m).	

Miramar marina & tourist resort	Al Qalamoun area **Protection tactics**: - Protective booming of entrance (width: 80m).	
Manara beach resort	Tripoli area **Protection tactics**: - Protective booming of entrance (width: 80m).	

Palma beach marina & tourist resort	Tripoli area **Protection tactics**: - Protective booming of entrance (width: 140m or 60m + 60m).	
El Mina small fishing port	Tripoli area **Protection tactics**: - Protective booming of entrance (width: 50m).	

Tripoli commercial, industrial & fishing port	Tripoli area **Protection tactics**: - Protective booming of entrance (width: 140m or 60m + 60m).	
El Aabde fishing port	El Aabde area **Protection tactics**: - Protective booming of entrance (width: 80m).	

11.3 Shore clean-up synoptic guidelines

All datasheets of clean-up techniques are provided in the Operational Support n°8.

11.3.1 Rocks and Infrastructures clean-up synoptic guidelines (Cedre)

ROCKS and INFRASTRUCTURES	**PHASE 1 : GROSS RECOVERY (1/2)**	
Shore clean-up synoptic guidelines. Rocky cliffs, shores, platforms, quaysides & rip-raps.		
Techniques / objectives / procedures	*Equipment needed*	*Factors to be considered*
1. Pumping at the water's edge		**Datasheet n°02**
AIM : To recover large accumulations of pollutant by promoting its concentration and improving selectivity and yield.		
➔ Develop the storage site (liquid to slightly viscous pollutants)		
• to facilitate sorting; • to reduce volumes for evacuation; • to restrict the spreading of the pollution.	*(should be adapted to suit the pollutant and the site)* • areas, trenches, bunds, skips, (watertight) tanks • drainage (rainwater overflow) • screening, sorting • earthmoving equipment (digging) • protective membranes and geotextile.	• ecological sensitivity • accessibility of site • transfer of the pollution (watertight storage, decontamination of trucks) • traffic (should be channelled)
➔ Concentrate slicks		
• where possible, block the pollutant trapped in creeks (retention boom)	• floating booms • shore-sealing booms	• dangerousness of site (height, rock fall, slipping, exposure to waves etc.); • personal health and safety (protective clothing, life jackets, masks) • accessibility of the coast • tidal range
(a) ➔ Contain and reconstitute the slick by the pumping/skimming means:		
• by trawling (worksite boom, sorbent boom) • by scraping (planks, scrapers, brushes) • by hosing	• worksite booms • conditioned sorbents • planks, scrapers, hoses • small boat.	• nature (emulsion, viscosity) and evolution of the pollutant according to the temperature • presence of solid debris • draught of skimmers and compatibility with depth of water
➔ Pump		
• stop obstruction of the pumps: anticipate screening or another way of retaining diverse debris.	• skimming/pumping equipment (skimmer, pump, vacuum truck or other transfer system) • grating, filter baskets • storage capacities and transfer means.	• recovery of liquids from settling • traffic lanes
➔ Separate		
• promote the separation of water and oil: emulsion breaking, settling • evacuate the products recovered.	• settling tanks/separator • transfer pumps • demulsifier • trucks suited to the pollutant.	• Traffic plan.

ROCKS and INFRASTRUCTURES		PHASE 1 : GROSS RECOVERY (2/2)
Shore clean-up synoptic guidelines. Rocky cliffs, shores, platforms, quaysides & rip-raps.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
2. Manual recovery		**Datasheet n°09**
AIM : to remove mobilisable clusters of pollutant and heavily polluted diverse materials (sediments, seaweed, floating debris		
• direct collection (use mechanical support wherever possible: vehicles, cranes etc.) • scraping • concentration (containment) • absorption • disposal	• shovels, forks, scrapers, brushes • brushes, brooms, trowels etc. • worksite booms, sorbents • bins, bags	• dangerousness of site (height, rock fall, slipping, exposure to waves etc.) • personal safety: permanent supervision and protective equipment • sites which are rarely workable for mechanical equipment • organisation of teams.
3. Flushing		**Datasheet n°12**
AIM : to dislodge layers of oil deposited on rocks or trapped in crevices (cracks, boulders etc.) and move the pollutant towards a collection area.		
	• pump unit (3 to 8 bar individual pump, 25 to 30 m3/h) • fire or impact hose • hoses, connectors.	• dangerousness of site (height, rock fall, slipping, exposure to waves etc.) • personal safety: permanent supervision and protective equipment • organisation of teams.
4. Systematic complementary operation: Effluent recovery		**Sea : Datasheet n°14 / Land : Datasheet n°15**
AIM : to stop the pollution from spreading by installing a recovery system.		
• prepare a collection area, channel the effluents .	(should be adapted to suit the pollutant and the site) • containment equipment: floating or shore-sealing booms, bunds, pits etc. • recovery and evacuation means: pump, sorbents etc. • settling and storage tanks.	• tide • agitation of the water body

ROCKS and INFRASTRUCTURES		**PHASE 2 : CLEAN-UP**
Shore clean-up synoptic guidelines. Rocky cliffs, shores, platforms, quaysides & rip-raps.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
1. Flushing		**Datasheet n°12**
AIM : to wash surfaces in a large quantity of water to dislodge residual and recover it at a collection point.		
• prepare a collection area, channel the effluents • wash • recover freed waste.	• pump unit (4 to 8 bar individual pump, 25 to 30 m3/h) • fire or impact hose • hoses, connectors • shovels • worksite boom (floating, shore-sealing) • skimmer, pump, sorbents • storage tanks, settling of recovered products.	• nature and evolution of the oil, viscosity, weathering, thickness of the layer, adherence etc. • dangerousness of site (height, rock fall, slipping, exposure to waves etc.) • accessibility of the coast • tidal range (put equipment away daily) • limited efficiency of washing using cold water on sticky or overly weathered pollutant.
2. High pressure washing using hot or cold water (with or without a washing agent)		
AIM : to remove oil from polluted surfaces using hoses under high pressure. Always comply with environmental and safety instructions..		
Prior operation: manual scraping		• nature and evolution of the oil, viscosity, weathering, thickness of the layer, adherence etc. • dangerousness of site (height, rock fall, slipping, exposure to waves etc.) • accessibility of the coast • tidal range (put equipment away daily) • limited efficiency of washing using cold water on sticky or overly weathered pollutant • potentially high impact of clean-up on the environment (cracking of rocks, destruction of unsoiled flora and fauna, removal of biological film etc.): • accept the temporary presence of an oily film after washing (destroyed in the long run by UV rays) • adjust pressure and temperature according to the requirements and objectives set • possible spreading of pollution: by projection and migration into the sediment • possible recontamination by released oil • toxicity of washing agent: choose a product tested by a recognised organisation (Cedre keeps an up-to-date list) • efficiency of selected product: conduct an onsite test.
AIM : to remove the bulk of residual layers (viscous pollutant) before pressure washing to increase effectiveness.		
	• scrapers, brushes • bags, bins etc..	
Prior operation: protection from projections		
AIM : to protect unsoiled rocky areas from being polluted by the projection of contaminated effluents and aerosols.		
	• flexible geotextile sheeting, possibly with stakes.	
High pressure washing with hot water **Datasheet n°19**		
Hot water is needed whereas use of a washing agent (for preference a solvent) is not systematically necessary.	• thermal washer • (50 to 150 bars, 0° to 90°C) • hoses, pipes, connectors • selected washing agents • horticultural spreading means	
Systematic complementary operation: Effluent recovery		**Sea : Datasheet n°14 / Land : Datasheet n°15**

AIM : to stop the pollution from spreading by installing a recovery system.		
• prepare a collection area, channel the effluents .	(should be adapted to suit the pollutant and the site) • containment equipment: floating or shore-sealing booms, bunds, pits etc. • recovery and evacuation means: pump, sorbents etc. • settling and storage tanks.	• tide • agitation of the water body

11.3.2 Pebbles & cobbles clean-up synoptic guidelines (Cedre)

PEBBLES & COBBLES		**PHASE 1 : GROSS RECOVERY (1/2)**
Shore clean-up synoptic guidelines. Pebble & cobble beaches.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
Prior operation: Development of the storage site		
• to facilitate sorting • to reduce volumes for evacuation • to stop the pollution from spreading (overflow, leaks, infiltration etc.)	*(should be adapted to suit the pollutant and the site))* • area, trenches, (watertight) bunds, skips, tanks • drainage (rainwater overflow) • screening, sorting • earthmoving equipment (digging) • protective membranes and geotextile .	• ecological sensitivity and accessibility of the site • transfer of the pollution (watertight storage, decontamination of trucks) • traffic (should be channelled)
Prior operation: Recovering solid waste:		
(removal or temporary movement to the upper beach where it will be out of the reach of the sea) Mechanical recovery Manual recovery Waste disposal.	• farm machinery (forks…) earthmoving equipment (loader, shovel, bulldozer…) • forks, rakes, brushes, bins, bags • farm, earthmoving and mining equipment (loaders, skips, dumper, trailer etc.)	• accessibility of beach to mechanical machinery • organisation of workforce (large number of responders) • selectivity.
1. Skimming/pumping		**Datasheet n°02 & 03**
AIM :**:** to recover large accumulations of pollutant by promoting its concentration and improving selectivity and yield (see also sand datasheet)		
• concentration of the slick using booms: prevent slicks from beaching on stones at all costs • if a slick has stranded on a stony beach, try to gather the oil in certain areas to facilitate pumping • contain and reconstitute the slick by the pumping/skimming means (trawling with sorbent booms, hosing, manual tools) • pump • store and transfer	• floating booms • shore-sealing booms • worksite booms • conditioned sorbents • small boats (possibility) • planks, scrapers, hoses • very powerful pump, compatible with great lengths of pipe • skimming/pumping equipment (skimmer, pump, vacuum truck or other transfer system) • grating, filter baskets • storage capacities and transfer means.	• personal health and safety (protective clothing, masks) • nature and evolution of the oil, viscosity, weathering, thickness of the layer, adherence etc. • dangerousness of site: often exposed (waves, swell) • Accessibility of the coast: areas are often unworkable for ordinary machinery • tidal range (put equipment away daily)
2. Manual recovery		**Datasheet n°09**
AIM : to recover large accumulations of pollutant by promoting its concentration and improving selectivity and yield.		
• Mainly manual recovery of accumulations and waste • Mechanical support where possible.	• buckets, pails, earthmoving equipment • earthmoving equipment, quad bikes.	• selectivity • potential presence of the pollutant under the surface: infiltration (fluid pollutant) and/or burying (viscous pollutant)

PEBBLES & COBBLES		**PHASE 1 : GROSS RECOVERY (2/2)**
Shore clean-up synoptic guidelines. Pebble & cobble beaches.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
3. Surf-washing		**Datasheet n°10**
AIM : to use the sea's energy to separate the pollutant from stones and ensure initial clean-up.		
• move polluted stones to the lower foreshore • recover the freed pollutant in the water or on the upper foreshore.	• earthmoving equipment tracto-loader, loader on wheels, bulldozer, trucks • recovery equipment: nets (heavy fuel oil) + mooring, sorbent materials, manual recovery, rollers	• accessibility of beach to mechanical machinery • geomorphological risk (erosion): sensitivity of back beach in the absence of temporary protection (consult an expert geomorphologist) • tidal conditions.
4. Flushing		**Datasheet n°12**
AIM :: to dislodge clusters of pollutant stuck to surfaces or trapped in crevices or under boulders.		
• low pressure, high speed washing with water.	• pump unit (3 to 8 bar individual pump, 25 to 30 m3/h) • hoses, connectors.	• seawater supply: tidal range, agitation of the water body • solidity of substrates (especially old stonework), risk of scouring • risk of emulsification of the pollutant • risk of penetration of the pollutant into the depths of the substrate •
5. Flooding		**Datasheet n°13**
AIM :: to flood a section of the shingle bar in order reduce vertical infiltration of pollutant into the sediment during flushing .		
• create a laminar flow .	• perforated tube • high speed pump (100m3/h	• seawater supply: tidal range, agitation of the water body
Systematic complementary operation: Effluent recovery		**Sea : Datasheet n°14 / Land : Datasheet n°15**
AIM : to stop the pollution from spreading by installing a recovery system.		
• prepare a collection area, channel the effluents .	(should be adapted to suit the pollutant and the site) • containment equipment: floating or shore-sealing booms, bunds, pits etc. • recovery and evacuation means: pump, sorbents etc. • settling and storage tanks.	• tide • agitation of the water body

PEBBLES & COBBLES		**PHASE 2 : CLEAN-UP (1/2)**
Shore clean-up synoptic guidelines. Pebble & cobble beaches.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
1. Flushing		Datasheet n°12
AIM :to wash the shingle bar in a large quantity of water to dislodge residual pollutant (liquid pollutant) and recover it at a collection point.		
• prepare a collection area, channel the effluents • wash • recover freed waste.	• pump unit (4 to 8 bar individual pump, 25 to 30 m3/h) • fire or impact hose • hoses, connectors • shovels • worksite boom (floating, shore-sealing) • skimmer, pump, sorbents • storage tanks, settling of recovered products.	• dangerousness of site: often exposed (waves, swell) • ecological sensitivity of site • accessibility of the coast • water supply • tidal range (put equipment away daily) • nature and evolution of the oil (viscosity, weathering, thickness of the layer, adherence etc.)
2. Washing in specialised installations		
AIM : to remove oil from polluted stones.		
Prior operations		
➔ Manual Scrapping		
AIM :**:** remove the bulk of residual layers (viscous pollutant) before pressure washing to increase effectiveness.		
	• scrapers, brushes • bin bags etc..	
➔ Effluent recovery		Datasheet n°14 & 15
AIM : to recover effluents at a collection point, to prevent the pollution from spreading to the lower beach.		
• should be set up before washing begins • make the most of natural run-off channels, line them wherever possible • should be constructed in the washing area.	• flexible geotextile sheeting, possibly with stakes • boom, skimmer, sorbent, filter • shovels • filtering geotextile • recovery means (absorption, pumping, landing nets etc.)	• possible spreading of pollution: migration in the sediment • possible recontamination by remobilised oil • potential presence of the pollutant under the surface: infiltration (fluid pollutant) and/or burying (viscous pollutant)
➔ a. Washing on cages		Datasheet n°20
• hot water is needed whereas use of a washing agent (for preference a solvent) is not systematically necessary • adjust pressure according to the size of the stones, use mesh bags (such as oyster bags) for small stones.	• thermal washer (50 to 150 bars, 0° to 90°C) which can use seawater • washing “cage” (wire mesh structure mounted on a stand) • hoses, pipes, connectors • (possibly) selected washing agents • horticultural spreading means	

PEBBLES & COBBLES		**PHASE 2 : CLEAN-UP (1/2)**
Shore clean-up synoptic guidelines. Pebble & cobble beaches.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
➔ b. Washing in a concrete mixer		Datasheet n°22
• hot water can facilitate washing whereas use of a washing agent (for preference a solvent) is not systematically necessary.	• concrete mixer • system for rinsing over grating • effluent recovery system.	• sensitivity of the back beach in the temporary absence of protection, previously ensured by the stones
➔ c. Washing in a concrete mixer drum:		Datasheet n°23
• hot water can facilitate washing whereas use of a washing agent (for preference a solvent) is not systematically necessary.	• concrete mixer drum • washing agents (solvent) • system for rinsing over grating • effluent recovery and settling system • storage of effluents and pollutants.	• Available surface
➔ d. Washing at a plant		Datasheet n°24
• Ready-to-use.	• Washing Plant	• efficiency and toxicity of the washing agent.
3. Surf washing		Datasheet n°10
AIM :: to use the sea's cleaning power to complete the washing of stones or cleaning of lightly polluted stones.		
• throw lightly oiled stones by hand down to the lower beach or deposit washed stones • recovery is in principle unnecessary.	• loader, skip trucks, wheelbarrows • possibly nets (for heavy fuel oil).	• sensitivity of the back beach in the temporary absence of protection, previously ensured by the stones.
4. Bioremediation		Datasheet n°29
AIM :: to accelerate natural breakdown of oil by bacteria and other micro-organisms.		
• assess the opportunity for implementation • spread bioremediation agents • set up a monitoring initiative.	• expert • bioremediation agent + spreader	• only on very light or residual pollution on a sheltered site • feasibility (assess according to procedures defined by experts) • efficiency and toxicity of the product

11.3.3 Sand clean-up synoptic guidelines (Cedre)

SAND		PHASE 1 : GROSS RECOVERY (1/3)
Shore clean-up synoptic guidelines. Sandy beaches.		
Techniques / objectives / procedures	*Equipment needed*	*Factors to be considered*
1. Pumping at the water's edge and on the water		**Datasheet n°02**
AIM :: to recover large accumulations of pollutant by promoting its concentration and improving selectivity and yield.		
➔ (a) Develop the storage site(liquid to slightly viscous pollutants)		
• to facilitate sorting • to reduce volumes for evacuation • to restrict the spreading of the pollution	*(should be adapted to suit the pollutant and the site)* • area, trenches, (watertight) bunds, skips, tanks • drainage (rainwater overflow) • screening, sorting • earthmoving equipment (digging) • protective membranes and geotextile.	• ecological sensitivity • accessibility of site • transfer of the pollution (watertight storage, decontamination of trucks) • traffic (should be channelled)
➔ (b) Concentrate slicks on the beach.		
• deflect the pollutant towards the beach (floating boom in a staggered configuration along large beaches positioned against the flow of longshore drift) • where possible, block the pollutant trapped in creeks (retention boom) • stop the slick from stranding (case of low tidal range) using a longitudinal boom positioned at the water's edge (pump pollutant over the boom)	• floating booms • shore-sealing booms.	• personal health and safety (protective clothing, masks), decontamination • accessibility of the coast • agitation of the water body (currents, swell, wind) • tidal range
➔ (c) Contain and reconstitute the slick near the pumping/skimming means:.		
• by trawling (worksite boom, sorbent boom) • by scraping (planks, scrapers, brushes) • by hosing.	• worksite booms • conditioned sorbents • planks, scrapers, hoses • small boat	• accessibility of the coast • agitation of the water body (currents, swell, wind) • tidal range.
➔ (d) Pump.		
• stop obstruction of the pumps: anticipate screening or another way of retaining diverse debris	• skimming/pumping equipment (skimmer, pump, vacuum truck or other transfer system) • grating, filter baskets • storage capacities and transfer means	• nature (emulsion, viscosity) and evolution of the pollutant according to the temperature • presence of solid debris • draught of skimmers and compatibility with depth of water
➔ (e) Separate.		
• promote the separation of water and oil: emulsion breaking, settling • evacuate the products recovered.	• settling tanks/separator • transfer pumps • demulsifier • trucks suited to the pollutant.	- recovery of liquids from settling - ecological sensitivity and accessibility of the site • traffic lanes.

SAND		**PHASE 1 : GROSS RECOVERY (2/3)**
Shore clean-up synoptic guidelines. Sandy beaches.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
RECOVERY ON BEACHES(1 /2)		
AIM : to recover large accumulations of pollutant by promoting its concentration and improving selectivity and yield		
Prior operation: Development of the storage site		
• to facilitate sorting • to reduce volumes for evacuation • to stop the pollution from spreading (overflow, leaks, infiltration etc.).	*(should be adapted to suit the pollutant and the site)* • areas, trenches, bunds, skips • (watertight) • tanks, containers etc. • drainage (rainwater overflow) • screening, sorting • earthmoving equipment (digging) • protective membranes and geotextile	• ecological sensitivity and accessibility of the site • transfer of the pollution (watertight storage, decontamination of trucks) • traffic (should be channelled)).
Prior operation: Recovering solid waste:		
(Removal or temporary movement to the upper beach where it will be out of the reach of the sea) • Mechanical recovery • Manual recovery • Disposal.	• farm machinery (forks…) earthmoving equipment (loader, shovel, bulldozer…), specialised means (sand screeners, mechanical rakes…) • forks, rakes, brushes, bins, bags • farm, earthmoving and mining equipment (loaders, skips, dumper, trailer etc.)	• accessibility of beach to mechanical equipment • organisation of workforce (large number of responders) • selectivity: avoid removing too much sand in a bid to immediately obtain an apparently clean beach .
2. Scraping the layer of oil		Datasheet n°04
Towards accumulation areas, then pumping or recovery by shovel	• earthmoving equipment: loader or rubber blade • manual: planks, scrapers (as using in pig sties), hoses	• personal health and safety (protective clothing, masks) • selectivity (layer thickness) • procedure: methodical progression
3. Pumping on the foreshore		Datasheet n°03
• promote the concentration of slicks and improves yield • stop obstruction of the pumps: anticipate screening or another way of retaining diverse debris.	• worksite booms • skimming/pumping equipment (skimmer, pump, vacuum truck or other transfer system) • screens, filters etc. • storage capacities and transfer means.	• personal health and safety (protective clothing, masks) • nature (emulsion, viscosity) and evolution of the pollutant according to the temperature • agitation of the water body and tidal range • presence of solid debris • draught of skimmers and compatibility with depth of water
• reduce volumes for evacuation: promote the separation of oil and water (emulsion breaking, settling)	• settling tanks/separator • transfer pumps • demulsifier (+ injector) • trucks suited to the pollutant	• recovery of liquids obtained after settling • ecological sensitivity and accessibility of the site • traffic lanes

3. Sand screening		**Datasheet n°08**
AIM :: to screen the sand in order to extract clusters of viscous pollutant.		
• follow procedures (selectivity) and environmental recommendations.	• sand screeners: adaptations may be necessary • tractor with loader for waste disposal.	• solid waste (should be removed beforehand) • favourable characteristics of sand: dry, fine and homogeneous • potentially high impact at the foot of dunes.

SAND		**PHASE 1 : GROSS RECOVERY (3/3)**
Shore clean-up synoptic guidelines. Sandy beaches.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
RECOVERY ON BEACHES (2 /2) .		
AIM : to recover large accumulations of pollutant by promoting its concentration and improving selectivity and yield		
1. Removal using rollers		**Datasheet n°07**
AIM :: Aim: to selectively remove the pollutant stranded on the surface of the beach.		
	• rollers (various models with various types of tractors)	• solid waste (should be remove beforehand) • favourable characteristics of sand: saturated with water, hard and homogeneous • sufficiently viscous, sticky, fresh oil .
2. Manual recovery		**Datasheet n°09**
AIM : **:** to recover accumulations of pollutant.		
• by direct collection • by concentration: scraping and raking • by screening.	• manual tools: forks, various rakes and brushes, picks, sieves etc. • bins, bags • mechanical support: farm, earthmoving and mining equipment (loaders, skips, dumper, trailer etc.), quad bikes	• personal safety: protective equipment • organisation of workforce (large number of responders) • selectivity: avoid removing too much sand in a bid to immediately obtain an apparently clean beach • accessibility of beach to mechanical equipment.
3. Flushing		**Datasheet n°12**
AIM : to displace fluid pollutant stranded on the beach.		
• low pressure, high speed washing with water • recover effluents	• tractor + plough with 2 ploughshares for drainage trenches.	• seawater supply: tidal range, agitation of the water body • risk of penetration of the pollutant into the depths of the substrate
Systematic complementary operation: Effluent recovery		**Sea : Datasheet n°14 / Land : Datasheet n°15**
AIM : to stop the pollution from spreading by installing a recovery system.		
• prepare a collection area, channel the effluents .	(should be adapted to suit the pollutant and the site) • containment equipment: floating or shore-sealing booms, bunds, pits etc. • recovery and evacuation means: pump, sorbents etc. • settling and storage tanks.	• prepare a collection area, channel the effluents .

SAND		**PHASE 2 : CLEAN-UP**
Shore clean-up synoptic guidelines. Sandy beaches.		
Techniques/objectives/procedures	*Equipment needed*	*Factors to be considered*
1. Surf-washing		**Datasheet n°10**
AIM :: to complete clean-up or separate residual pollutant either in the form of micro tar balls (as an alternative to screening) or fluid pollutant (stained sand		
• send polluted sediments to the lower foreshore • recover any freed clusters of pollutant.	• front-loader, loader on wheels, bulldozer, trucks • recovery equipment: nets (heavy fuel oil), sorbent materials, manual recovery, rollers.	• ecological sensitivity: geomorphological characteristics (consult a geomorphologist) • tidal conditions.
2. Flushing		**Datasheet n°12**
AIM : to wash surfaces with a large quantity of water.		
• move fluid residual oil towards a collection point • recovery of effluents.	• fire hose, impact hose + low pressure pump • light boom, sorbent + pumps, skimmers, sorbents.	• water supply • direction and pressure of water jet (avoid solid water jets, position the jet at an angle) • temporary quicksand
3. Drainage		**Datasheet n°18**
AIM : to promote the run-off of pollutant in areas of emergence of ground water.		
• dig oblique draining trenches, towards a ditch at the lower end of the beach • recover effluents.	• tractor + plough with 2 ploughshares for drainage trenches	• emergence of ground water • fluidity of oil • repeat the operation.
4. Tilling		**Datasheet n° 17**
(1) underwater : to cause fluid oil trapped in the sand to be placed in suspension and recovered at the water surface. **(2) on land** to promote the aeration of sand polluted by a fluid pollutant (stained sand**)**		
(1) UNDERWATER : • operation conducted in shallow waters at rising tide (0.20 to 30 cm) • recovery of floating effluents.	• tractor + harrow or claw, or scarifier or roto-cultivator (1 and 2) • recovery of effluents on water (worksite boom, sorbents, landing nets, skimming) (1)	• tidal conditions • homogeneous sediments • repeat the operation
5. Underwater agitation		**Datasheet n° 16**
AIM :: to cause fluid oil trapped in sand or stones to be placed in suspension and recovered at the water surface.		
• scour the polluted sand at high tide • recover floating effluents	• fire or impact hose • low pressure pump • light boom, sorbent • pumps, skimmers, sorbents	• repeat the operation • fluidity of oil • temporary quicksand.
6. Sand screening		**Datasheet n° 08**
AIM :: to remove residual small tar balls		
• proceed methodically by slowly screening in strips).	• large and small sand screeners • manual screening (may be necessary in vegetated areas): sieves	• (sand screener) • nature of substrate: fine-grain, dry, homogeneous sand, slight slope • potential ecological impact for vegetation at the foot of dunes • selectivity: risk of large-scale removal of clean sand
7. Bioremediation		**Datasheet n° 29**
AIM : to accelerate natural breakdown of oil by bacteria and other micro-organisms.		

• Spread bioremediation agents.	• bioremediation agents • spreader.	• implementation: only on very light or residual pollution on a sheltered site (assess according to procedures defined by experts) • efficiency and toxicity of the product • set up a monitoring initiative.

11.4 Phases 1 & 2 recommended shore clean-up techniques per types of shore

11.4.1 Phase 1 Recommended shore clean-up techniques per types of shore

Table 1 : List of Shore type clean-up – Worksite layouts (in Operational Support n°8) and links to Shore type clean-up – Synoptic guidelines, and Clean-up datasheets

Note. N 01 - “LEAVE ALONE” or NATURAL CLEAN-UP may be an option.

ESI	Shoreline type	Oil persistence	Worksite layouts - Phases 1 & 2	Work	Support	Access	Synoptic guidelines (Cedre)	Technique datasheets - Phase 1 (Cedre)
1A	**Exposed rocky shores / cliffs**	Few weeks	**Rocky shores & platforms**	Maritime	Maritime (Terrestrial)	Maritime	Rocks & infrastructures	N02 SKIMMING/PUMPING AT THE WATER'S EDGE N09 MANUAL COLLECTION N12 FLUSHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE
1B	**Exposed, solid man-made structures**		**Quayside & rip-raps**	Maritime or Terrestrial	Terrestrial	Terrestrial		
1C	**Exposed rocky cliffs with boulder talus base**		**Rocky shores & platforms**	Maritime	Maritime (Terrestrial)	Maritime		
2A	**Exposed wave-cut platforms in bedrock, mud, or clay**	Few months	**Rocky shores & platforms**	Terrestrial	Maritime (Terrestrial)	Maritime (Terrestrial or aerial)		
3A	**Fine- to medium-grained sand beaches**	1 - 2 years	**Sandy beaches**	Terrestrial	Terrestrial	Terrestrial or Maritime or aerial	Sand	N02 SKIMMING/PUMPING AT THE WATER'S EDGE N03 PUMPING ON THE FORESHORE (TRENCHES OR BUNDS) N04 SCRAPING USING EARTHMOVING EQUIPMENT N07 REMOVAL/ADHERENCE USING SPECIALISED EQUIPMENT N08 SAND SCREENING USING SPECIALISED MACHINERY N09 MANUAL COLLECTION N12 FLUSHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE

4	**Coarse-grained sand beaches**	1 - 3 years	**Sandy beaches**	Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)		N02 SKIMMING/PUMPING AT THE WATER'S EDGE N03 PUMPING ON THE FORESHORE (TRENCHES OR BUNDS) N04 SCRAPING USING EARTHMOVING EQUIPMENT N07 REMOVAL/ADHERENCE USING SPECIALISED EQUIPMENT N08 SAND SCREENING USING SPECIALISED MACHINERY N09 MANUAL COLLECTION N12 FLUSHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE
5	**Mixed sand and gravel beaches**	3 - 5 years	**Sandy beaches**	Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)		
6A	**Gravel beaches (granules and pebbles)**	3 - 5 years	**Pebbles beaches**	Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)	Pebbles & cobbles	N02 SKIMMING/PUMPING AT THE WATER'S EDGE N03 PUMPING ON THE FORESHORE (TRENCHES OR BUNDS) N09 MANUAL COLLECTION N10 SURFWASHING N12 FLUSHING N13 FLOODING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE
6B	**Exposed riprap**		**Quayside & rip-raps**	Maritime or Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)	Rocks & infrastructures	N02 SKIMMING/PUMPING AT THE WATER'S EDGE N09 MANUAL COLLECTION N12 FLUSHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE
8A	**Sheltered scarps in bedrock, mud, or clay**	> 5 years	**Rocky shores & platforms**	Terrestrial	Maritime (Terrestrial)	Maritime (Terrestrial or aerial)	Rocks & infrastructures	N02 SKIMMING/PUMPING AT THE WATER'S EDGE N09 MANUAL COLLECTION N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE
8B	**Sheltered, solid man-made structures**		**Quayside & rip-raps**	Maritime or Terrestrial	Terrestrial	Terrestrial		
8C	**Sheltered riprap**		**Quayside & rip-raps**	Maritime or Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)		

11.4.2 Phase 2 Recommended shore clean-up techniques per types of shore

Tableau 1. List of Shore type clean-up – Worksite layouts (in Operational Support n°8) and links to Shore type clean-up – Synoptic guidelines, and Clean-up datasheets

Note. N 01 – "LEAVE ALONE" or NATURAL CLEAN-UP may be an option.

ESI	Shoreline type	Oil persistence	Worksite layouts - Phases 1 & 2	Work	Support	Access	Synoptic guidelines (Cedre)	Technique datasheets - Phase 2 (Cedre)
1A	**Exposed rocky shores / cliffs**	Few weeks	**Rocky shores & platforms**	Maritime	Maritime (Terrestrial)	Maritime	Rocks & infrastructures	N12 FLUSHING N19 HIGH PRESSURE WASHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE
1B	**Exposed, solid man-made structures**		**Quayside & rip-raps**	Maritime or Terrestrial	Terrestrial	Terrestrial		
1C	**Exposed rocky cliffs with boulder talus base**		**Rocky shores & platforms**	Maritime	Maritime (Terrestrial)	Maritime		
2A	**Exposed wave-cut platforms in bedrock, mud, or clay**	Few months	**Rocky shores & platforms**	Terrestrial	Maritime (Terrestrial)	Maritime (Terrestrial or aerial)		
3A	**Fine- to medium-grained sand beaches**	1 - 2 years	**Sandy beaches**	Terrestrial	Terrestrial	Terrestrial or Maritime or aerial	Sand	N07 REMOVAL/ADHERENCE USING SPECIALISED EQUIPMENT N08 SAND SCREENING USING SPECIALISED MACHINERY N10 SURFWASHING N12 FLUSHING N16 UNDERWATER AGITATION N17 TILLING N18 DRAINAGE N29 BIORESTAURATION
4	**Coarse-grained sand beaches**	1 - 3 years	**Sandy beaches**	Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)		N07 REMOVAL/ADHERENCE USING SPECIALISED EQUIPMENT N08 SAND SCREENING USING SPECIALISED

5	**Mixed sand and gravel beaches**	3 - 5 years	**Sandy beaches**	Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)		MACHINERY N10 SURFWASHING N12 FLUSHING N16 UNDERWATER AGITATION N17 TILLING N18 DRAINAGE N29 BIOREMEDIATION
6A	**Gravel beaches (granules and pebbles)**	3 - 5 years	**Pebbles beaches**	Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)	Pebbles & cobbles	N10 SURFWASHING N12 FLUSHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE N20 WASHING ON CAGES N22 WASHING USING A CONCRETE MIXER N23 WASHING IN A CONCRETE MIXER DRUM N24 WASHING AT A POLMAR PLANT N29 BIOREMEDIATION
6B	**Exposed riprap**		**Quayside & rip-raps**	Maritime or Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)	Rocks & infrastructures	N12 FLUSHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE
8A	**Sheltered scarps in bedrock, mud, or clay**	> 5 years	**Rocky shores & platforms**	Terrestrial	Maritime (Terrestrial)	Maritime (Terrestrial or aerial)	Rocks & infrastructures	N12 FLUSHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE
8B	**Sheltered, solid man-made structures**		**Quayside & rip-raps**	Maritime or Terrestrial	Terrestrial	Terrestrial		
8C	**Sheltered riprap**		**Quayside & rip-raps**	Maritime or Terrestrial	Terrestrial (maritime)	Terrestrial (maritime)		

11.5 Shore clean-up - Choice matrix (Cedre, 2004)

Provided as general guidelines.

11.5.1 Phase 1 / Fluid pollutant

PHASE 1 : INITIAL CLEAN-UP			Natural clean up	Pump			Recovery				Recovery Help			Protection		
TYPE		EXPOSITION		Skimming	Pumping	Aspiration	Scraping	Manual recovery	Sand Screening	Rollers	Flushing	Flooding	Surf washing	Mop nets	River bed	Geo-textile
Harbour infrastructures	Quayside	+														
		-														
	Rip raps	+														
		-														
Rocks	Cliffs	+														
		-														
	Flatlands	+														
		-														
	Blocks	+														
		-														
Sediment beaches	Pebbles	+														
		-														
	Coarse sand	+														
		-														
	Thin sand	+														
		-														
Marshlands		-														

Recommended

Can be useful

In certain conditions

Non applicable

11.5.2 Phase 2 / Fluid pollutant

PHASE 2 FINE CLEAN UP			COLLECT							WASH				DEGRADATION		
TYPE		EXPOSITION	Manual recovery	Flushing	Drainage	Tilling	Underwater agitation	Mecanical screening	Pruning	Surf Washing	High pressure washing	Concrete mixer washing	Effluent recovery	Natural clean up	Bioremediation	Scatification
Harbour infrastructures	Quayside	+														
		-														
	Rip raps	+														
		-														
Rocks	Cliffs	+														
		-														
	Flatlands	+														
		-														
	Blocks	+														
		-														
Sediment beaches	Pebbles	+														
		-														
	Coarse sand	+														
		-														
	Thin sand	+														
		-														
Marshlands		-														

Recommended

Can be useful

In certain conditions

Non applicable

11.6 Waste storage sites

11.6.1 Intermediate waste storage sites

11.6.1.1 Requirements for intermediate storage sites identification

Distance from the shore	Not more than 5 km if possible, 30 to 50 km maximum
Surface area	Several thousands of m²
Location	**In areas declared as free of landmines (or other abandoned ammunitions) by competent services**
Access	Access and traffic systems able to allow traffic of heavy lorries
Hydrogeological and soil conditions	- Load-bearing capacity must be adequate - Impermeable subsoil, either naturally or artificially - Avoid groundwater systems - Avoid wetlands, areas at risk of flooding
Topographical constraints	Flat or slighty sloping
Environmental conditions	- At a safe distance from populated areas (50 m or more) - Beware of the impacts of lorries - Avoid protected areas, cultural or archaeologically sensitive sites

11.6.1.2 Recommendations for the set-up of intermediate storage sites

Occupancy	Plan on occupying for 0 to 1 year (more in extreme cases) according to Angolan regulations	
Example of storage capacities (to be adapted to local capacity/road network)	1 500 m²	3 000 m²
	1 watertight platfom of 200 m² 1 watertight platfom of 400 m² 2 (or bunded areas) pits of 200 m³ each	2 watertight platfoms of 400 m² 4 pits (or bunded areas) of 200 m³ each
	- Waste segregation: Storage pits for liquids and semi-solid waste Platforms for solid waste (in bulk, or in bags) - Cover for full storage facilities (provide air vents)	
Soil protection	Geotextile (non woven, puncture resistant) Geomembrane High Density Polyethylene (HDPE) sheet (1,5 mm width) Geomembrane welding, anchor system for HDPE…	
Security measures	Fences, gates, guards	
Management and maintenance conditions	- Risk assessment - Supervision of all traffic (waste tracking, quantities assessment) - Mobile weighbridge system - Rain runoff collection facilities / oil recovery system (sludge trap/skimmer) - Fire fighting installation - Clear marking of the different areas on site - Circulation plan (the flow direction must be clearly indicated for the drivers) - Waste record logbook (to register all movements of waste and incidents occuring in the site) - Decontamination areas for the vehicles - Site restoration once all waste has been evacuated	
Monitoring	Waste water control	

11.6.1.3 Schematic illustrating the principles of intermediate storage site set-up

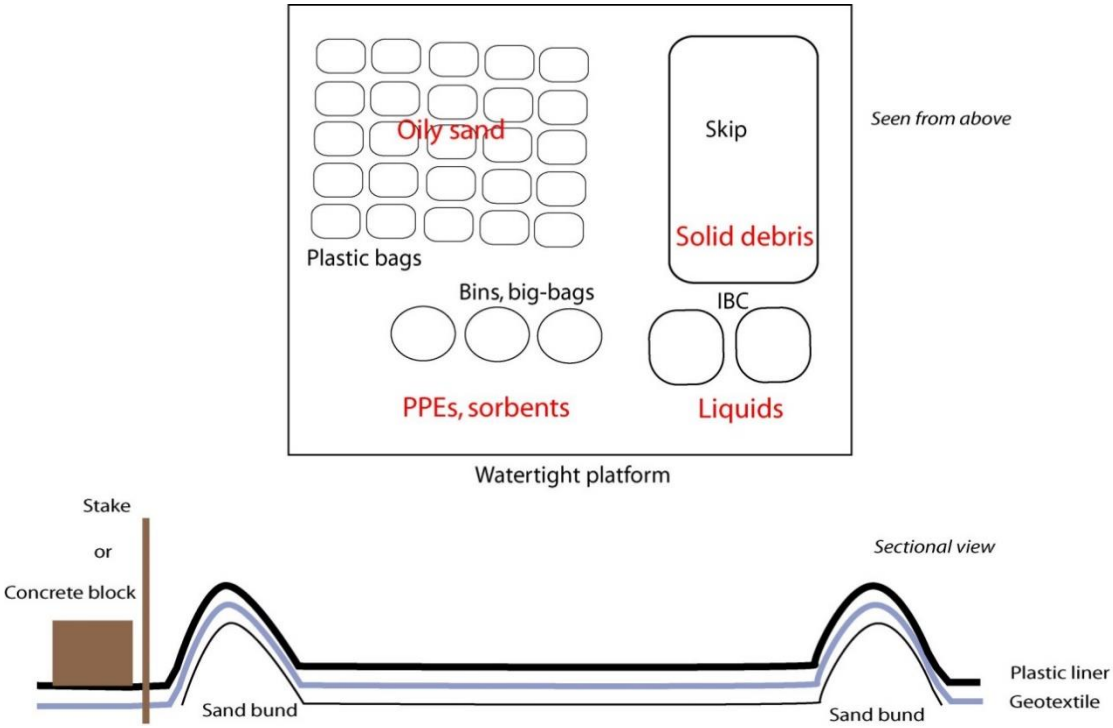


Photo: Bunded watertight platform

Photo: Cover of a primary storage site with plastic sheet

11.6.2 Long-term storage sites

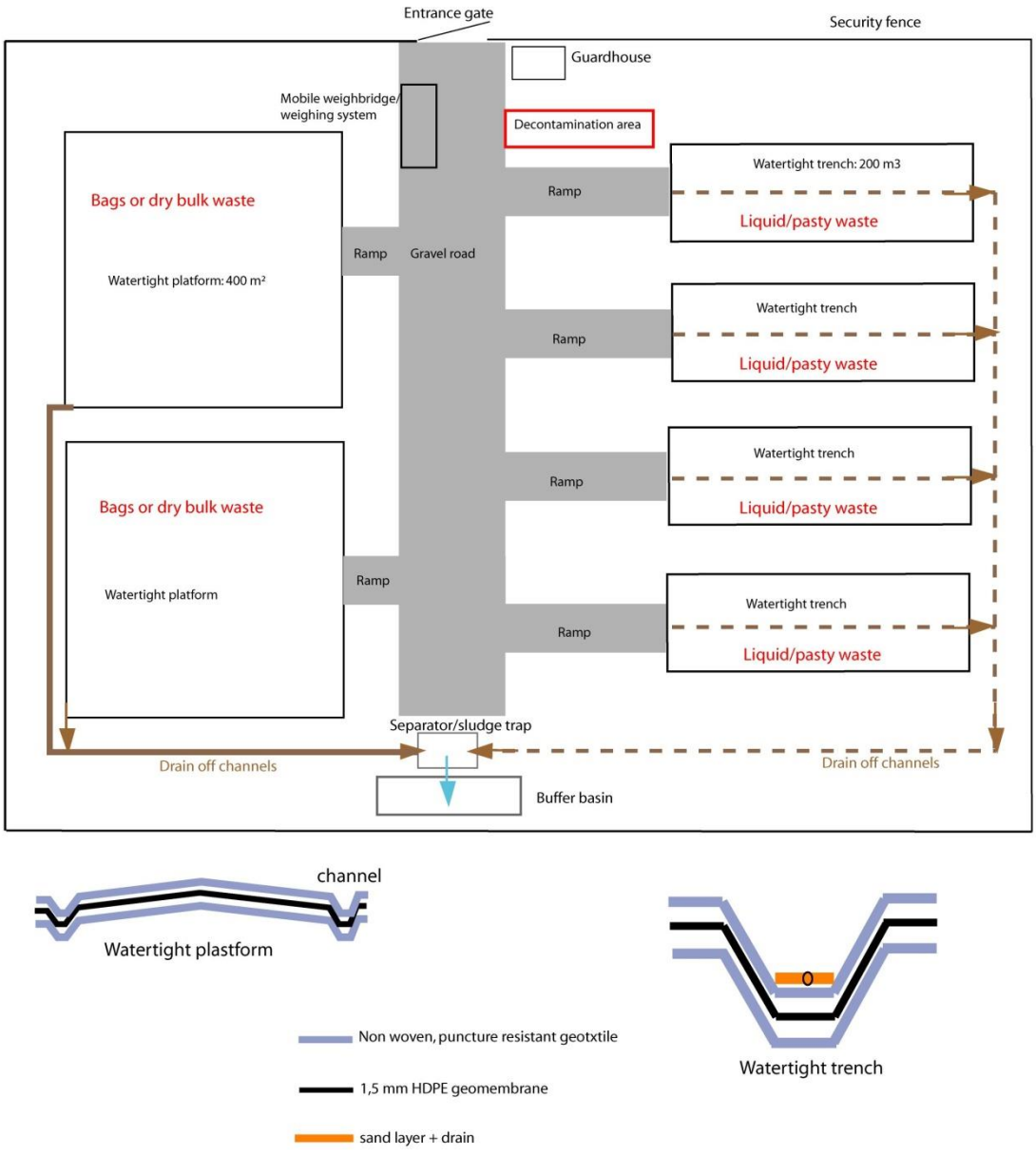
11.6.2.1 Requirements for long-term storage sites identification

Distance from recovery/ transfer sites	Not more than 50 to 100 km; ideally, one hour by road from previous storage, or as easy as possible to access
Surface area	Several thousands of m², up to 100 000 m²
Access	Access and traffic systems able to allow traffic of heavy lorries
Hydrogeological and soil conditions	- Load-bearing capacity must be adequate - Impermeable subsoil, either naturally or artificially - Avoid groundwater systems - Avoid wetlands, areas at risk of flooding
Topographical constraints	Possibility of carrying out terrace earthworks and grading at various levels
Environmental conditions	- At a safe distance from populated areas (50 m or more) - Beware of the impacts of lorries - Avoid protected areas, cultural or archaeologically sensitive sites

11.6.2.2 Recommendations for the set-up of long-term storage sites

Occupancy	Plan on occupying for up to 5 years, according to Angolan regulations
Surface area	20,000–100,000m² surface area.
Storage capacities (to be adapted to local capacity/road network)	Storage pits (1,000–10,000 m³). - Waste segregation: Storage pits for liquids/semi-solid waste Platforms for solid waste (in bulk, or in bags) - Cover for full storage facilities (provide air vents) - Pre-treatment, stabilization
Soil protection	Geotextile (non woven, puncture resistant) Geomembrane HDPE sheet Geomembrane welding, anchor system for HDPE…
Security measures	Fences, gates, guards
Management and maintenance conditions	- Risk assessment - Supervision of all traffic (waste tracking, quantities assessment) - Mobile weighbridge system - Rain runoff collection facilities / oil recovery system (sludge trap/skimmer) - Fire fighting installation - Clear marking of the different areas on site - Circulation plan (the flow direction must be clearly indicated for the drivers) - Waste record logbook (to register all movements of waste and incidents occuring in the site) - Decontamination areas for the vehicles - Site restoration after a complete environmental assessment of the impacts of the waste storage
Environment site monitoring	Waste water control Installation of groundwater monitoring wells Air monitoring (VOC, H_2S…) Soil sampling

11.6.2.3 Schematic drawing illustrating the principles of a long term storage site set-up



Seen from above and sectional view

OIL SPILL CONTINGENCY PLAN

OPERATIONAL SUPPORT N°8:

SHORELINE SPILL RESPONSE TACTICS & SITE COORDINATION

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

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Markings:

/!\ Warning

🗎 *Link to other documents of the TEP Liban OSCP*

ⓘ *Link to external document or information, not part of the TEP Liban OSCP*

TABLE OF CONTENTS

Table

Note. Some sections in the present volume are provided for information (in French).

1. ONSHORE SAFETY FOR RESPONSE

All Golden Rules remain applicable during any oil spill response operations.

See:

Operational Support n°4, "Golden Rules" in section "SAFETY PROCEDURES FOR OFFSHORE RESPONSE"

1.1 Job Risk Assessment – Before any onshore/ on land operation

Clean-up workers are mainly non-specialized personnel, hired for the clean-up, who may be exposed to various hazards, to be identified prior to any operations.

Hazards are related to the environment & conditions, the pollutant, the clean-up operations and equipment used. Due to the variety of coastal environments, oiling and local conditions (weather, currents, tides, access etc.), **specific Job Risk Assessment are carried out before any shoreline clean-up or protection operations.** For most sites (with no specific hazards), the Job Risk Assessment can be expedited.

Workers are briefed accordingly and provided with appropriate PPE.

Table 1 : Hazards on site.

Hazards related to conditions on site • Wind, waves, (rip) currents • Heat stress, dehydration **Hazards related to the sites** • Risks of landslides, falling rocks, etc. • Cliff erosion • Sharp/ cutting rocks **Hazards related to fauna & flora** • Poisonous fauna, mosquitoes, rodents… • Venomous plants	**Hazards related to response operations** • Accident during transport to & from the sites • Slip & fall • Collision/ hit with vehicles on site (earth-moving/ heavy machinery, 4x4 etc.) • Back injury from lifting and carrying • Skin and eye irritation or rashes (dermatitis) from contact with oil • Cuts, sprains and other injuries • Noise, exhaustion and fatigue
Hazards related to the pollutant • Inhalation of pollutant • Skin contact, etc.	**Hazards related to security**: • Tensions with local communities etc.
Others To be defined on a case by case basis.	

1.2 Site-Specific Health & Safety Plan

Based on the findings of the Job Risk Assessment, a Site Health and Safety Plan is implemented prior to any protection or clean-up, including (indicative):

Table 2: Indicative structure of a Site Health and Safety Plan.

RISKS	• Linked to the site and environment • Linked to the operations and equipment to use
WORKING PROCEDURES	• Local IC in charge of the area and team supervisors • Use of equipment (high pressure cleaner, water pumps, etc.) • Management of oily waste • Circulation of personnel and engines on the working site • Work organization (buddy system, shifts, specific local hazards, etc.)
HEALTH & SAFETY MEASURES	• Breaks including catering and water + prevention of heat stroke • Rest rooms & washing of hands before eating • Decontamination procedure after the work (steps and products to use)
LEVEL OF PPE FOR WORKERS	• Workers with no contact with oil: standard overall, safety boots, gloves. • Manual clean-up: disposable overall, boots (+ socks), oil- or chemical-resistant gloves (+ under-gloves), • High pressure clean-up: Standard + mask (to protect from inhalation of vapours) + goggles (to protect the eyes from pollutant spray and fragments of rock) • Operations from boat and close to deep/ shallow waters: life jackets. • Helmets when necessary (lifting, cliffs, sliding material or rocks).
EMERGENCY PROCEDURES	• Contacts of supervisors, Local IC, Safety Officer, 1st Aid responders; • Emergency contacts at TEP Liban; • Contacts of the closest reliable medical facility and doctor; • MedEvac procedure, etc.

1.3 Health & Safety instructions during operations

Every worker arriving on a working/ clean-up site provides a medical certificate to guaranty his fitness for the job. When employing local communities, a Medic or doctor ensures personnel employed are fit for the job.

A Health & Safety Officer ensures on site (managed directly by TEP Liban or contracted company):

- Appropriate Health and Safety measures are implemented on site;
- Operations are carried out safely;
- PPE level is satisfactory.

Each clean-up site is equipped with (at least) two 1st Aid Kits. The standard first aid kit is complemented depending on specific risks (e.g. eye cleaners for high pressure washing).

One qualified First aiders can be present on site at short notice.

Each site will have an Emergency summary sheet (extracted from the Site-Specific Safety Plan) with:

- Contacts of the supervisor of the site and of the Local IC in charge of the area;
- Procedure for decontamination;
- Procedure for Medical emergency, including MEDEVAC (by road, boat or helicopter);
- Emergency contacts (Person In charge, closest hospital or medical facility);

- Key information to provide when calling for an emergency.

"EMERGENCY SUMMARY SHEET – ON SITE", p.70

On high risk area (cliffs, wave exposed rocky area), all workers remain in permanent visual contact:

- Use buddy working system. No isolated worker.
- Ensure one person has permanent visual contact with personnel, equipped with Talkie Walkie or VHF.

1.4 Training & briefing

Before any operations, provide to each operator a basic training on:

- Main hazards, operations and working procedures and chain of command;
- Organization of the working site: cold, warm and hot zone, circulation on site;
- PPE to use, Health and Safety issues: decontamination, 1st aid kit, emergency contacts and procedures.

After the training, each operator signs a form to recognize receiving basic training, and being aware of the hazards and Health & Safety procedure and working accordingly to the rules.

Each operator has, every day, appropriate PPE to carry out operations.

Every day, the supervisor on site holds a morning briefing to detail planned operations of the day and remind the safety measures in place.

1.5 Decontamination of personnel & equipment after operations

Decontamination areas for personnel and equipment are organized as follow, from the most to the less dirty:

Table 3: Steps to follow for decontamination.

STEPS (each in a dedicated area)	**EQUIPMENT**
1 - Cleaning or disposal of small equipment (buckets, shovels, etc.).	Use tanks, high pressure cleaner, cleaning product.
2 - Removal of disposable PPE	Use plastic bags / bins to store oiled PPE.
3 - Cleaning of protective equipment (other than disposable PPE) when applicable: boots, rain coat etc.	- Water hose, cleaning with rags (with gasoline) - High pressure cleaner with moderate temperature and pressure: max. 50 bars et 40°C
4 - Cleaning of hands and face	Use first vegetable oil and sorbent paper then soap, fresh water, rags.
5 - Changing of the personnel in changing rooms / dedicated area	Prepare a sheltered (shaded) changing area.

2. IMPLEMENTATION & FOLLOW-UP OF PROTECTION OPERATIONS

For the preparation of protection operations, refer to:

Operational Support n°4, section "PROTECTION – PLANNING OPERATIONS".

Description of each site, with sensitivity, access, boom deployment plan (with satellite image background) and type & amount of equipment is prepared by the IMT/ Operation section with the help of IMT/ Planning.

2.1 Re-evaluation of situation at arrival on site

Upon arrival on site, a site survey is carried out to check the protection plan considering the conditions on site (waves, currents, access etc.) and adapted if needed (e.g. changes of conditions):

- Evaluation of conditions on site: tidal/ river currents, wind at day and night etc.;
- Evaluation of the maximum current, and needed boom angle with current;
- Length of boom needed depending on the river width and booming angle;
- Staging area and boom launching area, prefer to tow boom facing wind and/ or current;
- Identification of anchoring points and techniques (for high and low tide);
- Identification of shore-sealing boom needed (depending on slope of beach or bank and tidal range);
- Estimation of the boat horse-power required for the towing of the boom and number of vessels.
  - Rule-of-thumb: 1 horse power <> 20 kg pulling strength.

A tactical sketch of the boom deployment is prepared, and the step by step process to launch, deploy and anchor the boom is shared with all team members.

See examples in:

"Boom launching guidelines", p.40

Best time to deploy the booms is chosen after the site survey, particularly if tidal currents are significant (which will be rare in Lebanon):

- Low tide: no/ weak currents, all shore accessible by foot, less water depth on foreshore, which may facilitate the positioning of shore sealing boom and intermediate anchoring;
- High tide: no/ weak currents, higher water depth close to the shore, which may facilitate the navigation of small boats;
- Mid-tide: strongest tidal currents, possibly not a good period to deploy boom.

2.2 Marine support for protection operations

For towing and setting up of boom, boats are needed. The first option is to use locally available boats when available and reasonably safe (ports, fishermen, etc.).

Other option is to bring small shallow draft work boats on road trailer.

Indicative type of work boat for small protection booming operation (+/-100m boom in sheltered areas):

- Length: 4.5 to 5.5 m;
- Type: plastic with small draft (alternative: aluminium);
- Weight: light: maxi 500 kg (more easily to move with 4 persons);
- Power: outboard mini 20-30 HP to 50 CV;
- Mobilization: Solid road/ launching trailer with manual winch;
- Additional equipment: VHF, anchor, towing lines, raw, safety equipment (extinctor) + life jackets for crew.

2.3 Safety & Operations briefing

Local authorities are notified prior to the deployment.

A Safety & Operation briefing is organized before the deployment by the team leader:

- Specific safety measures in place;
- Role & responsibilities of each;
- Step by step sequence of operations: preparation/ launching, towing, positioning, anchoring, intermediate anchoring, check;
- Logistical support for the deployment (4x4 vehicle, quad, boats, etc.);
- Communications.

2.4 Preparation of boom deployment

Before the deployment, all equipment and boats are checked.

Equipment (boom) is positioned on site and secured if needed (e.g. boom reel on the quayside).

Anchoring points and devices are prepared on all locations, as well as towing lines, main and intermediate anchoring lines, securing lines, etc.

A team may be transferred on the other anchoring location to assist if possible.

Communication equipment is tested.

Boom is prepared, ready to be launched:

- Depending on the type of boom:
  - Foam filled boom in crates or bag: all boom out, connected and in “Z” configuration,
  - Inflatable boom on the bank or quayside: connected, inflated and in “Z” configuration,
  - Boom on reel: +/-10 to 20m of boom unreeled and inflated/ prepared,
- Connection of towing triangles and towing lines;
- Check of the condition of the boom and connections.

Launching area is prepared:

- Beaches and banks: removal of sharp objects/ vegetation/ obstacles etc.;
- Quayside and slipways: liner positioned to protect the boom;
- Anticipation by the towing vessel of the drift with the boom to choose the right sailing direction.

See technical information in:

"Technical sheets for boom deployment & anchoring", p.41

2.5 Launching of boom

Start of launching

One supervisor (or team leader) coordinates the deployment with other team leaders and vessels engaged.

First sections of boom are launched, and towing lines passed to the vessel.

/!\ Beware to avoid twists of the boom skirt during the launching.

Once the towing line is secured, vessel heads away, towards the anchoring point, compensate for the drift and keeps sufficient speed to maintain manoeuvrability (2-3 knots when safe).

An assistant on board visually checks the boom launching.

Captain of the vessel keeps constant communication with the supervisor on land and:

- avoids putting too much pressure on the boom (sailing too fast).
- remains ahead of the boom, even if sailing with wind and/ or current from the back.

/!\ Synchronization between vessel (sailing speed) and boom launching (speed) is critical.

An assistance vessel can assist in the towing and boom control by securing a second towing line on the boom on an intermediate point.

End of launching

The vessel comes close to the anchoring point and transfers the securing line to the land team (while keeping the towing line connected to the vessel).

Once the boom is secured on the anchoring point, the towing line is disconnected, and also transferred to the land team which can use it as a secondary anchoring line.

The vessel positions the intermediate anchoring lines as needed.

The land team on the launching area finishes the launching of the boom and secures it onto its anchoring point.

Water-tightness is installed at each anchoring point as needed (to avoid oil leaks between the boom and the quay/ bank/ beach):

- shore-sealing boom;
- sorbent boom;
- other systems.

2.6 Follow-up

The supervisor notifies the IMT/ Operation of the set-up of the protection.

The supervisor and the IMT/ Operation agree on the daily follow-up procedure of the boom and designates the team in charge.

3. PREPARATION OF CLEAN-UP OPERATIONS

3.1 Set-up and management of Local IC Post, base camp and equipment storage

Depending on the location of the work sites, the Local Incident Command Post(s) can be set-up in a close location/ city with existing facilities, water, electricity, communications etc. (hotel, lodge, administrative building, school, etc.).

3.2 Worksite layouts, intervention techniques and work, support & access modes

Clean-up techniques are confirmed considering the types of shore, type and level of oiling.

The main types of shores identified in Lebanon, requiring specific worksite layouts are listed below:

- Rocky shores & platforms;
- Quaysides & rip-raps;
- Sandy beaches;
- Pebble beaches.

The worksite layouts, for these types of shore, present:

- Typical work site layouts, for phase 1 & 2 operations, with land or sea work, access and support;
- Photos of representative Lebanon shores;
- Links to Synoptic guidelines describing Phase 1 & Phase 2 operations and technical datasheets describing the recommended clean-up techniques.

See:

Appendices "*Shore clean-up worksite layouts & equipment*", p.21

3.3 Preparation & zoning of worksites

Before any operations, the Local IC and supervisors:

- Ensure Local/ Provincial authorities and local communities are notified, and have access authorization.
- Ensure landowners are informed, and traditional rights and usage respected (when applicable).
- Obtain the necessary authorisations;
- Clarify the responsibilities of each party (local authorities, companies, ordering party);
- Review the clean-up techniques, their feasibility, probable efficiency and identify any risks;
- Ensure operations can be carried in a safe and secured environment (landmines, guard, etc.).
- Reviews the needed equipment and consumables to initiate the operations, and resources needed daily;
- Review the work/ logistics/ access modes (terrestrial, maritime or aerial) and set-up on site;
- Review the access to the sites, and anticipate the zoning of each worksite (Hot – Warm – Cold);
- Anticipate the work progress direction of the clean-up (usually clean-up is carried out following the main drift to minimize the possible re-oiling of areas already cleaned).

4. IMPLEMENTING CLEAN-UP OPERATIONS

4.1 Zoning of worksites

Supervisors should as much as practically possible (with land-based work):

- Delineate the overall extent of the working site (which will change over time as the clean-up progresses);
- Ensure the installation of an appropriate signalization (for the sites, entrances and exits, accesses etc.);
- Organize the working sites in **HOT** - **WARM** - **COLD** zones as illustrated in the figure below.

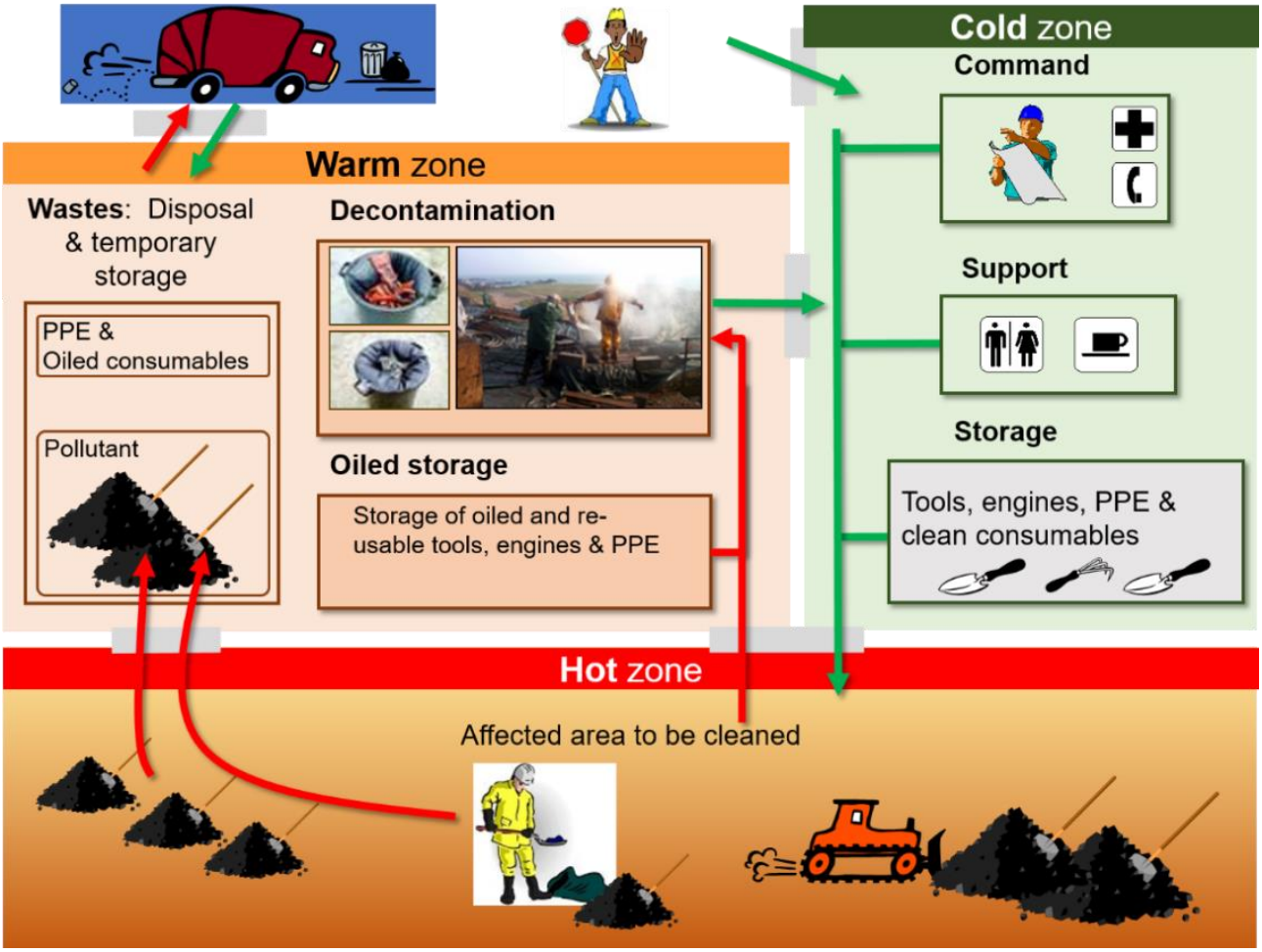


Figure 1 : Zoning of shore/ land clean-up sites

Table 4 : Description of Hot – Warm – Cold zones for shore clean-up sites

HOT ZONE **= Oil recovery & clean-up** (Restricted access)	- Delineated precisely (Red & White ribbon, traffic cones etc.). - No access without PPE.
WARM ZONE **= Oil spill waste storage**	- Delineated precisely (Red & White ribbon, traffic cones etc.). - Access limited to authorized personnel. - Area protected as needed (ground protection for storage of waste). - Appropriate waste storage area depending on daily production of waste.
= Decontamination area	- Fresh water + soap + vegetable oil + rags + sorbent paper. - Bins for oiled wastes. - Staging area for re-usable tools and PPE.
COLD ZONE (Uncontaminated) **= Staging area (equipment)**	- Delineated (Red & White ribbon, traffic cones etc.) and traffic signs. - Also: catering area, logistics area, command post (option), parking, traffic regulations and directions etc.

See "G01 WORKSITE DEFINITION", p.67

4.2 Set-up of worksites

▶ STEP 1. GENERAL DELIMITATION OF WORKING SITE AND ZONES: COLD, WARM, HOT

- Delineate on site the extent of the working, waste storage, equipment staging etc. sites, and ensure the installation of an appropriate signalization (for the sites, entrances and exits, accesses etc.).
- Ensure the surroundings of the working sites are safe and access limited and controlled as much as possible.
- Define the access roads/ tracks to the work sites, traffic circulation, in/out access to the site and parking areas (visitors, supplies etc.).
- Define, inside the working site, the **COLD, WARM, HOT** zones (see previous section) and tracks for vehicles and personnel on foot.

▶ STEP 2. SET-UP OF COLD ZONE.

- Store clean equipment and supplies, parking area, rest & catering area on the work site. Alternative location: Local Incident Command Post.
- Size of the zone depends on the number of personnel/ day, amount of equipment and consumable to received and stage (vs. available space on site).
- Sheltered from the wind, rain, waves, etc. and located close to the **WARM** & **HOT** zones.
- Easily accessible from the road or track (as much as practically possible) or sea.
- Delineate, mark out and organize a storage area for fuel, away from catering and other staging areas:

- Separate clearly and identify gasoline (red tanks/ cans) from gasoil (black/ green tanks or cans).
- Position a fire extinguisher close.

▶ STEP 3. SET-UP OF WARM ZONE.

- Delineate, mark out and organize an oil spill waste storage area:
  - Close to and accessible from the **HOT ZONE**,
  - With ground protection, out of reach of waves, and sheltered from the wind and rain if possible,
  - Allowing the sorting and storing of the waste,
  - Easy access for operators, vehicles, boats etc. bringing or evacuating oil spill waste,
  - Dimension depends on the expected volume of waste generated daily compared to the frequency of waste evacuation (daily? Every 2-3 days? Weekly? Less?).
- Delineate and set-up an area for the storage of oiled and re-usable PPE (e.g. plastic boots) and oiled equipment:
  - Close to and easily accessible for operators coming from the **HOT ZONE**,
  - Out of reach of waves, and sheltered from the wind and rain,
  - Dimension to be defined according to the number of operators per day on the site(s).

▶ STEP 4. SET-UP OF HOT ZONE.

- Delineate and mark out the extent of the **HOT ZONE** (area where clean-up operations are going to take place the current day, and next days).
  - Extent will vary depending on the site configuration, degree of oiling, clean-up techniques, amount of machinery and treatment rate expected, foreseeable difficulties, expected daily progression with the available resources etc.
- Define the daily progress direction of the clean-up work and displacement direction of the **HOT ZONE** as work progresses e.g.:
  - From top to bottom of beach,
  - From top to mid cliff for operators on rope,
  - From upstream to downstream for rivers etc.

▶ STEP 5. SECURING THE WORKING SITE.

Before any work, the supervisors ensure that all workers are aware of the operations, the risks and prevention measures & emergency procedures in case an incident happens. Key messages are repeated every day to all workers through a morning briefing.

Safety of personnel relies on key rues such as:

- Use of appropriate **Personal Protective Equipment (PPE)** depending on the operations;
- **Respect** of the zoning of the working site, traffic rules, safety measures, decontamination procedure etc.,
- Presence of a Health & Safety officer on site.

See "G02 & G03 PERSONNEL SAFETY, Cedre", p.68

Working site is organized to ensure the safety of all individuals (personnel and public):

- Employment of specialized personnel for specific tasks (rope work);
- Prohibit access of public to the working sites;
- Set-up and maintain the marking of all sites and areas;
- Enforce rules for work, traffic, use of equipment for clean-up operations, minimum PPE etc.

- Ensure availability of appropriate 1st aid kits on site and competent 1st aid responders;
- Ensure procedure is in place and operational for emergency medical evacuation.

Site supervisor ensures that:

- All workers and personnel know the emergency contacts;
- Panels on site clearly display names & contacts of person in charge and emergency contacts, and immediate actions in case of emergency

See "*G04 WORKSITE SAFETY, Cedre*", p.69

See "EMERGENCY SUMMARY SHEET – ON SITE", p.70

4.3 Health & Safety on site and decontamination

Key rule: NO PROTECTION ? NO OPERATION.

Operations only start:

- once a complete decontamination chain is set-up for every personnel at each clean-up site;
- when all personnel are aware of the H&S measures;
- when emergency procedures applicable on site are in place, e.g. medical evacuation;
- when all personnel have the appropriate PPE, and stocks are available on site to sustain the operations.

See "G05 DECONTAMINATION OF PERSONNEL", p.71

4.4 Respecting the environment

Some actions can limit the potential environmental impact of the clean-up.

- Channelling of & limiting road traffic to avoid secondary contamination e.g. with waste transport;
- Installing of first/ basic decontamination area for personnel and vehicles coming out of the working areas;
- Protection of the ground and vegetation to limit their degradation with the clean-up and waste storage;
- Respecting environmental recommendations provided by specialists.

See "G06 ENVIRONMENTALLY FRIENDLY PRACTICES ON THE WORKSITE", p.72

4.5 Equipment maintenance

Reliable and appropriate equipment as well as maintenance and reparation capabilities on site facilitate the response operations.

See "G07 EQUIPMENT MAINTENANCE", p.73

4.6 Daily budget monitoring of the work site

The daily record of the work site summarizes human and equipment resources used on the work sites.

Records, completed at the end of each day, are key in oil spill response:

- During the spill, these forms are a management and communication tool allowing an overview of the human and equipment resources used on the worksites hence, establishing a historical database global or detailed of the worksites (number, resources used).
- After the spill, these forms constitute a feedback database and act as archives. The daily budget forms are also used during the compensation process.

See "G09 WORKSITE RECORDS, Cedre", p.75

5. WASTE MINIMIZATION, SORTING AND STORAGE ON SITE

Present section aims at providing some guidelines for the sorting and temporary storage of waste on site.

For TEP Liban and considering spill of condensate or MGO, waste generation should be limited.

5.1 Oil spill waste minimization during clean-up operations

Minimizing the waste is a priority during clean-up.

- Collect “clean/ oil-free” solid debris and waste from the shore, before the arrival of oil, to minimize the management and cost of oil spill waste.
- Using appropriate clean-up techniques (i.e. avoid large sediment removal, clean on-site) to minimise the volume of sediments collected
- Prefer in-situ washing techniques instead of removal of oiled sediment (surf washing, flushing, etc.).

Avoid additional contamination

- Prevent soil contamination by using liners under drums, tanks and at bottom of storage pits
- Control access to clean-up sites and protect using lining and/ or geotextiles

5.2 Oil spill waste segregation during clean-up operations

Segregate the wastes, as much as possible, to allow for different disposal methods, ensuring cost effective and ecologically sound treatment.

Without prior knowledge of treatment streams, the waste should be sorted as follow.

	CATEGORIES	CONTENT	COMMENTS
1	**Liquids**	(Emulsified) oil+ water	Remove as much water as possible by settling
2	**Pastes & solids (sand…)**	Oil with sediment (sand/mud) Oiled sediment Contaminated soils	Define threshold according to pollutant
3	**Polluted pebbles & stones**	Oil with pebbles, Oiled pebbles	Criterion : degree of surface polluted
4	**Polluted sorbent**	Sorbent, geotextiles, rags	
5	**Polluted PPE & plastics**	PPEs (including gloves, boots, overalls…), liners, nets	
6	**Polluted debris**	Oiled debris/ solid waste	
7	**Polluted sea weed**	Seaweeds, vegetation, wood	
8	**Polluted fauna**	Bird, turtle and mammal corpses	

5.3 Temporary waste storage sites

Waste recovered each day is stored in temporary waste storage sites close to the clean-up sites, and ready to be evacuated, which are:

- Out of reach of the sea / waves and on a watertight area (use plastic lining for ground protection).
- Located close to the clean-up sites, and accessible by road or boat for the waste evacuation.
- Removed at the end of the clean-up operations (and the location cleaned).
- Dimensioned depending on the probable amount of waste generated during one or more days, vs. the frequency and capacity of waste evacuation (daily? Or less).
- *Note. Ideally waste is transferred to intermediate storage sites every 1 to 3 days to prevent saturation of the temporary storage, but due to the access difficulties they may remain for several days on site*.

Oil spill waste can be stored in various ways (depending on the volume and type of waste) to facilitate evacuation and avoid secondary contamination or run-off (or over-wash with rain):

- Dustbins for recovery on the shore/ temporary storage (for minor pollution).
- 1 m3 big bags for recovered waste.
- 1 m3 plastic container for temporary storage and transfer of the oil collected manually.
- Free standing flexible storage tanks for the storage of oil directly recovered with skimmers or manually.
- Pits can be used in sandy areas with typical dimension of (1.5 m deep x 1.5m wide X length depending on the volume required). The ground is protected using plastic lining.

The Site Protection Plans (developed for the most sensitive site) locate some potential temporary storage sites, located close to the sensitive sites to be protected.

Before the waste transfer to intermediate storages sites, the Local IC must estimate the quantity of each type of waste generated on the worksites.

See the appendices:

"Temporary storage sites", p.57

"G08 WASTE MANAGEMENT", p.74

Temporary waste storage (GULSER ANA spill, Madagascar, 2010. Source: Le Floch Dépollution)

6. APPENDICES

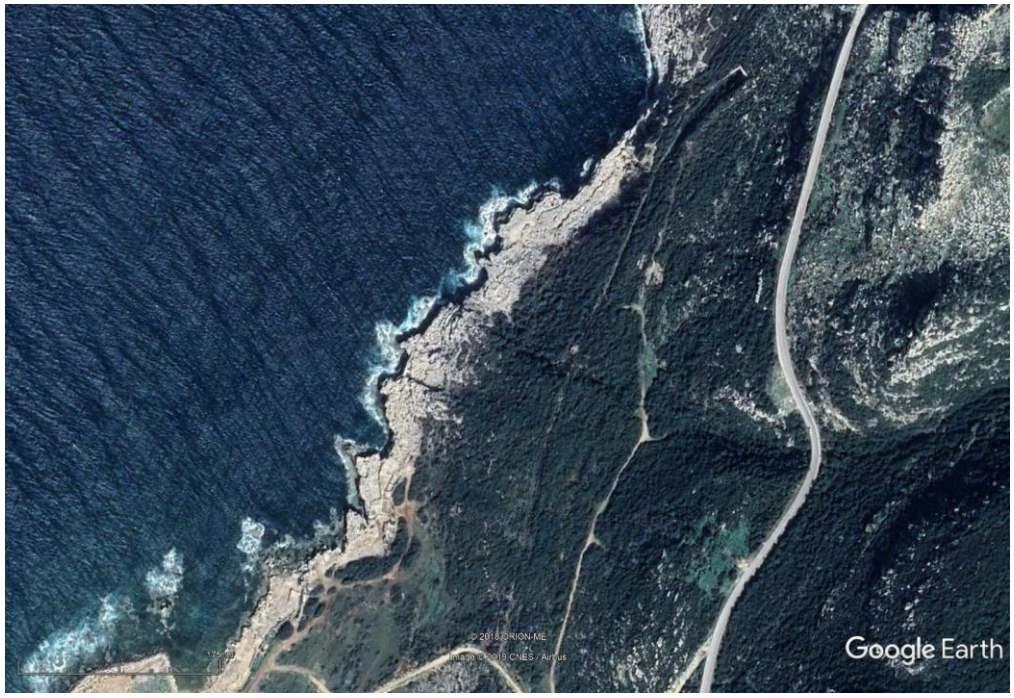
6.1 Shore clean-up worksite layouts & equipment

See next pages.

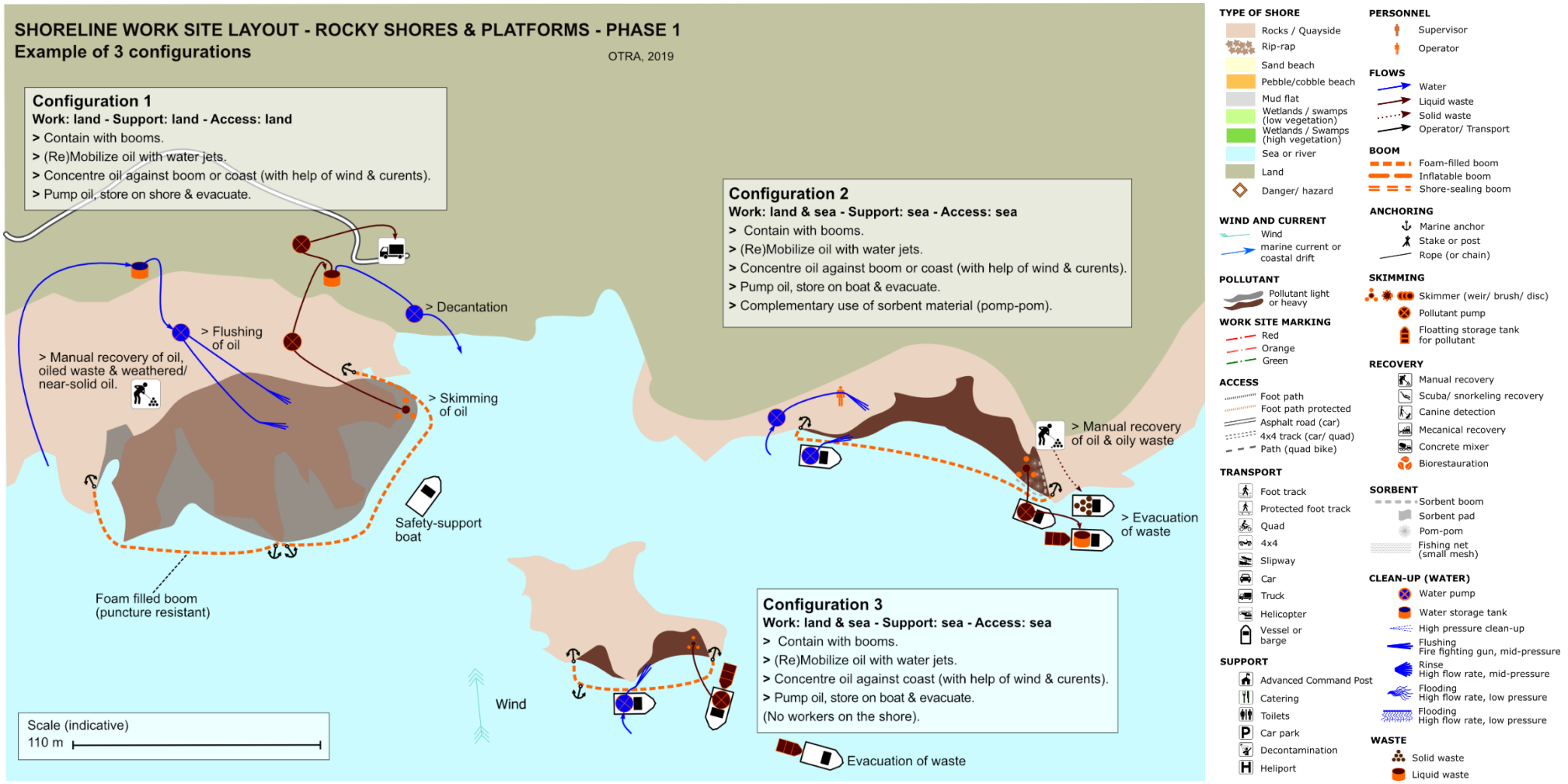
All figures by OTRA.

6.1.1 Lebanon rocky shores & platforms – Phases 1 “Gross recovery” & 2 “Clean-up”

All screenshots: www.maps.google.com (Google Earth).

Tabarja area	Ras El Cheeka cliffs area
	

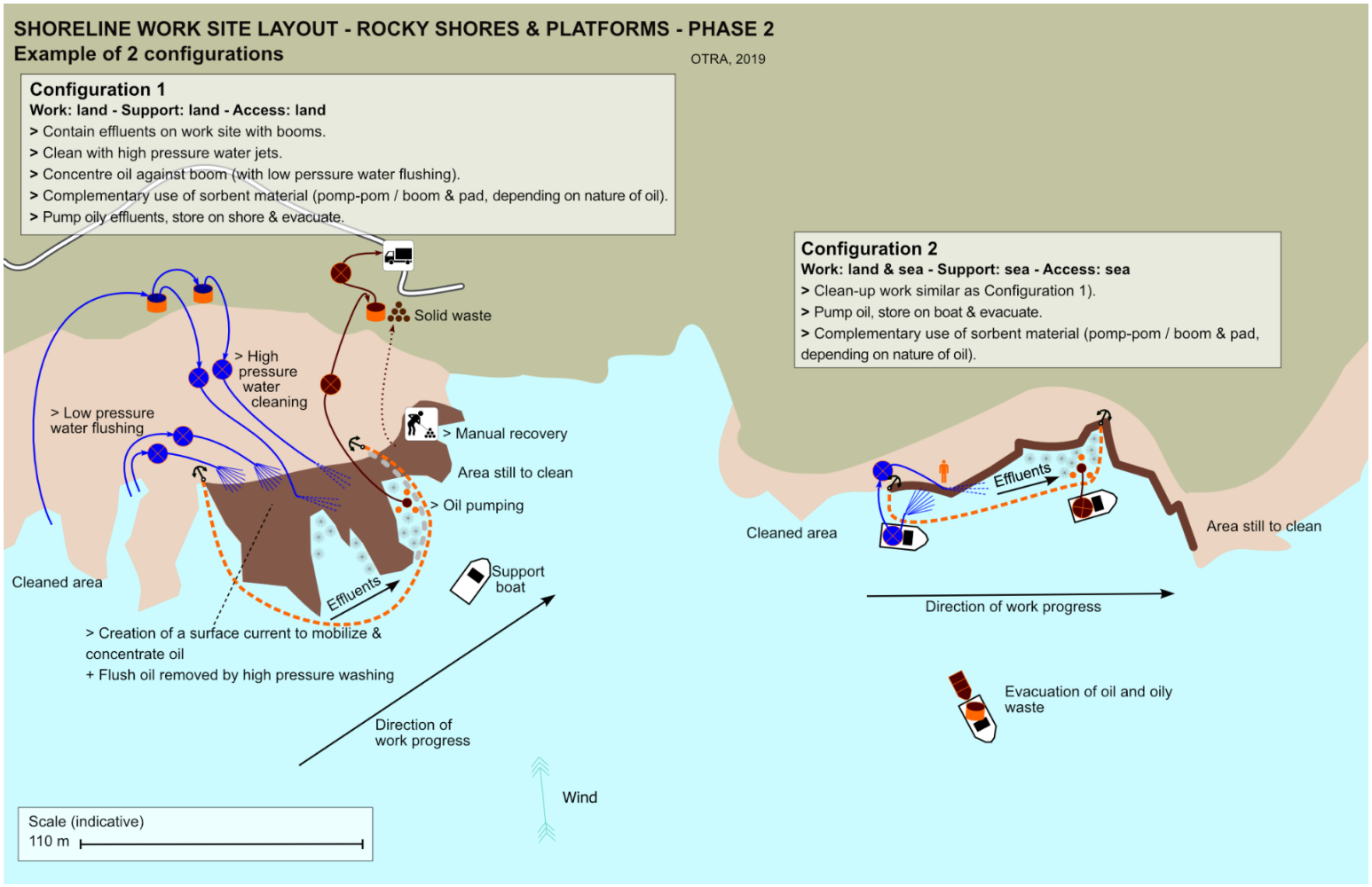
LEBANON ROCKY SHORES & PLATFORMS — PHASE 1

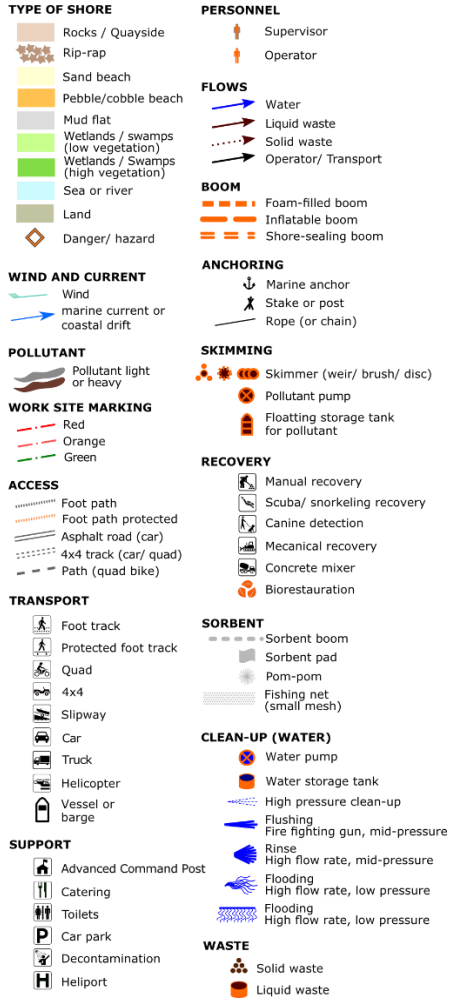


Link to Shore clean-up – Synoptic guidelines (Cedre):
Rocks and Infrastructures, Phase 1 (1/3 & 2/3)

Link to Technical datasheet:
N 02 SKIMMING/PUMPING AT THE WATER'S EDGE
N 12 FLUSHING
N 14 CONTAINMENT & RECOVERY OF EFFLUENTS ON WATER SURFACE

LEBANON ROCKY SHORES & PLATFORMS — PHASE 2

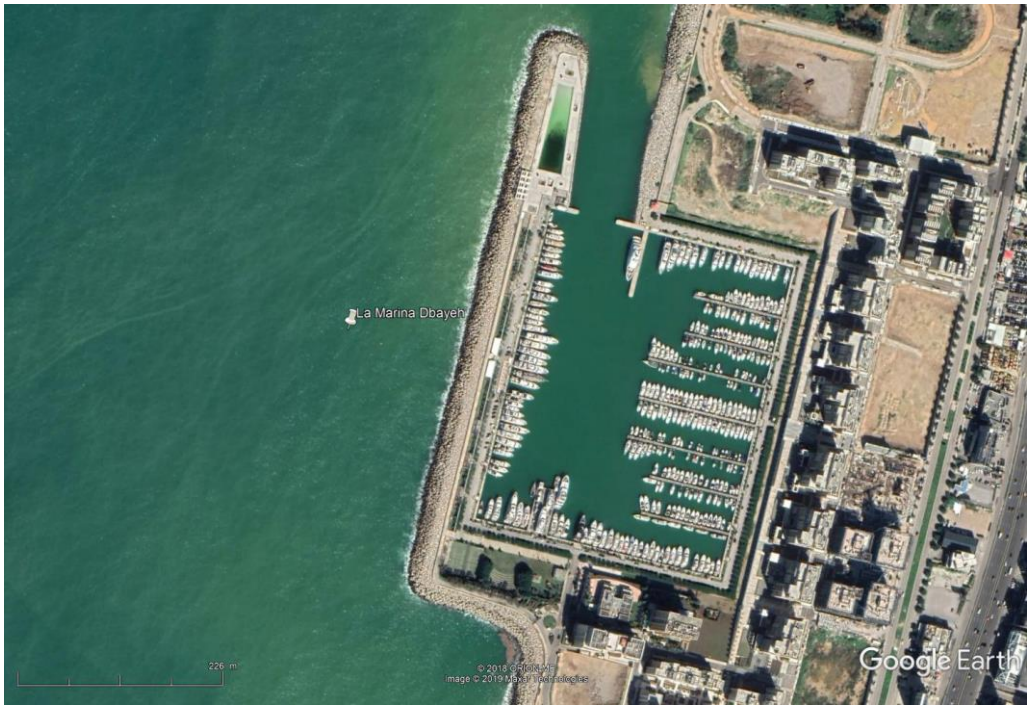
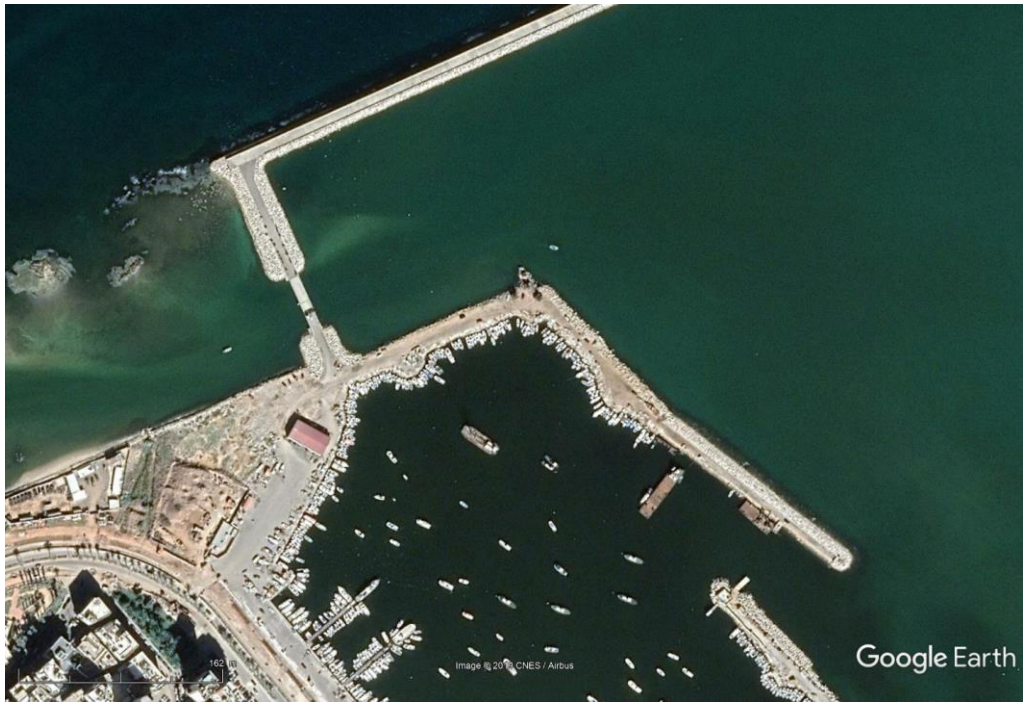




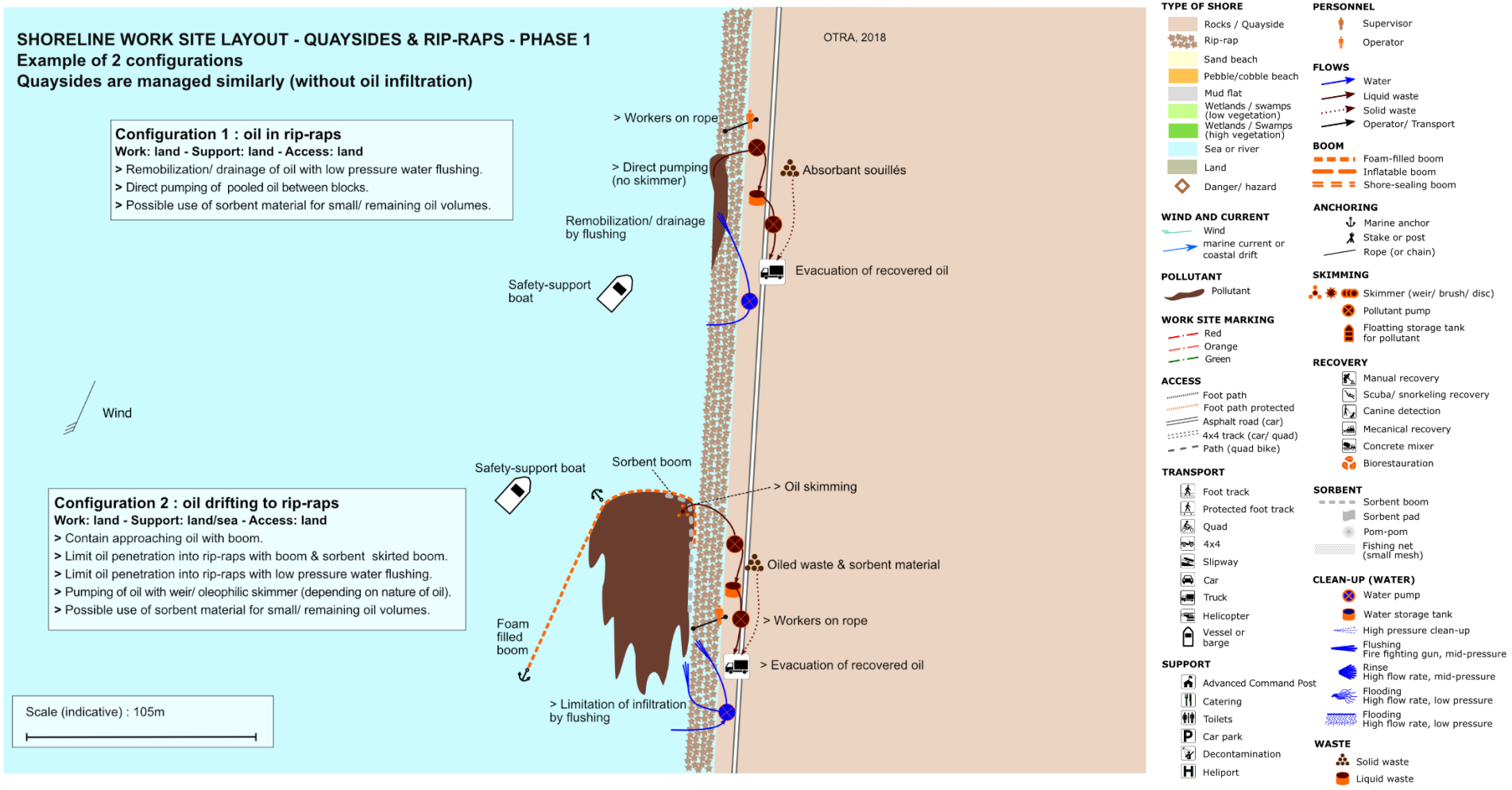
Link to Shore clean-up – Synoptic guidelines (Cedre):	Link to Technical datasheet:	
Rocks and Infrastructures, Phase 2 (3/3)	Before: MANUAL SCRAPING Before: PROTECTION AGAINST PROJECTIONS N 12 FLUSHING	N 14 CONTAINMENT & RECOVERY OF EFFLUENTS ON WATER SURFACE N 15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE N 19 HIGH PRESSURE WASHING USING HOT WATER (with/out products)

6.1.2 Lebanon quaysides & rip-raps – Phases 1“Gross recovery” & 2 “Clean-up”

All screenshots: www.bing.com/maps or www.maps.google.com (Google Earth).

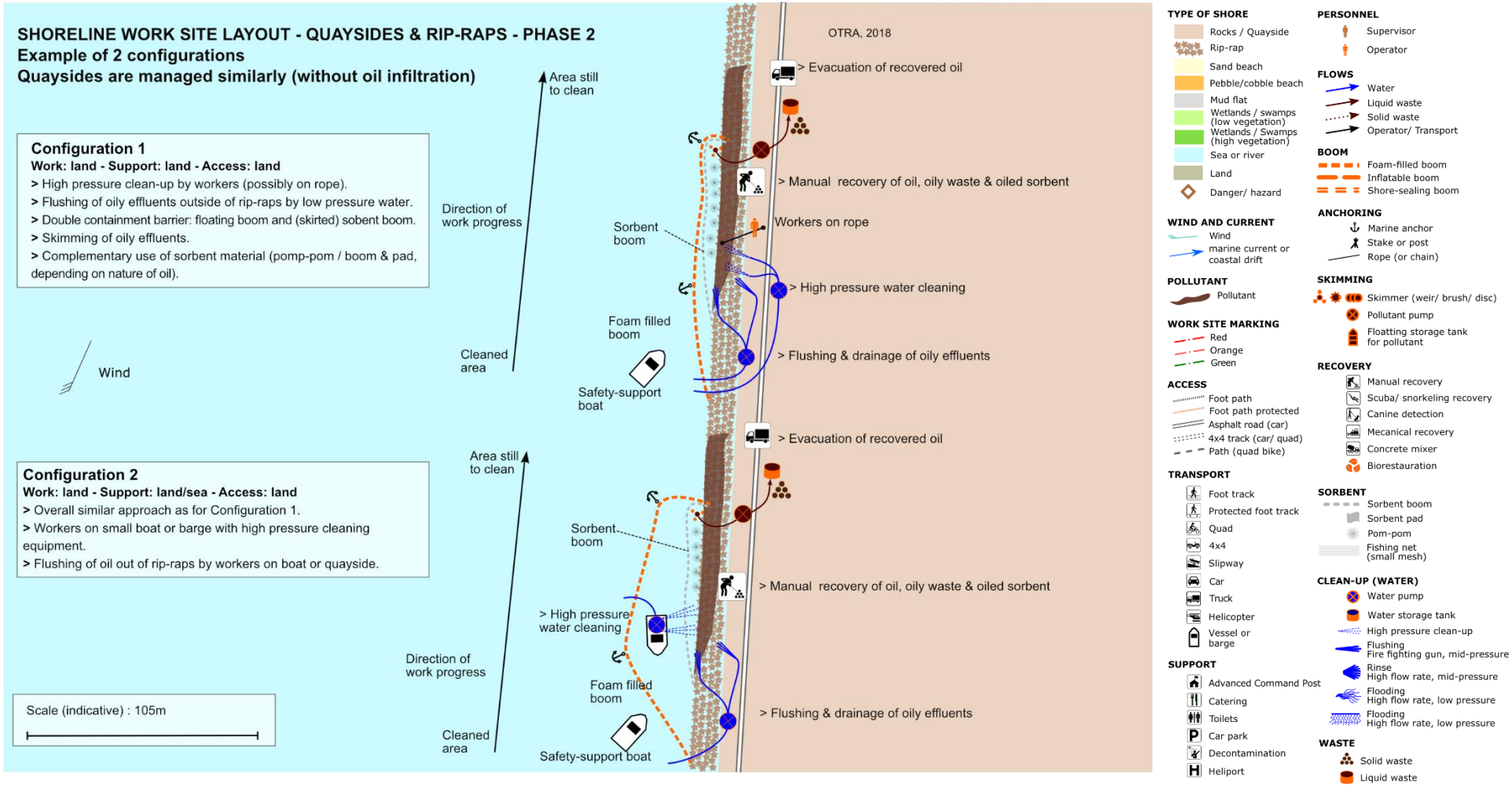
La Marina Dbayeh	Tripoli port – West part
	

LEBANON QUAYSIDES AND RIPRAPS — PHASE 1



Link to Shore clean-up – Synoptic guidelines (Cedre):	Link to Technical datasheet:	
Rocks and Infrastructures, Phase 1 (1/3 & 2/3)	N 02 SKIMMING/PUMPING AT THE WATER'S EDGE N 09 MANUAL COLLECTION N 12 FLUSHING	N 14 CONTAINMENT & RECOVERY OF EFFLUENTS ON WATER SURFACE N 15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE

LEBANON QUAYSIDES AND RIPRAPS — PHASE 2



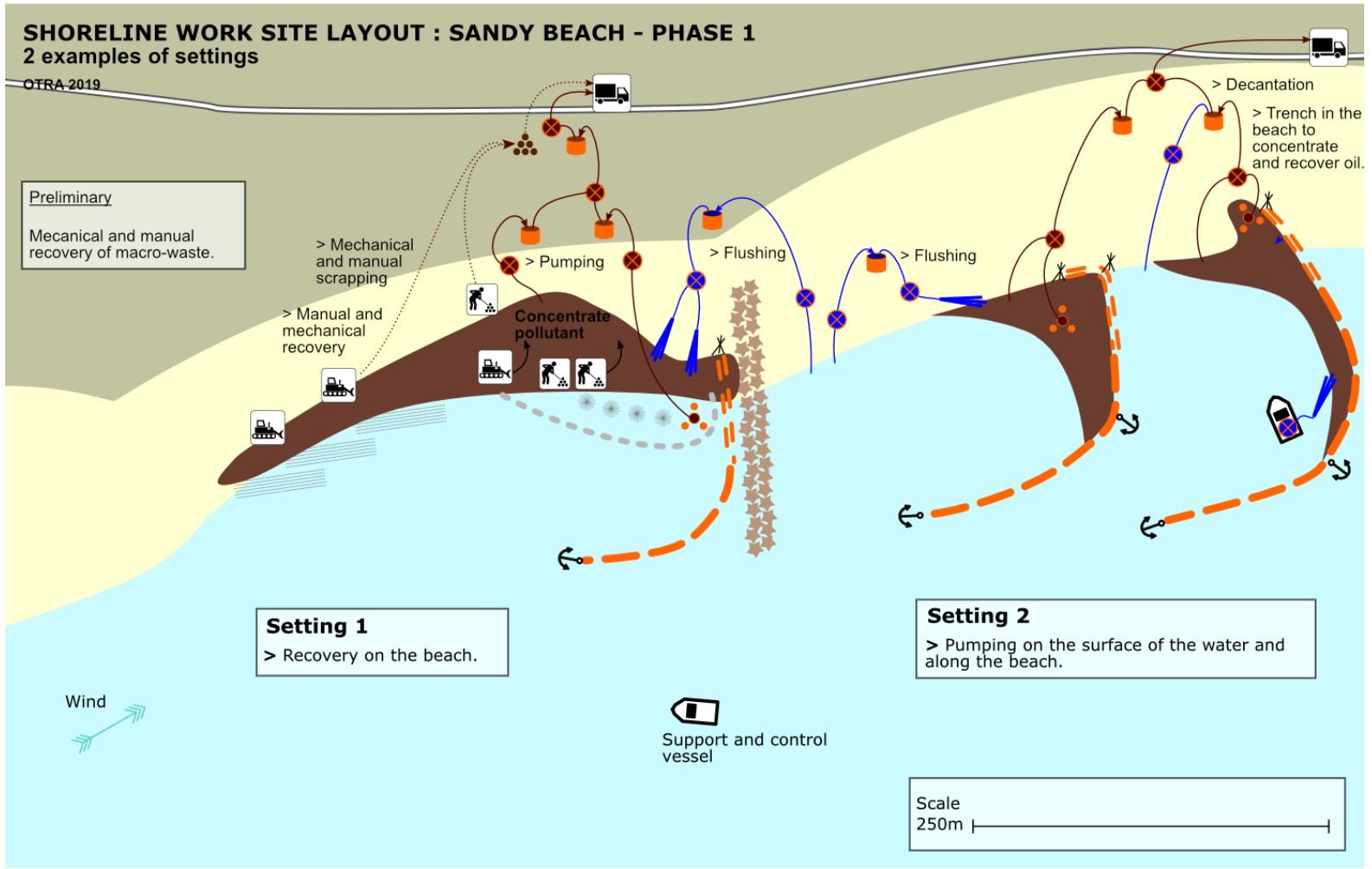
Link to Shore clean-up – Synoptic guidelines (Cedre):	Link to Technical datasheet:	
Rocks and Infrastructures, Phase 1 (3/3)	Before: MANUAL SCRAPING Before: PROTECTION AGAINST PROJECTIONS N 12 FLUSHING	N 14 CONTAINMENT & RECOVERY OF EFFLUENTS ON WATER SURFACE N 15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE N 19 HIGH PRESSURE WASHING USING HOT WATER (with/out products)

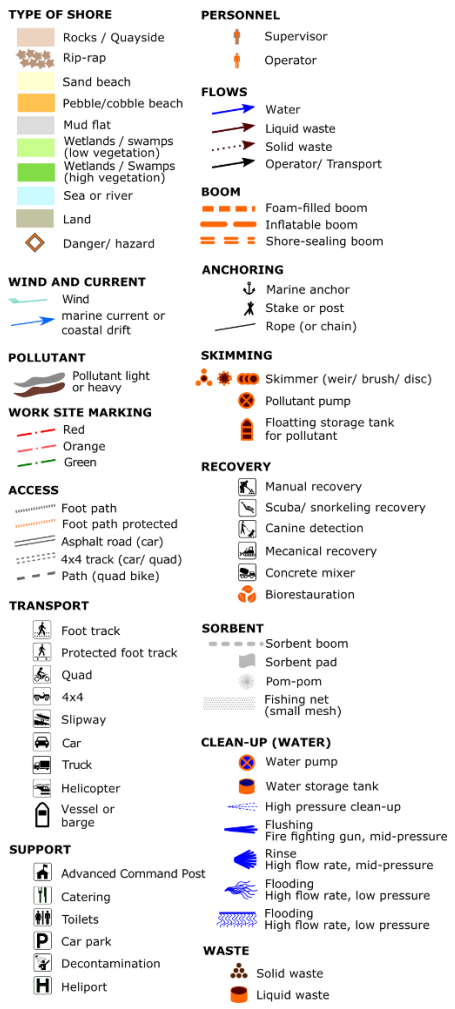
6.1.3 Lebanon sandy beaches – Phases 1 “Gross recovery” & 2 “Clean-up”

All screenshots: www.maps.google.com (Google Earth).

Nahr Ibrahim river beach	Cheeka beach
	

LEBANON SAND BEACH — PHASE 1

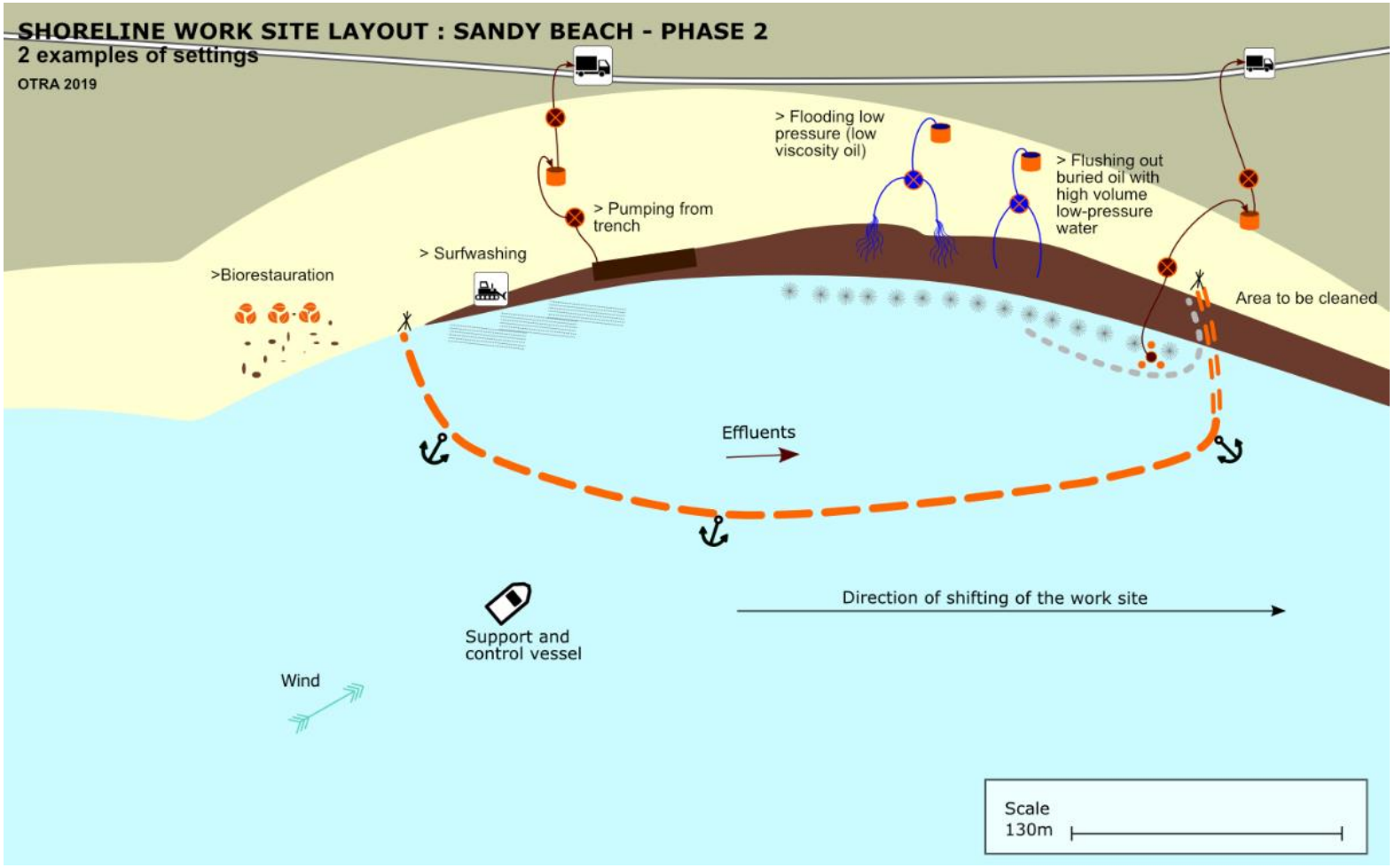




Link to Shore clean-up – Synoptic guidelines (Cedre):	Link to Technical datasheet:	
Sand (1/4 ; 2/4 ; 3/4)	Before: SET-UP OIL/WASTE STORAGE Before: REMOVAL OF SOLID WASTE N 02 - SKIMMING/PUMPING AT THE WATER'S EDGE N 03 - PUMPING ON THE FORESHORE (TRENCHES OR BUNDS) N 04 - SCRAPING USING EARTHMOVING EQUIPMENT	N 07 - REMOVAL/ADHERENCE USING SPECIALISED EQUIPMENT N 08 - SAND SCREENING USING SPECIALISED MACHINERY N 09 - MANUAL COLLECTION N 12 - FLUSHING N 14 CONTAINMENT & RECOVERY OF EFFLUENTS ON WATER SURFACE N 15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE

LEBANON SAND BEACH

PHASE 2



TYPE OF SHORE
- Rocks / Quayside
- Rip-rap
- Sand beach
- Pebble/cobble beach
- Mud flat
- Wetlands / swamps (low vegetation)
- Wetlands / Swamps (high vegetation)
- Sea or river
- Land
- Danger/ hazard

WIND AND CURRENT
- Wind
- marine current or coastal drift

POLLUTANT
- Pollutant light or heavy

WORK SITE MARKING
- Red
- Orange
- Green

ACCESS
- Foot path
- Foot path protected
- Asphalt road (car)
- 4x4 track (car/ quad)
- Path (quad bike)

TRANSPORT
- Foot track
- Protected foot track
- Quad
- 4x4
- Slipway
- Car
- Truck
- Helicopter
- Vessel or barge

SUPPORT
- Advanced Command Post
- Catering
- Toilets
- Car park
- Decontamination
- Heliport

PERSONNEL
- Supervisor
- Operator

FLOWS
- Water
- Liquid waste
- Solid waste
- Operator/ Transport

BOOM
- Foam-filled boom
- Inflatable boom
- Shore-sealing boom

ANCHORING
- Marine anchor
- Stake or post
- Rope (or chain)

SKIMMING
- Skimmer (weir/ brush/ disc)
- Pollutant pump
- Floatting storage tank for pollutant

RECOVERY
- Manual recovery
- Scuba/ snorkeling recovery
- Canine detection
- Mecanical recovery
- Concrete mixer
- Biorestauration

SORBENT
- Sorbent boom
- Sorbent pad
- Pom-pom
- Fishing net (small mesh)

CLEAN-UP (WATER)
- Water pump
- Water storage tank
- High pressure clean-up
- Flushing Fire fighting gun, mid-pressure
- Rinse High flow rate, mid-pressure
- Flooding High flow rate, low pressure
- Flooding High flow rate, low pressure

WASTE
- Solid waste
- Liquid waste

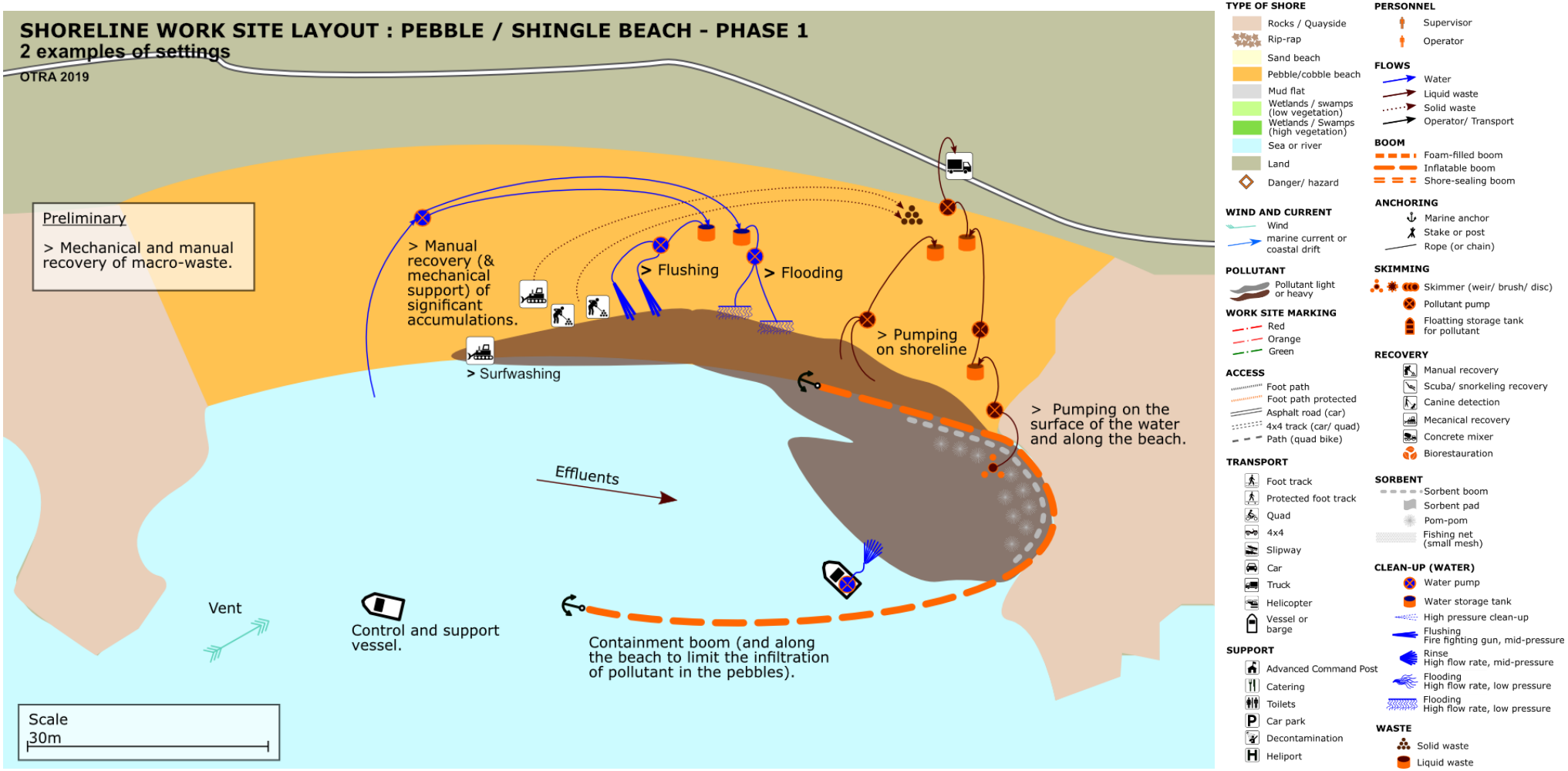
Link to Shore clean-up – Synoptic guidelines (Cedre): Sand (4/4)	**Link to Technical datasheet:** N 08 - SAND SCREENING USING SPECIALISED MACHINERY N 10 - SURFWASHING N 12 - FLUSHING	N 16 - UNDERWATER AGITATION N 17 - TILLING N 18 - DRAINAGE N 29 - BIORESTAURATION

6.1.4 Lebanon pebble beaches – Phases 1 “Gross recovery” & 2 “Clean-up”

All screenshots: www.maps.google.com (Google Earth).

Pebble/ cobble beach Jyeh area	Pebble/ cobble beach Jyeh area
	

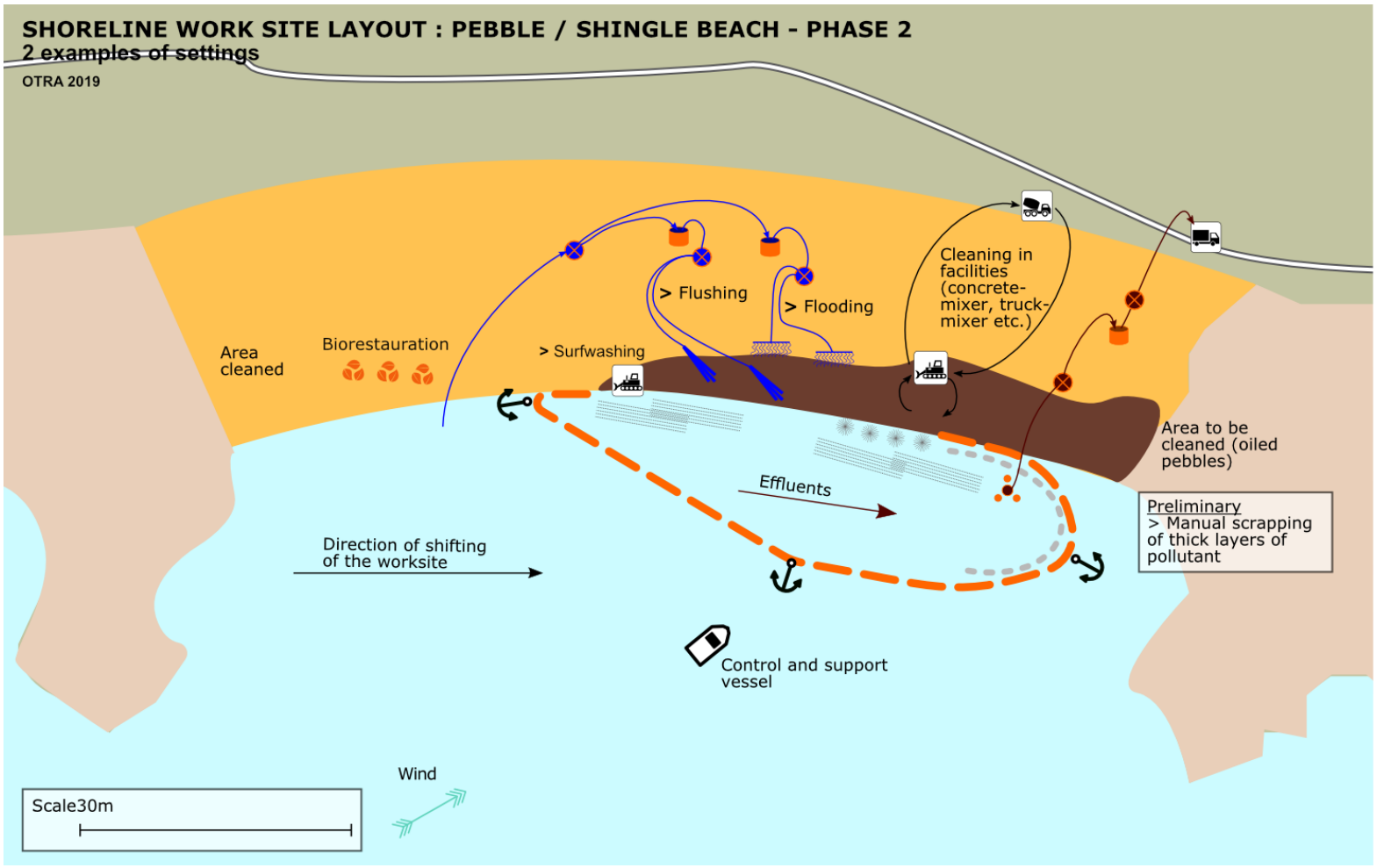
LEBANON PEBBLE/ SHINGLE BEACH — PHASE 1



Link to Shore clean-up – Synoptic guidelines (Cedre):	**Link to Technical datasheet:**	
Pebbles & cobbles	Before: SET-UP OIL/WASTE STORAGE Before: REMOVAL OF SOLID WASTE N02 SKIMMING/PUMPING AT THE WATER'S EDGE N03 PUMPING ON THE FORESHORE (TRENCHES OR BUNDS)	N09 MANUAL COLLECTION N10 SURFWASHING N12 FLUSHING N13 FLOODING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE

LEBANON PEBBLE/ SHINGLE BEACH

PHASE 2



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- marine current or coastal drift

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- Pollutant light or heavy

WORK SITE MARKING
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SUPPORT
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- Car park
- Decontamination
- Heliport

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- Operator

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- Solid waste
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- Floatting storage tank for pollutant

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- Biorestauration

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- Flushing Fire fighting gun, mid-pressure
- Rinse High flow rate, mid-pressure
- Flooding High flow rate, low pressure
- Flooding High flow rate, low pressure

WASTE
- Solid waste
- Liquid waste

Link to Shore clean-up – Synoptic guidelines (Cedre):	**Link to Technical datasheet:**	
Pebbles & cobbles	N10 SURFWASHING N12 FLUSHING N14 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE WATER SURFACE N15 CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE	N20 WASHING ON CAGES N22 WASHING USING A CONCRETE MIXER N23 WASHING IN A CONCRETE MIXER DRUM N24 WASHING AT A POLMAR PLANT N29 BIOREMEDIATION

6.1.5 Indicative personnel & equipment list for Phase 1 on beaches (& rocky platform)

Personnel (indicative):

• 60 operators (4 teams of 15) • 4 team leaders • 8-10 oil waste transfer operators from work site and temporary storage on site • 1 waste leader • 2 staging area operators	• 1 staging/ logistics leader • 1 health & safety leader • 1 First Aid responder • 1 supervisor

Table below proposes an example of equipment list for oil recovery (for +/-100 personnel during +/-12 days).

TRANSPORT ON THE SITE (OPTION)	**Quantity**	
- 4 x 4	2	
- Quad + small trailer	2	
PUBLIC WORKS EQUIPMENT (OPTION)	**Quantity**	
- Tractor + trailer (waste transfer)	1	
- Front end loader (recovery of large oil + heavily oiled sand)	1	
MANUAL RECOVERY TOOLS	**Quantity**	
- Spades	20	
- Flat rakes	10	
- Shovels	10	
- Trowel	30	
- Wheel barrow	10	

- Sorbent boom (fresh oil). Diam 15-20 cm, section of 3m	100 m	
- Pom pom on line (weathered oil)	100 m	
Fishing nets with very thin mesh (approx. 1 mm), Material PEHD (weathered oil)	2 x 150 m	 
Light geo-textile (polypropylene fibre non-woven) to protect access to the clean-up site	200 – 300m x 1m	
MECHANICAL RECOVERY (2 WORKING AREAS)	**Quantity**	
- Foam filled or inflatable boom (total height of 0.5 to 0.75m)	2 x 80 m	
- Small weir skimmer (weathered oil) or oleophilic (fresh oil) + suction tools	2	
- Peristaltic pump + suction & discharge hoses (with skimmer)	2	

- Flexible storage Fastank (10m3)	2	
WASTE STORAGE	**Quantity**	
- Heavy duty waste bags 50 litres (oiled sand)	3 000	
- Heavy duty waste bags 100 litres (oiled vegetation)	2 000	
- Industrial/ builder buckets	25	
- Dustbins (plastic, 100 – 150 litres)	25	
- Roll of 2m x 200m of tarpaulin, polyethylene, thickness of 180 µm minimum	2	
PPE	**Quantity**	
Disposable coveralls + helmets or sun caps	2 500	
Plastic boots	250 pairs	
Nitrile gloves	1 800 pairs	

6.1.6 Indicative personnel & equipment list for Phases 1 & 2 in port & rocky areas

Personnel (indicative):

- 1 supervisor
- 2 team leaders
- 1 health & safety leader
- 10-15 operators (in one or two teams: quayside and boat)

Table below proposes an example of equipment list for Phase 1: oil recovery and to initiate (e.g. first 5 days) Phase 2: clean-up operations in port areas and inland, for 10-15 persons, for a spill of Marine Gas Oil.

Similar equipment can be used for rocky areas and rip raps and for crude oil – with some adaptations for the heavier and weathered crude oil (e.g. change sorbent material etc.).

All equipment, except the tents and sorbent, can be stored in 2 road trailers (internal length 4m minimum), except the workboat.

GENERAL ITEMS FOR PHASE 1 & 2 OPERATIONS

TRANSPORT & DEPLOYMENT	**Quantity**
Option. Storage on road Trailer (4m internal length minimum)	2
Shallow draft boat/ Workboat (5-6m, 20 HP mini.)	1
SAFETY	**Quantity**
Gas detector/ Explosimeter	2
Air quality meter (VOC and benzene)	1
Half-face cartridge mask (organic & inorganic vapours, acid gases and ammonia vapours)	20
1st Aid kit	2
Fire extinguisher	2
Portable marine VHF with charger and extra battery, and waterproof protective cover	4
Lifejackets	10
HEALTH	**Quantity**
Disposable TYVEK (2/ pers/ day)	100 mini.
Nitrile gloves (1/ pers/ day)	50 mini.
Safety rubber boots	15 pairs
Gas / dust mask (water flushing & high-pressure cleaning)	10+
Goggles (water flushing & high-pressure cleaning)	10+
Decontamination kit for personnel - indicative • 5 x litres of vegetable oil • 2 litres of soap microbeads • 2 litres of soap • 2 kg of cloth • 4 x rolls of small sorbent	1 kit
SITE SET-UP	**Quantity**
Roll of 2m x 200m of polypropylene geotextile, filaments, 125 g / m2, filter opening 83 µm (Light ground protection. Protection of clean areas when cleaning. Water filtration.)	2 roll
Worksite Signalization Kit: • 10 x Traffic cones	1

• Red & White ribbon 2 x 100m roll • 20m x red & white plastic chain • 10 x steel bars Diam. 1cm, Length 1.5m • 20 x wood stakes	
Small equipment: • very thin rope (100m x Diam 2mm) • very thin rope (100m x Diam 4mm) • rope (100m x Diam 8-10mm) • rope (100m x Diam 16mm) • Set of shackles • Grey duct tape 4 x 100m roll	10
WASTE STORAGE	**Quantity**
Roll of 2m x 200m of tarpaulin, polyethylene, thickness of 180 µm minimum	1
IBC 1 m3 (storage of recovered oil)	5
Big bags 1 m3 waterproof, 1,000 litres, with closing and lifting straps (storage of oiled PPE & sorbent)	10
Heavy duty waste bags (50-100 litres)	500
Buckets (industrial/ builder)	10
Dustbins (plastic, heavy duty, 100 – 150 litres)	4
FastTank – flexible storage 10 m3 + Saddle (to secure hose) + top cover (protection if heavy rain)	1

PHASE 1 - "BOOM & RECOVERY"

All suction & discharge hoses with Camlock fittings, usual diameter : 2''.

CONTAINMENT OF OIL AT SEA AGAINST QUAYSIDE	**Quantity**
Foam Filled Boom +/-0.75 m. in total height, 15m section, ASTM fitting	90 m
Towing triangle for Foam Filled Boom + tow line - 15m + return line 15m	4
"Sliding" anchoring at quayside: anchors (Danforth, 15 kg) or deadweight + 25m non-floating line	4
Anchor (Danforth, 15 kg) + 30m non-floating line + 3m chain + buoy	4
Skirted sorbent booms (Polypropylene, total height: 0.45m, section of 12.50m), with connection	75m
Option. Magnetic anchors kit, e.g.: • 2 x 200 kg resistance • 4 x 450 kg resistance	1
Option. Emergency magnetic obturation kit (e.g. Miko Plaster), e.g. • Magnetic plaster (0.5m x 0.45m, 0.83 x 0.45 , 1.25m x 0.90m) • 10 magnets • 1 magnetic anchor 200-300 kg resistance • Ropes, shackles & storage bag	1
Option. Pipe clamping kit: • clamps for the most common diameters of pipelines • clamping tools (flange, screws, tools, etc.)	1
RECOVERY OF OIL AT SEA AGAINST QUAYSIDE	**Quantity**
Peristaltic pump 25m3/ hr, diesel engine, spark arrestor and Chalwyn valve, for skimmers + 25 suction corrugated hose for skimmer to pump (5m section) + 35m discharge lay flat hose for pump (5m section) + 5 buoys to attach on suction hose	2
Small self-adjusting weir skimmer with buoys (draft < 50-60cm, weight < 40-50kg) – working with peristaltic pump	1
Very small weir skimmer (draft < 10cm, weight <10kg) – working with peristaltic pump	1
Note. Oleophilic are not suitable to recover MGO.	
CONTAINMENT &c RECOVERYOF OIL AT SEA	**Quantity**

4-5m pole to deploy foam filled or skirted sorbent boom from small vessels in the port area	2
CONTAINMENT & RECOVERY ON LAND	**Quantity**
Drain seals kit, polyurethane (e.g. 0.5m x 0.5m, 0.7m x 0.7m, 1m x 1m)	1
Land spill flexible berm, polyurethane, 3m x 10cm x 7cm	4
Land manual tool kit: • 4 x spades • 2 x rakes	1
Suction nozzles kit for peristaltic pump (flat, round, with strainer etc.)	1
SORBENT AT SEA & ON LAND	**Quantity**
Sorbent boom (Polypropylene, Diam. 0.2m x Length 5 m, absorption capacity for 10m = 300 litres)	50 m
Sorbent boom (Polypropylene, Diam 0.13m x Length 3m, absorption capacity for 12m = 180 litres)	60 m
Sorbent sheets (Polypropylene, 100-sheet bag, 40 cm x 50 cm, total capacity = 136 litres)	8 bags
Sorbent roll (polypropylene, 44m x 96cm, absorption capacity = 250 litres minimum)	2 rolls
Bulk sorbent (peat or similar) in 10 kg bag	10 bags

PHASE 2 - "CLEAN-UP" (IN ADDITION TO PHASE 1 EQUIPMENT)

All suction & discharge hoses with Camlock fittings, usual diameter : 2''.

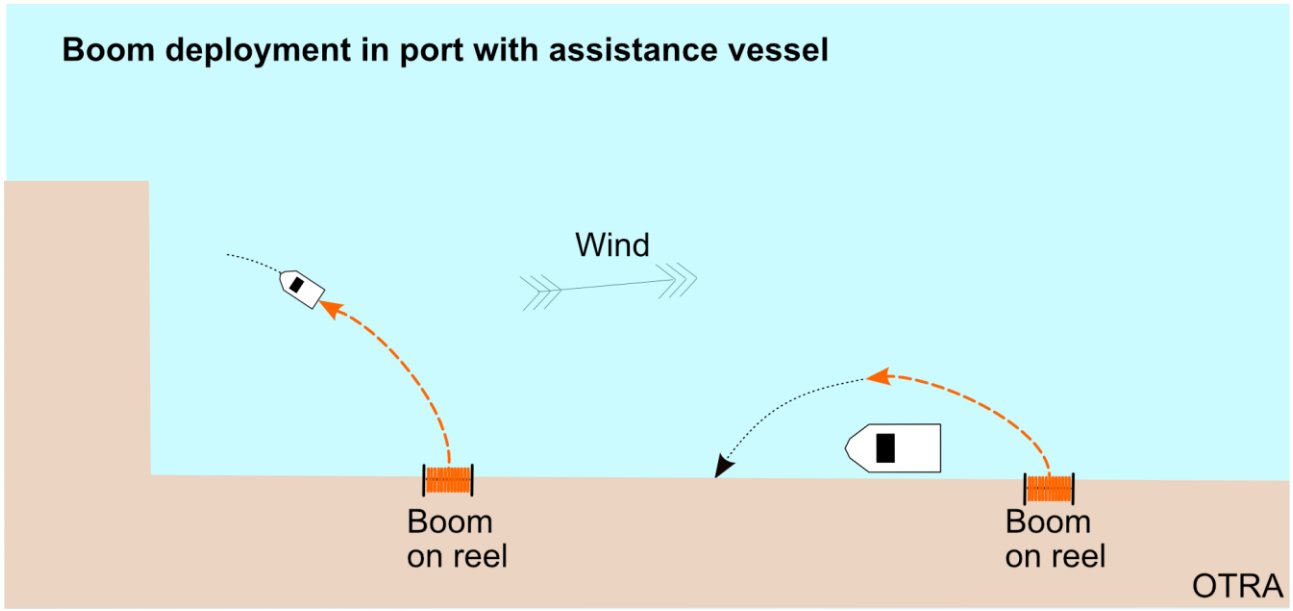
CLEAN-UP	Quantity
Centrifugal water pump, 20-30m3 / hr, diesel engine, with 2'' camlock connection + 4 x 5m 2 "suction hose, with camlock connection with strainer + 6 x 5m lay flat discharge hose 2 ", with camlock fitting	2
Flushing gun (Venturi system)	2
FiFi guns kit (150-200 l/min): • 2 round FiFi guns • 2 flat FiFi guns	2

OPTIONS – PERMANENT BOOM FOR VESSEL BUNKERING OPERATION

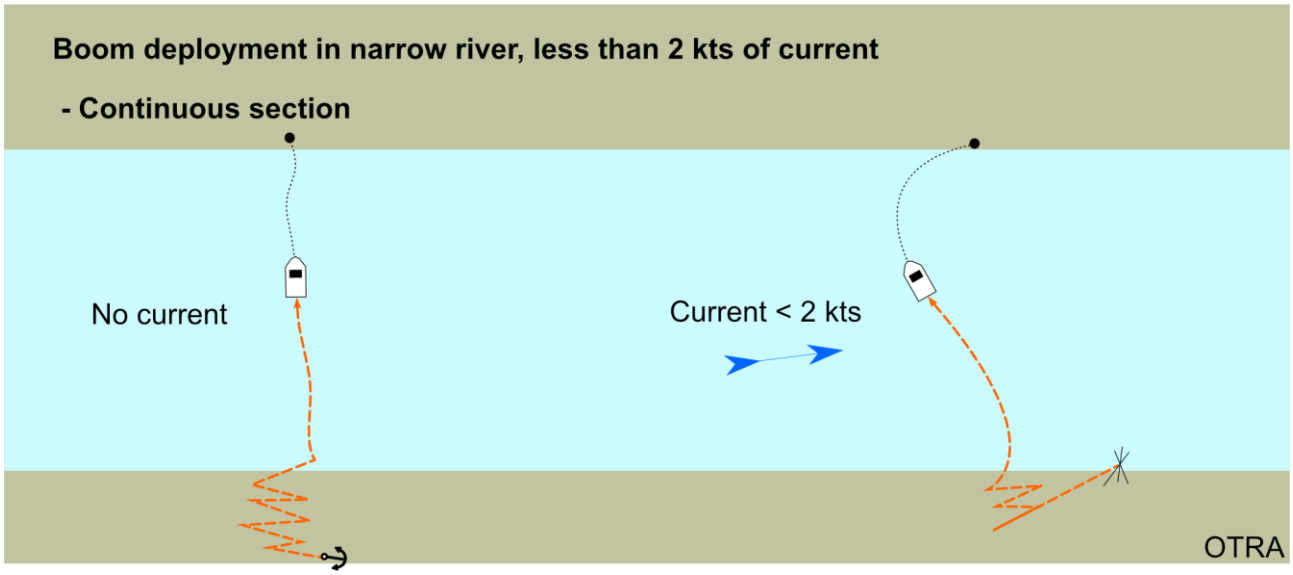
PERMANENT QUAYSIDE CONTAINMENT SETUP	Quantity
OPTION 1. Permanent boom (total height: +/- 60cm, section of 15m, skirt made of resistant PVC fabric, solid plastic floaters moulded and bolted on skirt) + mooring with tidal compensation system To be deployed in 2 sections (ship aft and stern) or in one section surrounding the ship.	90 m
OPTION 2. Flexible floating boom to be positioned between the ship and the quayside during transfer operations. 2 Units in use 1 Unit spare.	3 units

6.2 Boom launching guidelines

6.2.1 Launching of boom in port



6.2.2 Launching of boom in narrow river & current < 2 kts



6.3 Technical sheets for boom deployment & anchoring

6.3.1 Wind and current force on a boom

Current and wind exert their force on an anchored boom. Both must be estimated to dimension adequately the type of boom and anchoring systems (anchoring lines, anchors etc.).

➔**Force of current** Fc (kg) of velocity Vc (kts) exerted on a boom of sub-surface Area As (m2) **Fc = 26 x As x (Vc)²** Example. Boom 100 m long with 0.6 m skirt at 90° of 0.5 kt current : Fc = 26 x (0.6 x 100) x (0.5)² = 390 kg	➔**Force of wind** Fx (kg) exerted of velocity Vw (kts) on a boom of freeboard surface Area Af (m2) **Fx = 26 x Af x (Vw/40)²** Example. Boom 100 m long with 0.5 m freeboard in 15 kts wind : Fx = 26 x (0.5 x 100) x (15/ 40)² = 183 kg
Total force of wind and current = Fc + Fx For a boom at 90° of the current direction, the total force **is split 50/50 at each end of the boom.** Note. Boom are flexible and moored with an angle: force will be less. Use above as guidelines.	

Speed of current			**Angle with current**	**=> Total force (kg) exerted by currents of 0,7 to 5 knots on 50m boom (at 90° of current), with drafts of 0,3 to 1,25 m**					
(knots)	*(km/hr)*	*(m/s)*	*(degrees)*		**Draft of boom (m)**				
					0,3	**0,4**	**0,6**	**0,9**	**1,25**
					Total height of boom when inflated (m)				
					0,5	*0,7*	*1*	*1,5*	*2*
0,7	1,3	0,36	90	Force (kg)	191	255	382	573	796
1	1,9	0,51	90	Force (kg)	390	520	780	1 170	1 625
1,5	2,8	0,77	90	Force (kg)	878	1 170	1 755	2 633	3 656
2	3,7	1,03	90	Force (kg)	1 560	2 080	3 120	4 680	6 500
3	5,6	1,54	90	Force (kg)	3 510	4 680	7 020	10 530	14 625
4	7,4	2,06	90	Force (kg)	6 240	8 320	12 480	18 720	26 000
5	9,3	2,57	90	Force (kg)	9 750	13 000	19 500	29 250	40 625

Tableau 1 : Total force (kg) exerted by currents of 0,7 to 5 knots on 50m boom (at 90° of current), with drafts of 0,3 to 1,25 m (OTRA)

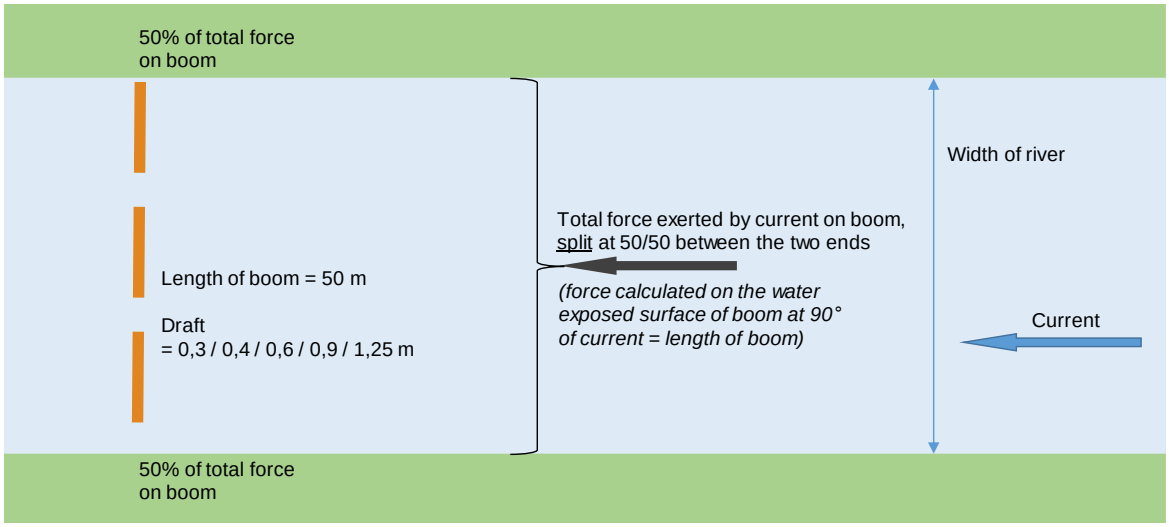


Figure 2 : Force of current, width of river, length of boom and force exerted on the boom (OTRA)

6.3.2 Limit angle of boom / current before booming failure

Figure below illustrates the efficiency limits of a boom depending on the speed of the current and angle between the current and the boom.

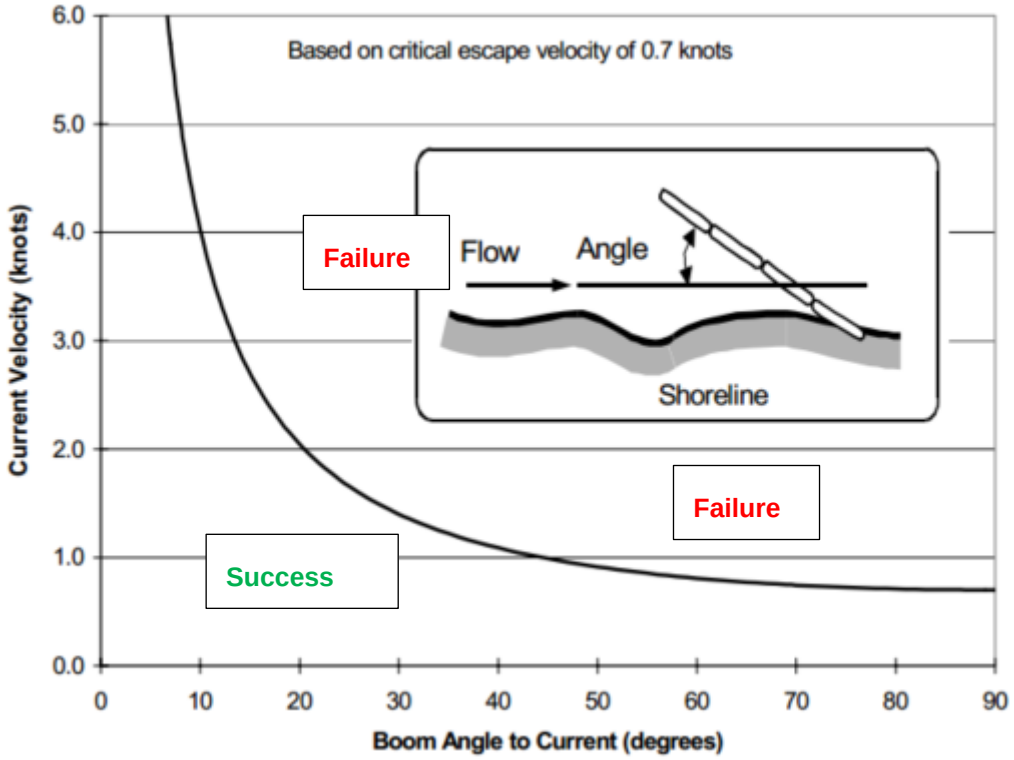


Figure 3 : Efficiency limits of a boom depending on the speed of the current and angle between the current and the boom (OSRL)

Approximately :

- A boom at 90° of the current is efficient up top 0,7 kts of current.
- With a 1 kt current, maximum angle is 45°.
- With a 1.5 kts current, maximum angle is 30°.
- With a 2 kts current, maximum angle is 20°.
- With a 3 kts current, maximum angle is 15°.

Length of boom is increased accordingly.

In medium/ strong currents (> 1.5 to 2 kts), boom should be deployed in independent sections (e.g. 25m to 50m long) rather than one continuous section.

6.3.3 Length of boom needed depending on current and width of river

Table below presents the **length of boom required** and total forces exerted (depending on the current, the maximum angle « current/ boom » applicable and the width of the river).

➔**1st step: estimate the current speed** (option : estimate as the time for an object to drift 10m, left column).

➔**2nd step: estimate the angle to apply to the boom depending on the current speed.**

➔**3rd step: estimate the length of boom needed depending on the current speed and width of river:**

- Length of boom needed (m) = Width of river (m) / Sinus (angle boom-Current (degrees))

➔**4th step: calculate the force exerted on the boom surface exposed at 90° of the current (0.6 draft).**

- Force exerted on boom surface in water (kg) = 26 (Constant) x 0,6 m x Length of boom (m) x Sinus (angle boom-Current (degrees)) x (Current speed (kts))²
- /!\ The stronger the current, the smaller the angle “boom/ current”, the stronger the force exerted on the end of the boom upstream.

Time for 10m drift	Speed of current			=> Angle with current	=> Length of boom needed (m) with a draft of 0.6m, and force exerted (kg) on boom surface in water depending on the current, angle with current and width of river						
(second)	(knots)	(km/hr)	(m/s)	(degrees)	Length & Force	Width of river (m) 25	50	75	100	200	300
28	0,7	1,3	0,36	90	Length (m)	25	50	75	100	200	300
					Force (kg)	191	382	573	764	1 529	2 293
19	1	1,9	0,51	45	Length (m)	35	71	106	141	283	424
					Force (kg)	390	780	1 170	1 560	3 120	4 680
13	1,5	2,8	0,77	25	Length (m)	59	118	177	237	473	710
					Force (kg)	878	1 755	2 633	3 510	7 020	10 530
10	2	3,7	1,03	20	Length (m)	73	146	219	292	585	877
					Force (kg)	1 560	3 120	4 680	6 240	12 480	18 720
6	3	5,6	1,54	15	Length (m)	97	193	290	386	773	1 159
					Force (kg)	3 510	7 020	10 530	14 040	28 080	42 120
5	4	7,4	2,06	12	Length (m)	120	240	361	481	962	1 443
					Force (kg)	6 240	12 480	18 720	24 960	49 920	74 880
4	5	9,3	2,57	8	Length (m)	180	359	539	719	1 437	2 156
					Force (kg)	9 750	19 500	29 250	39 000	78 000	117 000

Note. For a boom of 0,3m draft, diviee forces by 2. For a draft of 0,9m add 50%.

Tableau 2 : Length of boom needed (m) with a draft of 0.6m, and force exerted (kg) on boom surface in water depending on the current, angle with current and width of river (OTRA)

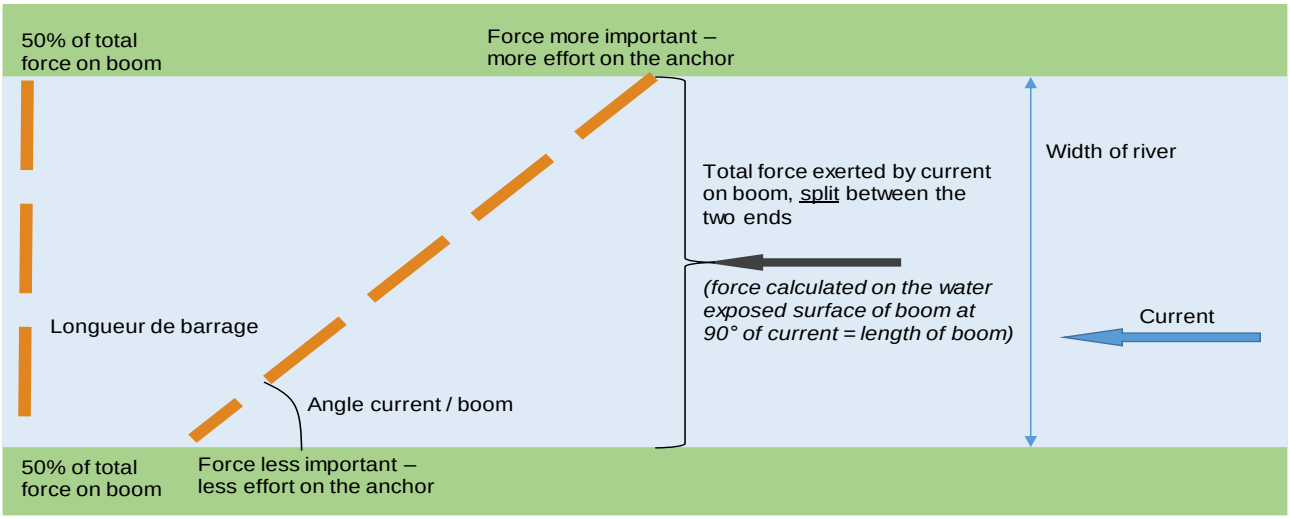
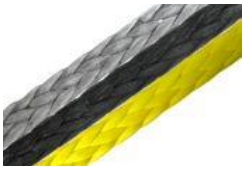


Figure 4 : Current speed, width of river, length of boom and forces exerted on a boom (OTRA)

6.3.4 Ropes, lines & shackles for towing and securing booms

6.3.4.1 Types of lines & ropes (French)

Table 5 : Type de cordage classiques et Dyneema

Fibre synthétique :	**Polyamide (Nylon ®),** fond, se rétracte et noircit en le brûlant.	**Polyester (dacron, terylène, etc.),** ne noircit pas en le brûlant.	**Polypropylène,** a la brillance du plastique, raide en main.	**Dyneema** (fibre de polyéthylène (PE) à haute résistance) Lisse au toucher
				
EMPLOI	**Mouillage** et corps mort	Polyvalent, amarrage	**Remorquage barrage**	**Triangle de traction,** manilles textiles, facilement épissable
FORCE				
Capacité d'absorber des chocs	Excellent. Très souple	Très bonne	Très bonne	Très bonne
Résistance à la rupture	Excellent	Très bonne	Bonne	Excellent
POIDS				
Flottabilité	Non (lourd)	Non	Oui (densité 0,91)	Oui
ÉLASTICITE				
Pourcentage à la rupture	15-28%	12-15%	18-22%	4%
Élasticité soumise à une charge	Grande	Faible	Grande	Très faible
HUMIDITE				
Capacité d'absorption	2-8%	1%	0% (hydrophobe)	0%
Résistance à la pourriture	Excellente	Excellente	Excellente	Imputrescible
DEGRADATION ET ABRASION				
Résistance aux rayons U.V.	Bonne	Excellente	Acceptable (moyen)	Excellente
Vieillissement	Excellent	Excellent	Bon	Excellent
Gaine	Très bonne	Optimale	Bonne	Non applicable
Coeur de la corde	Très bonne	Optimale	Bonne	Très bonne
PROPRIETES THERMIQUES / EFFICACITE				
à haute température	121°C	135°C	93°C	70°C
à basse température	-57°C	-57°C	-29°C	Non disponible

6.3.4.2 Resistance of ropes & lines depending on material and diameter (French)

Diamètre	Ø mm	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	44
Poly-amide	**R/rupture daN**	**750**	**1 200**	**2 000**	**3 000**	**4 000**	**4 800**	**5 400**	**8 000**	**9 500**	**11 000**	**13 500**	**15 000**	**17 000**	**20 000**			
	g/m	20	39	56	80	108	137	170	207	250	305	350	400	455	510			
Poly-ester	**R/rupture daN**	**554**	**1 000**	**1 560**	**2 230**	**3 120**	**3 980**	**4 980**	**6 230**	**7 470**	**8 960**	**10 500**	**12 000**	**13 400**	**15 400**			
	g/m	27	48	76	110	148	195	245	303	367	437	512	594	682	778			
Polypro-pylène	**R/rupture daN**	**590**	**1 040**	**1 380**	**1 950**	**2 690**	**3 330**	**4 250**	**5 120**	**6 140**	**7 170**	**8 300**	**9 440**	**10 800**	**11 900**	**14 900**	**18 100**	**21 700**
	g/m	17	30	40	58	81	103	133	162	198	234	274	319	364	414	526	658	792
Dyneema	**R/rupture daN**	**4300**	**5300**	**9000**	**11900**	**14500**	**19200**											
	g/m	23	35	60	72	95	131											
Chaîne acier galvanisé	**R/rupture kg**	**4 480**	**8 000**	**12600**	**18000**		**32000**	**40000**	**50000**									
	g/m	800	1400	2200	3800		5700	7300	9000									

Tableau 3 : Choix de type de cordage, 1 daN = 1,02 kg. Données : Cousin Trestec® et Direct Cordage France

/! Les noeuds dans un cordage réduisent la résistance de celui-ci jusqu'à la moitié (nœud de chaise : résistance restante de 60%, cabestan et demi-clef : 75%).

Les épissures sont préférables (résistance restante de 95%). Résistance restante du Dyneema avec nœud : 35-50% ➔ Épissures obligatoires.

6.3.4.3 Resistance of steel shackles (French)

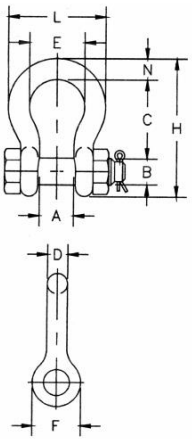
	A	B	C	D	E
	Longueur intérieure	Largeur intérieure	Épaisseur mat.support	Épaisseur mat.boulon	Rayon
KG	MM	MM	MM	MM	MM
500	29	12	7	8	10
750	32	13.5	9	10	11
1000	36.5	17	10	11	13
1500	43	19	11	13	14,5
2000	51	22	13.5	16	16
3250	64	27	16	19	21.5
4750	76	31	19	22	25.5
6500	83	36	22	25	29
8500	95	43	25	28	34
9500	108	47	28	32	37.5
12000	115	51	32	35	41.5
13500	133	57	35	38	46
17000	146	60	38	42	49.5
25000	178	74	45	50	63
35000	197	83	50	57	69
55000	260	105	65	70	90

Exemple de manille lyre :

Résistance (kg) de manilles lyre en acier galvanisé selon leurs dimensions,

Source :

http://www.mitari.fr/chaines-accessoires/manilles-de-haute-resistance/manille-lyre-haute-resistance.html



Bolt Type Shackles

Nominal Size (in.)	Working Load Limit (tons)	Stock No. G-2130	Stock No. S-2130	Weight Each (lbs.)	Dimensions (in.) A	B	C	D	E	F	H	L	N	Tolerance +/– C	A
3/16	1/3	1019464	-	.06	.38	.25	.88	.19	.60	.56	1.47	.98	.19	.06	.06
1/4	1/2	1019466	-	.11	.47	.31	1.13	.25	.78	.61	1.84	1.28	.25	.06	.06
5/16	3/4	1019468	-	.22	.53	.38	1.22	.31	.84	.75	2.09	1.47	.31	.06	.06
3/8	1	1019470	-	.33	.66	.44	1.44	.38	1.03	.91	2.49	1.78	.38	.13	.06
7/16	1-1/2	1019471	-	.49	.75	.50	1.69	.44	1.16	1.06	2.91	2.03	.44	.13	.06
1/2	2	1019472	1019481	.79	.81	.64	1.88	.50	1.31	1.19	3.28	2.31	.50	.13	.06
5/8	3-1/4	1019490	1019506	1.68	1.06	.77	2.38	.63	1.69	1.50	4.19	2.94	.69	.13	.06
3/4	4-3/4	1019515	1019524	2.72	1.25	.89	2.81	.75	2.00	1.81	4.97	3.50	.81	.25	.06
7/8	6-1/2	1019533	1019542	3.95	1.44	1.02	3.31	.88	2.28	2.09	5.83	4.03	.97	.25	.06
1	8-1/2	1019551	1019560	5.66	1.69	1.15	3.75	1.00	2.69	2.38	6.56	4.69	1.06	.25	.06
1-1/8	9-1/2	1019579	1019588	8.27	1.81	1.25	4.25	1.13	2.91	2.69	7.47	5.16	1.25	.25	.06
1-1/4	12	1019597	1019604	11.71	2.03	1.40	4.69	1.29	3.25	3.00	8.25	5.75	1.38	.25	.06
1-3/8	13-1/2	1019613	1019622	15.83	2.25	1.53	5.25	1.42	3.63	3.31	9.16	6.38	1.50	.25	.13
1-1/2	17	1019631	1019640	19.00	2.38	1.66	5.75	1.53	3.88	3.63	10.00	6.88	1.62	.25	.13
1-3/4	25	1019659	1019668	33.91	2.88	2.04	7.00	1.84	5.00	4.19	12.34	8.80	2.25	.25	.13
2	35	1019677	1019686	52.25	3.25	2.30	7.75	2.08	5.75	4.81	13.68	10.15	2.40	.25	.13
2-1/2	55	1019695	1019702	98.25	4.13	2.80	10.50	2.71	7.25	5.69	17.90	12.75	3.13	.25	.25
3	85	1019711	-	154.00	5.00	3.30	13.00	3.12	7.88	6.50	21.50	14.62	3.62	.25	.25
3-1/2	120	1019739	-	265.00	5.25	3.76	14.63	3.62	9.00	8.00	24.88	17.02	4.38	.25	.25
4	150	1019757		338.00	5.50	4.26	14.50	4.00	10.00	9.00	25.68	18.00	4.56	.25	.25

http://www.superiortoolrental.com/product/bolt-type/

6.3.5 Boom anchoring on quayside and vessel hull

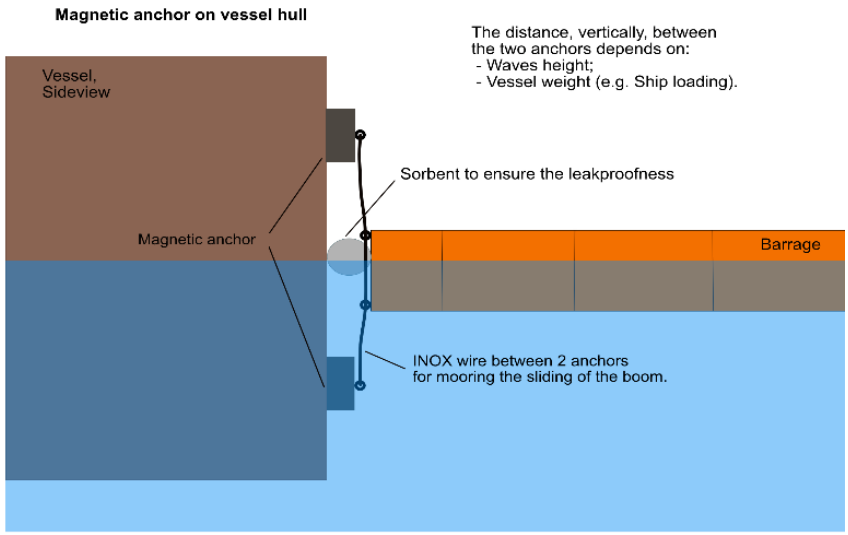


Figure 5. Boom anchoring on vessel *(OTRA)*

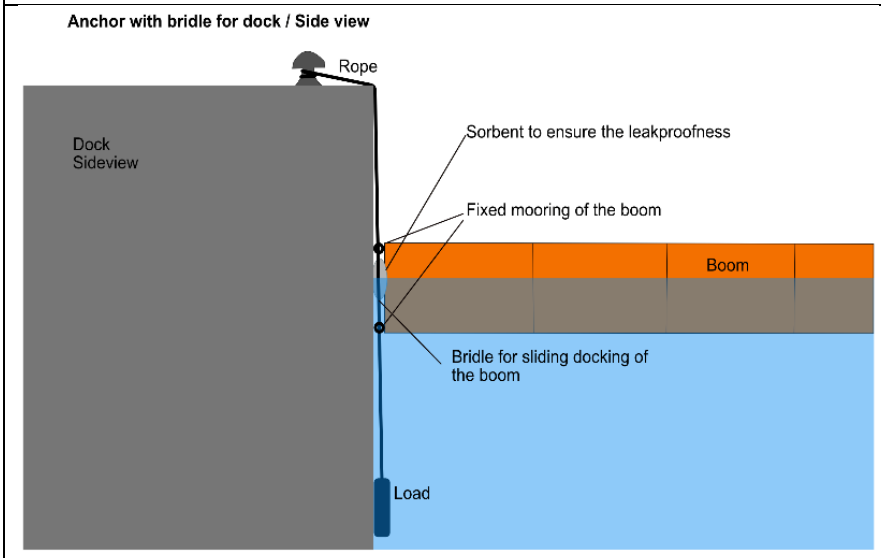


Figure 6. Anchor on quayside with tidal compensation (useful for wave, even with no tidal range). View from side (OTRA)

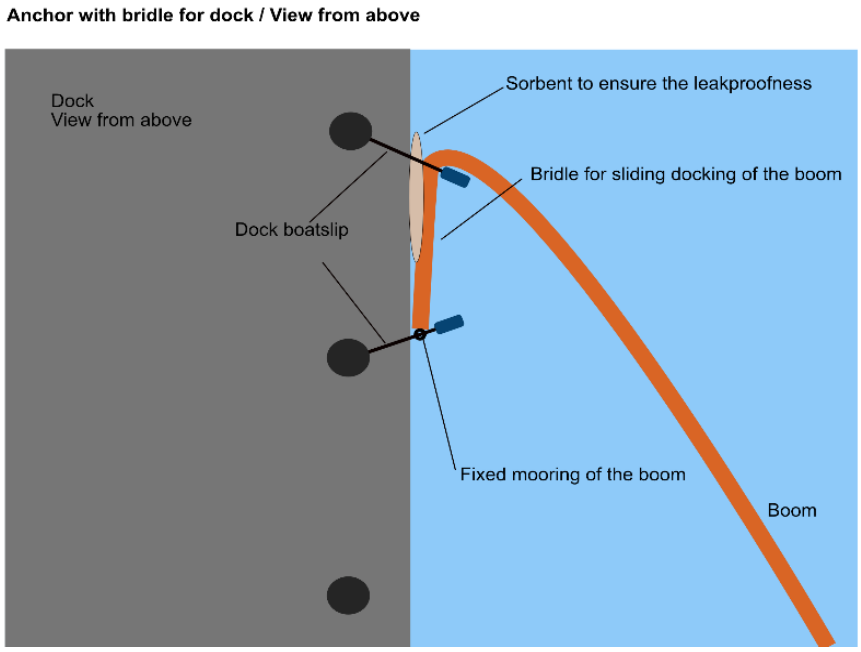
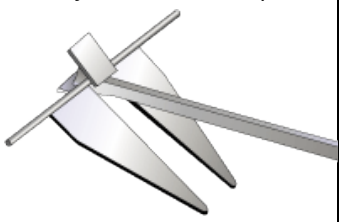


Figure 7. Anchor on quayside with tidal compensation. View from above (OTRA)

6.3.6 Anchoring at sea

6.3.6.1 Types of anchors (French)

<table>
<tr><th>Ancres en crochet
A éviter</th><th>Ancres charrue
Efficaces et polyvalentes</th><th>Ancres plates ou plateau
Utiles, légères mais des limites</th><th>Diverses
Efficaces</th></tr>
<tr><td colspan="2">Emploient une surface relativement petite fixée sur un bras étroit et lourd pour pénétrer profondément dans les fonds problématiques tels que les algues, ou le sable dur.</td><td>Conçues pour pénétrer d’elles-mêmes les fonds lorsqu’une force de traction leur est appliquée. Elles sont considérées comme polyvalentes pour la plupart des fonds marins, de la vase au rocher.</td><td>Utilisent une surface importante pour créer une tenue élevée lorsqu’elles sont profondément enfoncées dans les fonds. Bien qu'elles aient moins de capacité à pénétrer et qu’elles soient instables, leur poids léger les rend très populaires.</td><td>Modèles modernes.</td></tr>
<tr><td>Ancre à jas :
  </td><td rowspan="2">Soc de charrue
 
Ex. CQR véritable
  </td><td rowspan="2">Danforth aux États-Unis,
Brittany et FOB en Europe.
  </td><td rowspan="2">Les ancres claw ont une forme conçue pour pénétrer facilement les fonds marins (trois doigts en forme de cuillère).
Les ancres concaves utilisent au mieux cette caractéristique pour obtenir une tenue plus élevée</td></tr>
<tr><td>Ancre grappin :
  </td></tr>
<tr><td>Risque de surpattage. Moins bonne tenue comparée aux ancres modernes de même poids.
Grappin : généralement pas assez de surface pour développer une tenue suffisante dans le sable ou la vase.</td><td>Assez polyvalentes dans tous les fonds, mais pas exceptionnelles dans aucun d’entre eux.</td><td>Difficultés pour pénétrer les fonds durs ou recouverts d’algues.
En présence d’un courant, peut « planer » sur les fonds à cause de la surface de ses pelles.
Tendance à décrocher si la direction de la force de traction change, à cause d'un changement du vent ou des courants de marée, et peut chasser.</td><td></td></tr>
</table>

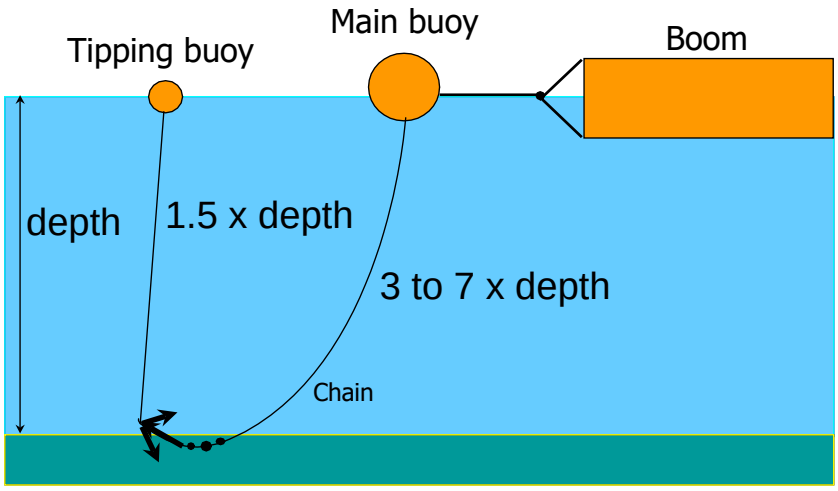
Source : adapted from WikiPedia

Résistance des ancres plates

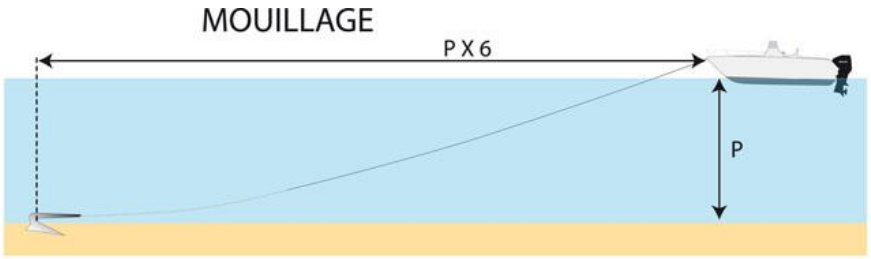
Poids de l'ancre (kg)	Force supportée par l'ancre plate avant de décrocher (kg)		
	Boue	Sable	Argile
15	200	250	300
25	350	400	500
35	600	700	700

6.3.6.2 Anchoring configuration at sea (French)

SIMPLE MOORING OF BOOM AT SEA AND IN RIVERS



(OTRA)



Source : http://osia-sas.fr/img/cms/Mouillage1.jpg

Place anchors every 50 to 75 m of boom

• Increase in case of current

Minimum length of anchor line

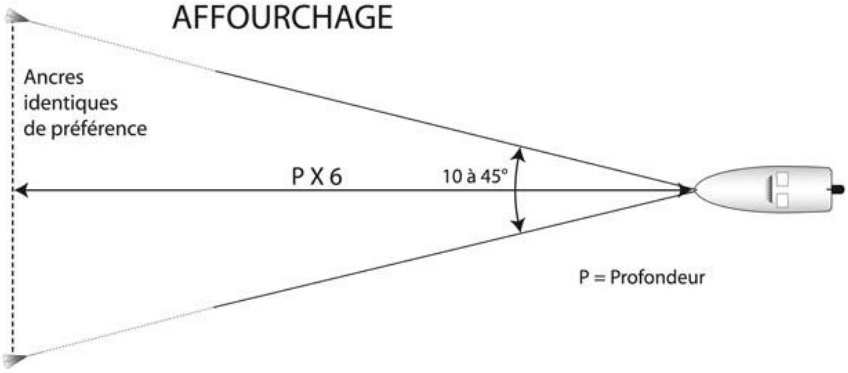
• Calm waters : L = 3 x depth

• Choppy waters : L = 5 x depth

• Rough waters : L = 7 x depth

• Add chain at bottom for choppy/ rough water

ANCHORING WITH TWO ANCHORS WITH ANGLE



Source : http://osia-sas.fr/img/cms/Mouillage1.jpg

Source : http://www.sisl.ch/mouillage/mouillage3.htm

To increase the holding power of the anchoring

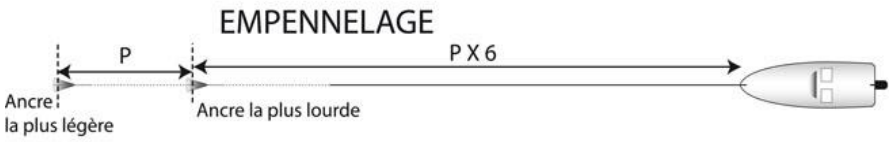
And to limit the movement of the boom

with varying winds and currents.

Two anchors are placed at 20° to 30° angle, up to 45°.

One line should be shorter to avoid line entanglement.

ANCHORING WITH TWO ANCHORS IN LINE



Source : http://osia-sas.fr/img/cms/Mouillage1.jpg

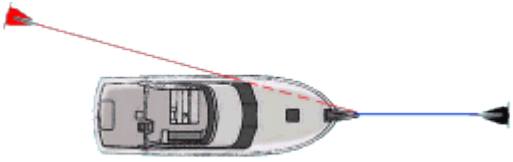
Source : http://www.sisl.ch/mouillage/mouillage3.htm

To increase the holding power of the anchoring

With current and winds mainly in the same direction.

Intermediate anchor is usually the heaviest.

BAHAMA MOORING



Source : http://www.sisl.ch/mouillage/mouillage3.htm

For areas with strong alternating tidal currents.

Two anchors placed at nearly 180°.

6.3.7 Boom mooring in soil, on shore, river banks & trees

Following schematics propose anchoring's in soil or around trees. Prefer wooden large stakes in sand, and metal stake (diameter: +/- 1cm or more) in dirt and clay (figures: OTRA).

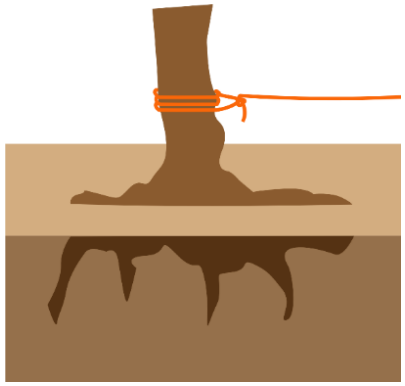


Figure 8. Mooring around a tree

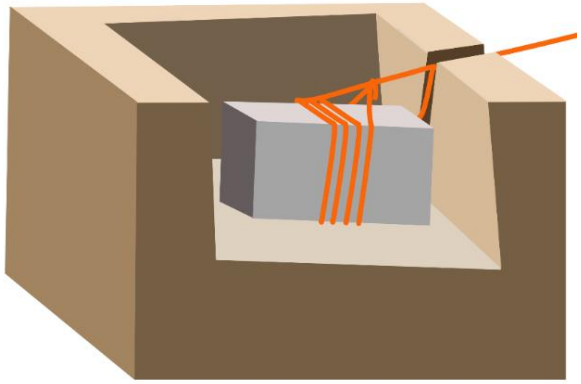


Figure 9. Mooring on a block/ dead weight

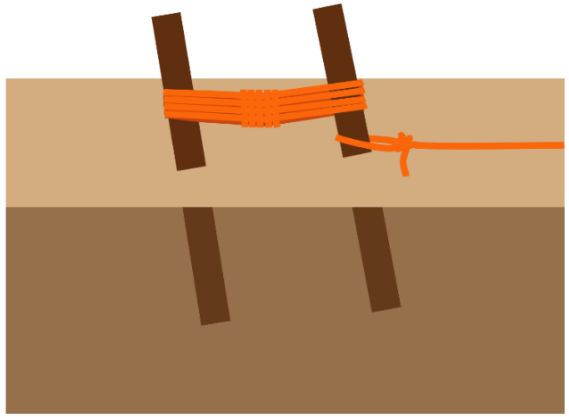


Figure 10. Mooring with 2 stacks

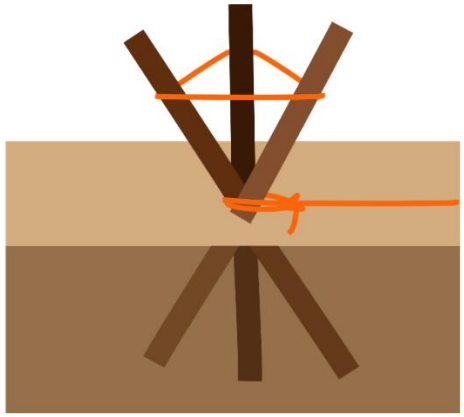
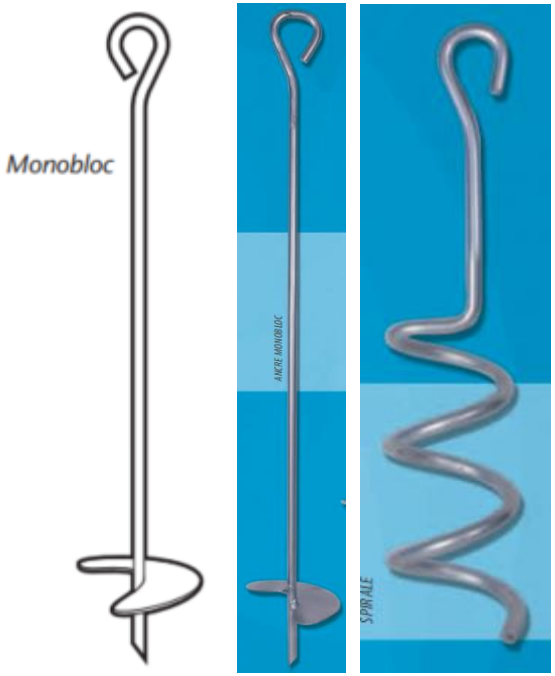
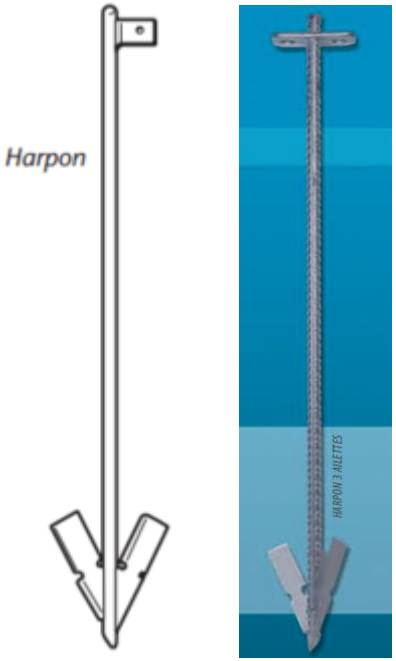
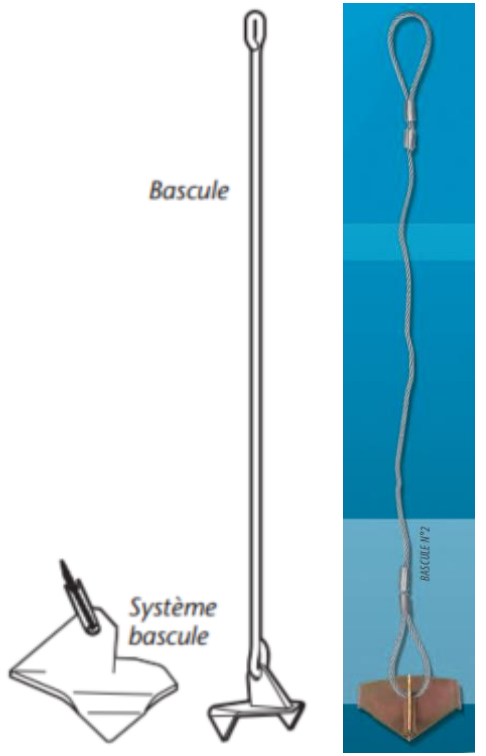


Figure 11. Mooring with 3 stakes in triangle

Figure 12. Mooring with multiple stacks in a row

6.3.8 Boom anchoring using screw, “pig-tail”, harpoon or shifting systems

Soft & loose soils (soft sands, soft silt…) and lightly stony soils (silt/ clay & some stones…)	Moderately stony and dense soils (mix gravel & coarse sand etc.)	Very stony soils &/ or compact soils (compacted clay with stones)
 *Figure 13.“Pig tail”*	 *Figure 14. Harpoon system*	 *Figure 15. Rocking system*

Source : http://www.ancrest.com/fr/agriculture/telechargement.php

6.3.9 Small boom towing & oil recovery with small vessels of opportunity (Cedre)

EQUIPMENT	ANCILLARIES
- Sorbent boom with skirt or small inflatable boom or foam filled cylindrical boom (flat foam filled boom may be used but do not behave well when towed). - oil skimmer and storage capacity on board - 1 or 2 small vessels of opportunity (shallow draft, engine > 20 HP) - 1 pilot + 2 assistants on vessel	VHF, Towing ropes Mast/ pole

DESCRIPTION

BOOM TOWING WITH 2 VESSELS

- Launch the boom and secure it to vessel “A”.
- Sail towards the oil slicks.
- Close to the oil slicks, connect the other end of the boom to vessel “B”.
- Come into a “U” or “J” configuration to collect and concentrate the oil.
- Sail at 1 kt maximum speed against wind and current if possible.
- Sail at lower speed once oil is contained in the boom (0.5 to 0.7 kt).
- Recover oil contained in boom with skimmer.
- Option (light oil / minor volumes. Recover oil contained in boom with sorbent material.

BOOM TOWING WITH 1 VESSEL

- Install a pole on the vessel (2 to 5m depending on the size of the vessel) at 90° of the boat.
- Deploy the boom: one end fixed to the pole; other end secured to the vessel.
- Recover contained oil similarly as above or have a second vessel to carry out the oil recovery.

6.4 Oil recovery with sorbent material (Cedre)

Bulk (type A)

Bulk or loose sorbents are products without a shape of their own made up of particles without any links between them. Bulk sorbents are powders or short fibres, of mineral origin (treated substances: expanded perlite, vermiculite...), vegetable origin (treated or untreated substances: sawdust, peat...) or synthetic origin (polymers: polyurethane, polypropylene, polystyrene, epoxy...).

Pads (type B)

Pads or sheets are thin, flexible products (thickness less than or equal to 3 mm) whose length and width, although less than a metre, are far greater that their thickness (ratio of at least 10 between the width/length and the thickness). They are sufficiently resistant to be handled as they are (e.g. felts, polypropylene sheets).

Rolls (type C)

Rolls, also known as blankets, are products which can be up to several dozen metres long. They are usually made up of unwoven fibres (felted).

Particularity: they can be reinforced by a rope (filament). In this case they are often known as sweeps.

Photos © Cedre

Figure 16 : Types of sorbent according to their shape (Source : Cedre)

⚠ In the absence of water, sorbents do not necessarily need to float or be hydrophobic. Universal sorbents can be used.

	Fluid pollutant (light refined product, light crude oil, chemical product...)	Viscous pollutant (cold heavy fuel oil, weathered emulsified crude oil...)
1	Leak from equipment	
	Place pillows (D) or pads (B), or possibly rolls (C), under the leak or a boom (E) around the equipment.	Use bulk sorbent (A) or sorbent pads (B), or even rolls (C).
2	Run-off on the ground	
	According to the width, stop run-off using booms (E) or pillows (D). Spread bulk sorbent (A) or sorbent pads (B) upstream to reduce infiltration into the ground.	According to the width, stop run-off using booms (E) or pillows (D). Spread bulk sorbent (A) or mops (F) upstream of the boom (mix to promote impregnation).
3	Puddle	
	Spread bulk sorbent (A) on the puddle and scrape away after impregnation, or apply pads (B) or rolls (C).	Spread bulk sorbent (A) on the puddle, mix and scrape or wipe with mops (F).
4	Accumulations in cracks	
	Soak up the pollutant with pads (B) or pillows (D).	Recover the pollutant with mops (F).

Figure 17 : Recommended sorbents for on land spills (Source : Cedre)

⚠ In this case, pollutant are non-polar, non-miscible with water and mainly oils.

	Fluid oil (light refined product, light crude oil...)	Viscous oil (cold heavy fuel oil, weathered emulsified crude oil...)
1	In open water with no current	
	Protection/containment: - Standard floating boom or sorbent boom (E)*, failing which, sorbent rolls (C) reinforced by a rope. **Recovery:** - Pads (B), pillows (D) and bulk (A).	**Protection/containment:** - Standard floating boom or sorbent boom (E)*. **Recovery:** Mops (F), bulk (A).
2	In open water with current	
	Protection: - Smooth surfaced embankment: Sorbent boom (E)*, pads (B) or pillows (D). - Rough surfaced embankment: Sorbent boom (E)* or roll (C). **Containment / deflection / recovery:** - Slow current (< 0.2 m/s) and small quantities of pollutant: sorbent rolls (C) reinforced by a rope stretched across the current. - Stronger current, in large water body: standard floating boom or sorbent boom (E)*, failing which, sorbent rolls (C) reinforced by a rope. Deflect the pollutant towards a sheltered site or let it be carried by the current to then carry out recovery as in part 1 (above).	**Protection:** - Sorbent boom (E)* or roll (C), or even mops (F) if current is slow. **Containment / deflection / recovery:** - Standard floating boom or sorbent boom (E)* or, failing which, mops (F) attached to a rope. Deflect the pollutant towards a sheltered site or let it be carried by the current to then carry out recovery as in part 1 (above).

* equipped with a ballasted skirt

Figure 18 : Recommended sorbents for on water spills (Source : Cedre)

6.5 Temporary storage sites

6.5.1 Temporary storage sites identification and set-up

Requirements for temporary storage sites identification

Distance from the shoreline	On the upper or back beach. In the immediate vicinity of the worksite.
Surface area	Several 10 m². Sufficient space for waste segregation.
Access	Easy access for trucks
Location	Out of reach of the sea, tides and waves
Topographical constraints	Flat or slightly sloped
Environmental conditions	Away from sensitive areas/habitats

Recommendations for the set-up of temporary storage sites

Occupancy	Duration of the clean-up operations on the worksite
Surface area	Several 10 m²
Storage capacities	- Waste segregation: Pits, tanks, IBC for liquid waste Plastic bags, big-bags, pits for semi-solid waste Platforms for solid waste - Cover for full storage facilities
Soil protection	Geotextile Plastic liners
Management and maintenance conditions	- Risk assessment - Containers protection from rain water and to contain odours - Containers protection from prolonged exposure to sunlight if necessary - Drainage of the area by run-off channels - Security to prevent unauthorized dumping - Quantities assessment - Site restoration

6.5.2 Equipment for oily waste temporary storage sites

Type of container		Type of waste	Favourable sites	Comments
	In bulk or inside plastic bags (100 L max) on watertight platform	Oily sand, small debris	Platform on slight slope	Plastic may add to disposal problem
	Buckets (10 L), open top bins (75 to 150 L), wheely bins or containers (150 L to 1 m^3)	Oily sand, small debris	All types of sites	Have a lid which is useful against rain
	Big bags (0,5 to 2 m^3)	Oily sand, solid debris	All types of sites	Can be crane-lifted, air-lifted
	Skips (10 to 30 m^3)	Oily sand, solid debris	All types of sites	Protect inside the skip with a plastic liner Can be crane-lifted
	Watertight pit (50 to 200 m^3; depth<3m)	Liquids, oily sand	Loose ground	Suited for large volume of waste or when lack of containers
	IBC (Intermediate Bulk Container) (600 L to 1 m^3)	Liquids	All types of sites	Top can be cut of and removed for semi-solid and solid waste Some models allow decantation if bottom discharge valve
	Self-supporting flexible tanks (1 to 40 m^3)	Liquids	Flat surface	Some models allow decantation if bottom discharge valve
	Flexible containers with metal structure (10 to 100 m^3)	Liquids	Flat surface	Some models allow decantation if bottom discharge valve


Avoid disposing of oiled containers in non-protected areas (Source: OTRA)


Ensure the temporary storage sites and accesses are protected (Source: Cedre)

Adequate temporary waste storage sites (Source: Le Floch Depollution)

6.6 Cedre Datasheets: protection alternative techniques

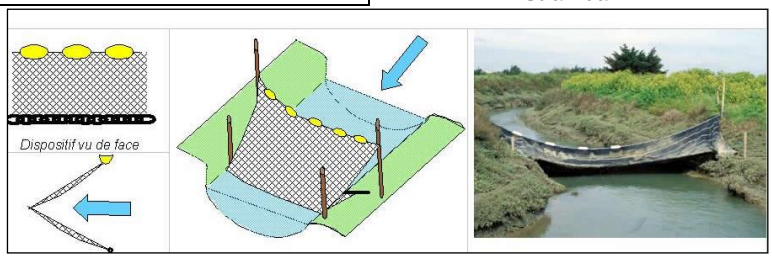
6.6.1 P-01 PROTECTING CHANNELS USING NETS AND FILTER DAMS, Cedre

SCOPE

Substrates: marsh, mudflat
Pollution: all types
Pollutant: viscous to highly viscous
Sea: with or without tides

Straw dam

Oyster shell dam



Fine mesh nets

EQUIPMENT NEEDED

(case 1) - Fine mesh nets, stakes (case 2) - Grating (chicken wire or plastic) or a fine mesh net (used for catching eels, for scaffolding, etc.)	- Planks, stakes - Stiffeners (cables, etc.) - Sorbent materials (straw, shells etc.)	Extra equipment: - Power shovel - Water hoses (for anchorage of stakes into the seabed) - Winch

DESCRIPTION/PRINCIPLE

Involves setting up makeshift systems to retain the largest clusters of pollutant in the water column to prevent marshes and especially production basins (salt production, oyster farming) from being polluted. The type of device varies according to the type of channel and the resources needing protected.
According to the case in hand, the options are:

- (case 1: narrow channel) an ordinary straight or oblique net made of fine mesh (5 to 8 mm) and fitted with floats and ballast positioned obliquely, or in staggered or chevron mode depending on current speed. Nets can also be positioned one after the other at different points along the river.
- (case 2: wider channel) a filter dam made of a double framework incorporating filtering materials (straw, oyster shells etc.) held in place by a net and wire mesh (metal or plastic).

These systems are high maintenance (to ensure durability and when removing the trapped oil and oiled materials). The same channel can be dammed by a series of different types of systems.

CONDITIONS OF USE

Pollution: viscous pollutant, heavy fuel oil
Substrate: load-bearing embankment
Site: marsh

IMPACT ON THE ENVIRONMENT

Physical: temporary modification of hydrological conditions; possibly some turbulence here and there perhaps with scouring depending on current speed and size of the water course.
Biological: risk of trapping fish in the device if the entire water column is closed off.

PERFORMANCE

Yield: variable depending on the type of protection and channel characteristics (width, current, distance, environmental sensitivity).
Implementation: variable depending on the type of protection (as in the case for maintaining the protective structure and recovering the oil).
Waste: pollutant, oiled nets and sorbent material.

OBSERVATIONS

- Effective on viscous pollutant, in particular heavy fuel oil; significantly less effective on light pollutant especially in strong currents; does not filter dissolved fractions.

6.6.2 P-02 SEALING OFF CHANNELS, Cedre

SCOPE
Substrates: marsh, mudflat Pollution: all types Pollutant: fluid to highly viscous Sea: with or without tides

Solid stone dam

Earthen dam with flap gates

EQUIPMENT NEEDED	
Basic equipment: - Sealing materials - Flap gates	Extra equipment: - Power shovel, crawler power shovel

DESCRIPTION/PRINCIPLE
Consists of blocking off a channel to prevent marshes or more frequently productions basins from being polluted (salt production, oyster farming etc.). Closure affects the whole water course. Channels are sealed off using various types of materials (mud, earth, stones etc.). The type of device varies according to the kind of channel and the resources needing to be protected. Complete closure is a possibility, but a boom with flap gates is generally preferable, especially on sensitive sites of ecological interest or economic importance (aquaculture). These systems are high maintenance (to ensure durability and when removing the trapped oil and oiled materials).

CONDITIONS OF USE
Pollution: pollutants of all viscosities Substrate: load-bearing embankment Site: marsh

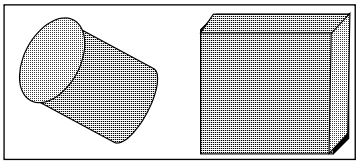
IMPACT ON THE ENVIRONMENT
Physical: temporary modification of hydrological conditions; possible creation of some turbulence here and there depending on current speed and the size of the water course and the flap gates. Biological: (case 1) alteration of local water conditions (immersion, salinity); risk of flooding behind the closure in the case of complete sealing during periods of heavy rainfall or spates; obstructs the movements of fish.

PERFORMANCE
Yield: N/A Implementation: variable depending on the type of protection (as in the case for maintaining the protective structure and recovering the oil). Waste: pollutant, polluted debris and oiled materials.

OBSERVATIONS
- Effective on fluid to very viscous pollutants. - Complete closure (without flap gates) cannot be envisaged for more that 5 or 6 days without leading to a risk of ecological impact in the marsh due to permanent immersion and decreasing salinity which can be harmful for flora and fauna. - A dam with flap gates can be costly in aquaculture production zones (fragility of jetties, unique use of marshland, accurate sizing of flap gates so as not to damage the immersion-emersion cycle, need for a specialised company). - Presupposes daily maintenance (systematic removal of pollutant and blocked debris). - Closure materials can be pre-positioned before the pollution arrives.

6.6.3 P-03 PROTECTING WATER INTAKES BY FILTRATION, Cedre

SCOPE
Substrates: all types Pollution: light to heavy Pollutant: viscous to highly viscous Sea: with or without tides



EQUIPMENT NEEDED	
Basic equipment: - Grating (metal or plastic) - Synthetic oleophilic sorbents - Crushed oyster shells, straw	Extra equipment:

DESCRIPTION/PRINCIPLE
Involves providing water intakes supplying (by gravitational convection) production basins (salt production, oyster farming etc.) with a type of filtering plug. This structure is made of wire mesh (chicken wire or plastic mesh), and its size and shape are designed to fit the nozzle or the water feed trough. It is filled with filtering and sorbent materials. The filtering material should be suited to the resource needing protected (straw, oyster shells for coarse retention, oleophilic sorbents for better filtration) and should be replaced as often as is necessary.

CONDITIONS OF USE
Pollution: moderately fluid to highly viscous pollutant. Substrate: N/A Site: N/A

IMPACT ON THE ENVIRONMENT
Physical: N/A Biological: N/A

PERFORMANCE
Yield: N/A Implementation: variable according to the water intake (the same goes for maintenance and oil recovery). Waste: pollutant, various oiled filtering materials.

OBSERVATIONS
- Effective on viscous pollutant such as heavy fuel oil; considerably less effective on light pollutants, and completely ineffective for dissolved fractions. - To facilitate the placement and removal of the device at the water intake, and to prevent it from being sucked inside, design a tampered, stopper-shaped filtering unit.

6.6.4 P-04 TRAPPING OIL USING MOP NETS, Cedre

SCOPE
Substrates: all types Pollution: light to heavy Pollutant: viscous to highly viscous Sea: with or without tides

EQUIPMENT NEEDED	
Basic equipment: - Nets - Big-bags, boulders or concrete blocks	Extra equipment: - Power shovel (to bury mooring points)

DESCRIPTION/PRINCIPLE

This technique relies on the capacity of fine mesh nets to capture clusters of heavy fuel oil.
Each net is anchored at one end and follows the water movements to recover all the tar balls it meets as it sweeps through the water. The nets are generally 10 to 20 m long and 1 to 5 m wide (but the size depends on the efficiency of the net – closely linked to the rigidity of the structure of the material – and should be suited to the site). They are set up above the half tide line (which varies according to the height of the current tide), so that they partially emerge at high tide. They should be anchored at low tide using a makeshift mooring (net wrapped around stones or, even better, using a big-bag filled with sand) that is buried using a power shovel for instance.
This technique can be used in two ways:

- (case 1) as a remedial solution, to recover large clusters of oil freed during surfwashing operations: the nets, positioned upstream of deposited piles of sediments, are removed after the following tide; this use of mop nets is the most effective.
- (case 2) as a preventative solution, to trap any potential arrivals of oil. In this case, their onsite maintenance is more time-consuming and involves: checking the solidity of moorings, repositioning the nets according to the tide, replacing oiled nets etc. This effort may be disproportionate in view of the volume of pollutant collected. It can very quickly become difficult to manage when such a system is used for a long period of time on a large scale, on very scattered pollution (the efficiency of the system is not permanently guaranteed: nets are unsuitably positioned most of the time due to variations in the height of tides, nets can become buried under sand or torn away by the sea, oiled nets that have not been replaced in time are washed by the sea, the system may be completely abandoned…)

CONDITIONS OF USE

Pollution: viscous pollutant, heavy fuel oil.
Substrate: all
Site: all (but can be difficult to manage along vast straight dunes).

IMPACT ON THE ENVIRONMENT

Physical: none
Biological: none

PERFORMANCE

Yield: variable according to the mode of use and the type of pollutant (low output for light oil).
Implementation: at least 2 to 3 people (same goes for maintenance).
Waste: very lightly to very heavy polluted nets.

OBSERVATIONS

- Very effective on sticky, viscous pollutant such as fuel oil.
- Significantly less effective on light pollutants (lack of adherence, and also self-adherence, of this type of pollutant), or even completely ineffective on relatively exposed sites.
- Can be considered for infrequent use, as a preventative measure, on Mediterranean coasts (coves) at the water's edge with shorter nets or in the water (anchoring/retrieving system will need to be assessed).

6.6.5 P-05 LAYING PROTECTIVE SHEETING, Cedre

SCOPE
Substrates: all types (sheltered) Pollution: moderate to heavy Pollutant: viscous to highly viscous Sea: with or without tides

EQUIPMENT NEEDED	
Basic equipment: - Nets, plastic sheeting, geomembrane	Extra equipment: - Tools and system for fixing sheeting in place: rivet gun, stakes, sledgehammer etc.

DESCRIPTION/PRINCIPLE
Consists of deploying geotextile membranes to prevent the shore from being polluted. Involves setting up plastic sheeting or geotextile membranes at the high tide level in anticipation of the arrival of the pollution. The oil deposited on the sheeting is removed. This technique is easier to apply in non-tidal seas or seas with a small tidal range. It is particularly useful on sites with a risk of oil pollution (quay, terminal etc.) It is a temporary protective measure whose efficiency relies on constant maintenance (attaching sheeting, rips and tears, watertightness etc.) It can only be used on sites with little exposure. It is totally unrealistic for example to try to protect exposed riprap.

CONDITIONS OF USE
Pollution: moderate to heavy: all types of oil. Substrate: all types, vertical to sloping flat structure. Site: coast with a small tidal range for preference and relatively sheltered from wave action; compatible with easy deployment of tarpaulins.

IMPACT ON THE ENVIRONMENT
Physical/biological: very limited to none (temporary presence); prevents or greatly limits the contamination of the sediment.

PERFORMANCE
Yield: time needed to deploy and attach the sheeting varies. Waste: fresh oil, oiled tarpaulins and geomembranes.

OBSERVATIONS
- Short duration of system. - High maintenance (attaching sheeting, ensuring system is watertight, repositioning etc.) - On wharfs: easier to install. - On the beach: The sheeting is held in place using stakes and the edges are buried in the sediment (limited efficiency and hold). The seam between the different strips can be made by simply folding over the material. Requires considerable lengths in order to be effective.

6.6.6 P-06 PROTECTION USING SORBENTS, Cedre

SCOPE
Substrates: all types Pollution: light to moderate Pollutant: low to medium viscosity Sea: with or without tides

EQUIPMENT NEEDED	
Basic equipment: - Sorbent materials (such as straw) - Oleophilic sorbents (in bulk) - Blower or ejector	Extra equipment: - Manual collection (rake, hand skimmer, fork) - Skimmer (on the water) - Suction unit (on land)

DESCRIPTION/PRINCIPLE
Involves spreading straw or bulk sorbents on the upper foreshore (or at the water's edge for non-tidal seas) in anticipation of an arrival of pollutant (technique associated with another clean-up technique such as surfwashing, tilling or underwater agitation) so as to limit the spreading of the pollution, the penetration of the pollutant into the sediments and to facilitate recovery. The sorbents are left in place until they are impregnated with pollutant, then recovered using manual or mechanical means or by suction.

CONDITIONS OF USE
Pollution: moderate to heavy: fresh oil, fluid to moderately viscous. Substrate: all types. Site: all types where the layout allows for recovery of sorbents (creeks, for example, but not long straight lines of dunes).

IMPACT ON THE ENVIRONMENT
Physical/biological: very limited to none (providing that the oiled sorbents are recovered); prevents or greatly limits the oiling of sediment.

PERFORMANCE
Yield: deployment and recovery times vary. Waste: oiled sorbents and materials.

OBSERVATIONS
- Sorbents must be recovered; do not use bulk sorbents in the presence of vegetation. - Pressurised ejection can be effective on viscous pollutant (requires specialised equipment). - Spreading sorbent materials and oleophilic sorbents in parallel strips on the foreshore allows progressive impregnation of the pollutant. - Should be implemented on a small scale (as this technique requires a lot of material).

6.6.7 P-07 PROTECTION USING FILM-FORMING AGENTS, Cedre

SCOPE
Substrates: bare rocky surfaces and installations Pollution: moderate to heavy Pollutant: fluid to viscous Sea: with or without tides

EQUIPMENT NEEDED	
Basic equipment: - Film-forming agent	Extra equipment: - Spreading means - Thermal pressure washer (preparation)

DESCRIPTION/PRINCIPLE
This product is designed to be spread on hard, consistent bare surfaces, before the pollution arrives, so as to reduce the adherence of the oil and to facilitate clean-up operations. Film-forming agents are made of a non-toxic, biodegradable polysaccharide compound (alginates, pectins) made from seaweed. They are stored as powder and easily mix with hot water to form a gel which is sprayed onto the rocks. Once they are dry, they form a very thin protective film to which the pollutant cannot stick. A simple low pressure hose can be used to remove the pollutant in areas where pressure washing with hot water, and possibly washing agents, would otherwise have to be carried out.

CONDITIONS OF USE
Pollution: moderate to heavy: all types of oil. Substrate: infrastructures, installations, riprap, rocky surfaces. Site: easily accessible (land or sea).

IMPACT ON THE ENVIRONMENT
Physical: none Biological: none, does not impede gas exchange; non-toxic and biodegradable.

PERFORMANCE
Yield: varies according to the site. Waste: none

OBSERVATIONS
- Dries in a few hours (depending on the weather conditions). - Short duration: lasts 3 days max. - Instantaneous preparation (powder, hot water, pressure washer). - Can prove useful on sheltered limestone cliffs and on the upper beach in the Mediterranean for instance. - Effective for protecting response equipment (boom, skimmer): facilitates post-pollution washing.

/!\ FOST feedback. Ensure good mixing for a homogenous mixture and a water temperature of 50°C minimum.

6.7 Cedre Datasheets: worksite set-up, management and Health & Safety on site

6.7.1 G01 WORKSITE DEFINITION, Cedre

Aim

This stage aims to accurately define:
- the appropriate techniques according to the nature of the affected shoreline and the type of arrivals
- the limitations of intervention and the level of clean-up to be attained (use of certain clean-up techniques in particularly sensitive sectors can be harmful for the environment)
- the general organisation of the worksite and the location of access points and storage sites on the upper beach.

Assessment team

This task should be carried out by a technical and environmental assessment team, reporting to the regional permanent response centre and may be made up of representatives of the authorities, State services, NGOs and private companies. It should include:
- technicians (response strategies and techniques, worksite organisation)
- environmental experts (environmental precautions)
- safety advisors (e.g. fire service)
- equipment specialists (resources and logistics)
- representatives of the local authorities and the response centre.

Depending on the circumstances, other representatives may also join the group, such as the land owner or manager (natural reserve, forestry commission, coastal protection…), the health board (fishing areas or sites used by the general public), environmental NGOs etc.

Recommendations

The various technical recommendations (especially in terms of clean-up) should be jointly defined in writing by the different participants when they visit the site and should be recorded on a site form. This form should include the following points:
- description of the site and the pollution
- environmental constraints (sensitivity) and logistics (access, storage)
- technical recommendations (strategies, techniques, procedures, necessary resources) and environmental advice
- limitations of response.

These forms can be used as reference documents for companies in the case of a public call for tenders. Where response is carried out by private companies, these forms can be used as a reference for worksite closure.

Before worksite opening

Take the necessary administrative steps prior to worksite opening:
- obtain the necessary authorisations
- inform the competent organisations
- clarify the responsibilities of each party (local authorities, companies, ordering party)
- inform the general public and private companies (local council, town hall, newspapers etc.)

6.7.2 G02 & G03 PERSONNEL SAFETY, Cedre

Risk awareness

All responders must be informed (and team leaders reminded) of the risks that the working conditions present in relation to the pollutant as well as the environment, in particular:
- movements of heavy duty machinery (for lifting or transportation) within the immediate vicinity
- the relief and load-bearing capacity of the ground (cliffs, marshland etc.)
- movements of the sea (surf, waves etc.)

It may be advisable to appoint a health and safety officer.

Personal Protective Equipment (PPE)

Personal protective equipment (PPE) must be worn, and reminders must permanently be given, especially for operations with real risks of:
- oiling of the skin: wear gloves, boots, cotton overalls, a disposable protective suit etc.
- oiling or harm to eyes during washing operations using pressure washers for example: wear goggles, head gear and a mask to protect the eyes from pollutant spray and fragments of rock, as well as from inhalation of vapours
- harm to respiratory tract: wear a breathing mask suited to the vapours generated by the product used
- rock fall, during response below overhang for example, or rock slide: wear a helmet
- slipping into the water, for instance during operations using a pump suction strainer in the water from slippery rocks especially on exposed sites: wear a life jacket.

The majority of PPE is subject to manufacturing standards defined according to the type of risks to which the operator is exposed (oil, falling, drowning etc.). These standards must be followed wherever the working conditions could lead to these risks.

As well as PPE, all type of clothing to improve personal comfort may also be worn: cotton gloves and underwear to reduce the discomfort of perspiration due to poor aeration for instance.

First aid

First aid is highly recommended, or may be mandatory on certain high risk worksites, and can be ensured by:
- the presence of a first aid kit whose content may be altered to suite the particularities of the site (addition of collyrium in the case of a clear risk of pollutant being sprayed into the eyes for instance)
- the recommended presence among the operators of qualified first aiders (2 per team on high risk sites)
- a list of emergency telephone numbers displayed in case of a serious accidents
- accurate signposting of the worksite from the road (especially for remote sites whose name does not appear on existing maps) so that the emergency services can arrive quickly.

Permanent contact

On high risk sites, all the different team members must be in permanent contact. To do so:
- never leave one person to work in isolation
- provide compatible means of communication, suited to the relief of the ground. Do not simply rely on a mobile phone (which may not work at the foot of a cliff or, as is often the case on remote natural sites, may not have good network coverage.
- position someone at a check point (at the top of a cliff for instance) to ensure permanent contact (visual or voice) and always equipped with a walkie-talkie to rapidly alert the emergency services if need be.

6.7.3 G04 WORKSITE SAFETY, Cedre

Ensuring the safety of worksite installations

This applies to the whole worksite in the widest sense (clean-up site, living areas and access routes):
- signpost the different areas of activity (on the beach), living areas (locker room, meals, showers, toilets etc.) and stockpiling areas presenting a risk (fuel, equipment, waste pit etc.)
- define a site for fuel storage away from the locker room:
  - provide an extinguisher for each cabin
  - set up a recovery system for leaks of fuel
  - provide at least minimum lighting for installations and the surrounding area during the winter.

For public safety:
- set up the necessary signposting (cordoning off, forbidden access signs etc.) to stop anyone not involved in the worksite from entering
- remove all equipment, products or parts of installations likely to present any danger to any wrongdoer or oblivious passer-by: for instance, at the end of the day, abseiling ropes or jerry cans of fuel, or upon worksite closure stakes and crabs on cliffs and in the surrounding area.

Response in dangerous environments

All response operations in dangerous environments (at a great height, underwater) necessitate the intervention of specialised professional operators, who are expected to be trained, certified and experienced in working in high risk environments. This should not stop the operators from being informed on the specific risks on the shoreline response worksite (pollutant, clean-up techniques, other responders, sea and weather related factors etc.)
It is important to ensure that all precautions are taken and permanently followed. In particular:
- Responders (climbers and divers) must all be qualified professionals with the necessary physical and professional training and aptitudes.
- Equipment and installations must satisfy the legislation in force.
- The equipment must be in good condition and constantly checked (using a control sheet) by an authorised member of the company.
- The same goes for the specialised installations, whereby an accredited organisation should carry out controls (of all hoisting systems or specialised diving equipment for instance) before the worksite is opened.
- All people present on the worksite should be authorised: minimum training is required by the various coordinators, leaders, advisors and controllers working in this very specific type of worksite.

For cliffs:
- Ensure that personal safety is the priority over response.
- Assess the risk of rock fall (in the case of a high risk site, call upon the services of a geologist).
- Have the stability of the rock face systematically assessed by a competent, qualified member of the company in charge of the response in cliffy areas.
- Where necessary, position indicators of crack opening.
- Clear away any overhanging ground or rocks which may be liable to fall.
- Ensure safety on the worksite by signposting and taking safety measures (railing at least 3m from the edge).
- Check that operators working on foot have had the necessary basic training on using the specific installations set up by the climbers along the cliff to move around the site.
- Ensure daily control of PPE and installations for climbers and pedestrians.

6.7.4 EMERGENCY SUMMARY SHEET – ON SITE

Alert sheet to be visible and accessible to everyone on site

IN CASE OF ACCIDENT PLEASE CONTACT IMMEDIATELY

Safety Supervisor	Name : …
	Phone N° : …
	VHF Channel : …
Local Incident Commander	Name : …
	Phone N° : …
	VHF Channel : …
Medic on site	Name: …
	Phone N° : …
	VHF Channel : …
Closest doctor, hospital, clinic, dispensary etc.	Name : …
	Phone N° : …
	Other Phone N° : …

Clearly state :

"I am..."	**"I see…"**	**"I do …"**	**"I ask…"**
Your name, the worksite, the location, closest access routes…	Number of victims and their condition, cause of accident.	First aid actions undertaken.	What do I need?

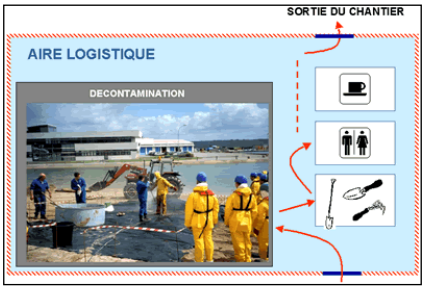
Never hang up the phone first!

Other contacts:

Emergency Number NOC	**Phone N° : + ???**
FIRE BRIGADE	**Phone N° : + ???**
HOSPITAL	**Phone N° : + ???**

6.7.5 G05 DECONTAMINATION OF PERSONNEL, Cedre

SCOPE
Substrates: N/A Pollution: all types Pollutant: all types Sea: with or without tides



EQUIPMENT NEEDED	
Basic equipment: - flat or slightly sloping open area (approx 30 m^2) - plastic tarpaulin, felt or Bidim geotextile - fluorescent tape and stakes - footbath, low tanks with a capacity of around 1 m^3 - brushes, cloths, oakum for rough cleaning - hot water pressure washer - washing agent (for oilskins and boots) - cooking oil and soap for hands	Extra equipment: - bins, barrels - storage/settling tanks for effluents - sorbent skimming - transfer pump - possibly, depending on the size of the worksite: worksite cabins (locker rooms, shelter, small equipment)

DESCRIPTION/PRINCIPLE
The purpose of decontamination is to allow personnel to leave the worksite in satisfactory conditions in terms of hygiene and comfort, but also to stop pollution from spreading from the beach. The principle is to put personnel through a cleaning chain from dirtiest to cleanest, on a watertight platform where washing effluents can be recovered. To begin with, hands are roughly cleaned (using cooking oil and cloths or oakum), along with oilskins and boots (by brushing or buffing, possibly with the addition of non toxic solvent for overalls). The overalls are then cleaned (by low pressure washing with lukewarm water directed towards the base to reduce spray into the person's face, which should be protected by a hood and possibly some type of waterproof veil or cloth). The skin is then washed with hypoallergenic soap. Protective clothing should be removed progressively throughout cleaning: oilskins after cleaning, then overalls.

CONDITIONS OF USE
Pollution: all types (pollutant and extent) Substrate: N/A Site: N/A

IMPACT ON THE ENVIRONMENT
Physical/biological: only if the environmental sensitivity of the site is not respected (sensitive vegetation) and if the area is not completely watertight.

PERFORMANCE
Yield: variable (possible rate of one minute per person, with 3 people simultaneously at work for rough cleaning, washing/rinsing and final wiping down). Minimum workforce required: variable according to the size of the worksite: 2 to 3 people assigned to the task at least at worksite closing time or else mutual assistance. Waste: pollutant mixed with a varying proportion of sediments, polluted effluents which may be more or less emulsified (washing agents), various solids (sorbents, cloths etc.)

OBSERVATIONS
- Be methodical and precisely identify the boundaries of the decontamination area and the pathways: cordon off the area (attach tape to stakes which are also used to hold the plastic film in place on the ground). - Always comply with environmental and safety instructions: recover effluents and dispose of them in a specialised plant. Ensure that the area is watertight when it is laid (lay films perpendicular to the slope) and check regularly. - Test the pressure and temperature of the hose before beginning to wash down responders (protect against spray and vapours). Do not use products such as white spirit, petrol, diesel or abrasives on the skin (recommendations on cleaning products and the protection of the skin can be found on the INRS website, the French reference for occupational health and safety, www.inrs.fr).

6.7.6 G06 ENVIRONMENTALLY FRIENDLY PRACTICES ON THE WORKSITE, Cedre

Environmental constraints

Ensure environmentally friendly practices and reduce harm to the environment throughout the whole duration of the worksite (from its creation to its closure), whatever the sensitivity of the site, but with extra special attention paid to natural sites:

- do not unnecessarily damage the plant cover or destroy rare or legally protected plants: follow environmental experts' advice, especially botanists who will define the exact points where access routes and worksite installations will be set up (huts, decontamination areas, pathways, equipment base, waste storage sites etc.)
- reduce harm cause by excessive passage of pedestrians and vehicles: organise traffic (circulation plan, cordoning off, no go areas), pose artificial paths (wickerwork fencing, tarpaulins, planks, track linings for vehicles etc.), use quad bikes
- prevent the pollution from spreading (from the beach to the back beach): set up decontamination areas or at least boot scraping points according to the case in hand
- keep the site as clean as possible:
  - group machinery together and raise it above the plant cover (sit it on pallets for example)
  - anticipate leaks from machinery (pose protective geotextile sheeting)
  - provide bins and clean the site once all the installations have been removed.

Prior authorisation

To access worksites, it is sometimes necessary to pass through private property:

- request authorisation from the land owner or manager
- carry out a joint visit of the site beforehand to explain the planned solutions and actions, and to observe the condition of the site (existing deterioration).

Over and above ecological impact, the creation of access routes can alter the use (and the frequentation) of an area. The creation of all access routes must therefore be studied in collaboration with all the interested parties: most importantly the municipality and the site manager, but also the local authorities, environmental NGOs etc.
It is sometimes possible to create or reopen access routes without causing serious or irreversible damage:

- try to use disused coastal paths
- find out about the existence of a local practice of regularly or periodically making clearings by cutting back vegetation (creation of a fire break or pathways for hunting etc.)
- in some exceptional cases (worksite in a very sensitive natural area far from existing paths), consider the possibility of using a helicopter to bring equipment supplies and to evacuate large volumes of waste (costly operation but can prove to be cost effective if it is well organised simultaneously for several sites. Requires prior authorisation).

Rehabilitation and restoration of damaged sites

Areas of land deteriorated by clean-up operations (access routes, storage sites etc.) must always be rehabilitated:

- with the problem of: "can we and should we return the site to its former condition?"
- in cooperation with all the concerned parties
- following a diagnosis made by environmental specialists (botanists)

The objectives and modalities of this restoration vary according to:

- the type of plant cover (its sensitivity and self-regeneration capacity)
- the usage of the site (initial use and possibly the use anticipated in the long run as part of a post-pollution development project)

All rehabilitation must be subject to botanical monitoring in order to:

- validate/rectify the chosen procedures and techniques
- provide relevant elements to help to decide when to stop rehabilitation operations.

Prohibiting pedestrian access and traffic of vehicles facilitates the regeneration of the vegetation. It should therefore be implemented as soon as possible, as a preventative measure (channelling traffic), but also as a remedial solution by progressive closure of deteriorated areas as the worksite advances, as well as systematically when the worksite is finally closed.

6.7.7 G07 EQUIPMENT MAINTENANCE, Cedre

- **Upkeep and repair**

Minor equipment failures can considerably hinder operations, or even bring a worksite to a standstill:

- train operators to use the machines (inform them of misuse, minor failures which can easily be detected and repaired etc.)
- regularly maintain the machines (pumps, pressure washers etc.)
- assign a mechanic to each worksite
- provide an equipped repair and maintenance site (at base camp for example)
- set up a systematic maintenance-cleaning-repair operation at the end of each week.

Protection

It is not necessary to remove equipment from the beach at the end of the day as long as it is out of reach of the sea, but in the event of a bad weather forecast, it should be moved up the beach or even to the back beach:

- do not rely simply on the tidal coefficient
- do not be deceived by an apparent lack of variation in the sea level for example in the Mediterranean
- always check weather reports and anticipate storm surges.

Reliability and conformity of equipment

When using earthmoving equipment and other heavy duty machinery, ensure that all the legal checks that this type of machinery must go through have been correctly carried out. The same goes for launches.

Theft and vandalism

The possibility of equipment being stolen or vandalised over the weekend must be considered on worksites and even at the base camp, wherever the worksite is located.

- On the worksite: cabins should be fitted with padlocks (however this may often be insufficient).
- At the end of the day, and according to the site possibly at lunchtime too, small tools and equipment, and even detachable parts of all equipment remaining outside, should be stored away (e.g. stainless steel bucket of small sand screeners).
- At the end of the day, storage tanks (especially flexible tanks which are easy to pierce) containing recovered pollutant or even water should be emptied (only leave the amount of water needed to keep the tank in place in strong winds).
- Before the weekend, large equipment should be moved to a supervised site. Do not leave anything valuable or essential for the worksite inside the cabins (e.g. tool box, fire extinguisher).
- Security personnel should permanently supervise base camp sites and equipment storage points.

6.7.8 G08 WASTE MANAGEMENT, Cedre

Principles

- *Definition*

Primary storage sites should be set up on the upper or back beach. The size of these storage facilities will vary with that of the worksite. They can range from a simple daily deposit point for a few dozen to a few hundred kilos (in bulk or packaged in bags, big-bags or skips) to a larger site grouping together these deposit points, to constitute a primary buffer storage point.
All these temporary primary storage sites may be identified in contingency plans.

- *Recommendations*

Prevent the pollution from spreading, at each link in the storage chain, and reduce resulting damage to sites by:
- protecting the ground from infiltration and the impact of traffic (tarpaulins, geotextiles)
- effectively managing the available space: assess intermodal transfer operations and the circulation of machinery used for evacuation.

Sort waste at an early stage:
- where possible, waste should be initially sorted on the beach, however it can be difficult to have enough containers, therefore small quantities of polluted waste which are initially sorted are often evacuated in the one container
- otherwise, sort waste in an area where there is enough space and a little more time, i.e. at the primary storage site (sorting and possibly packaging)
- bags or big-bags are very useful (for non fluid pollutant of course) but in order to effectively manage them the contents should be identified using a colour code before leaving the worksite (using different coloured spray paints for instance).

Primary storage site

Identification
If the primary storage site has not been pre-defined in a contingency plan:
- look for a suitable site in terms of sensitivity, proximity and access, with help from local coordinators, response authorities and the relevant State services (environment, waste…)
- call upon the services of a botanist very early on
- accurately define the respective responsibilities of the different parties in the choice, development, use and rehabilitation of the site.

- *Management*

The site will require:
- specific storage areas suited to the different types of waste
- personnel, in particular: at least one person to supervise unloading operations and impose sorting procedures in the different parts of the storage area
- regular intervention of a site maintenance team, in particular when it rains
- site closure outside of unloading hours so that the site does not turn into a dump for all types of refuse
- the organised monitoring of waste entering and leaving the site (type of waste and where possible its average oil content, volume, origin, destination etc.)

Rehabilitation
The return of the site to its original condition implies:
- a contamination diagnosis made by a organisation specialised in ground pollution, possibly decontamination operations, and the approval of the authorities
- in some cases, a botanical evaluation to define a plant cover restoration operation.

6.7.9 G09 WORKSITE RECORDS, Cedre

Principle

Worksites should be monitored on a daily basis to determine the human resources and equipment used on the different worksites on the shoreline.

In order to do this, forms should be filled up at the end of each day, summarising the operations conducted and listing the means deployed, site by site, during the day.

These daily worksite monitoring forms are a key element in response management:
- *during the crisis*, they constitute a valuable management and communication tool, in that they give a constant overview of human and material resources used on the worksites, meaning that a detailed picture of the worksites (number, means used…) is available at all times
- *after the crisis*, they are the basis for experience feedback, archiving and even compensation procedures.

Filling in the forms

Content
The information required on the worksites in operation mainly concerns the following points: location, date, human resources and equipment (number, origin), operations (type) and results (volumes of waste).

NB: personal protective equipment (oilskins, disposable overalls, masks, goggles, boots etc.) and manual tools (shovels, scrapers, bags etc.) should not be listed daily for each individual worksite but rather on a weekly basis by the advanced response centre. Their provision must nonetheless be taken into account (in terms of requirements for the following days).

Writer
An individual worksite form (cf. datasheet G01) should be filled in at the end of every working day by the different worksite leaders and taken to the advanced response (ARC) centre for the evening meeting.
The ARC will compile all these forms (cf. datasheet G02) and transfer them to the operational response centre and the permanent response centre.
A model form, taken from the French national contingency plan revision guide written by *Cedre*, is presented below.
When filling in the form, the worksite leader should be as accurate as possible in the description of the means used on the site.

Form 1 – DAILY WORKSITE MONITORING – INDIVIDUAL FORM

Response centre:	**Date:**	**Site:**

PERSONNEL		**TYPE OF OPERATIONS**	**EQUIPMENT USED**			**COLLECTED WASTE**	**ADDITIONAL COMMENTS**	**REQUIREMENTS FOR THE FOLLOWING DAY**
WORKFORCE	ORIGIN(1)		QUANTITY	TYPE (2)	ORIGIN (1)	QUANTITY (M^3)	(INCIDENTS, CHANGES, TEAMS, FAILURES ETC.)	PERSONNEL/EQUIPMENT

How to fill in the form
(non exhaustive list to be adapted to suit the situation in hand)

(1) Origin of resources		**(2) Type of equipment**			**(3) Type of operations**
Equipment Local authorities*, Fire Service, Army*, private company*, other*	Personnel Local authorities*, Fire Service, Army*, volunteers, private company*, other*	Heavy duty machinery/logistics earthmoving equipment (e.g. power shovels) farm machinery (e.g. tractors, trailers…) water supply equipment (e.g. tanker …)	Specialised equipment Sand screeners, HP washers, transfer pump, impact hose… storage (tanks, big-bags…)	Disposable products Geotextile, sorbents, washing agents, other*	Manual recovery Mechanical screening HP washing etc.

* specify

Form 2 - DAILY WORKSITE MONITORING - SUMMARY FORM FOR RESPONSE CENTRE USE

Date:	**Response centre:**

WORKSITES	**7. PERSONNEL**		**TYPE OF OPERATIONS (3)**	**EQUIPMENT USED**			**COLLECTED WASTE**	**ADDITIONAL COMMENTS**	**REQUIREMENTS FOR THE FOLLOWING DAY**
(NAMES OF SITES)	NUMBER	ORIGIN (1)		NUMBER	TYPE (2)	ORIGIN (1)	QUANTITY (m^3)	(INCIDENTS, CHANGES, TEAMS, FAILURES ETC.)	PERSONNEL/EQUIPMENT
1									
2									
3									
4									
5									
6									

(non exhaustive list to be adapted to suit the situation in hand)

(1) Origin of resources		**(2) Type of equipment**			**(3) Type of operations**
Equipment Local authorities*, Fire Service, Army*, private company*, other*	Personnel Local authorities*, Fire Service, Army*, volunteers, private company*, other*	Heavy duty machinery/logistics earthmoving equipment (e.g. power shovel, bulldozer, loader etc.) farm machinery (e.g. tractors, trailers…) water supply equipment (e.g. tanker …)	Specialised equipment Sand screeners, HP washers, transfer pump, impact hose, storage (tanks, big-bags…)	Disposable products Geotextile, sorbents, washing agents, other*	Manual recovery Mechanical screening HP washing etc.

* specify

7.1 Cedre Datasheets: shoreline clean-up techniques

7.1.1 N 01 - “LEAVE ALONE” or NATURAL CLEAN-UP, Cedre

SCOPE
Substrates: all types Pollution: light to moderate Pollutant: all types Sea: with or without tides

EQUIPMENT NEEDED
N/A

DESCRIPTION/PRINCIPLE
Natural clean-up is the result of natural physical and biochemical processes taking place along the coastline, especially involving wave and current energy, adhesion of oil to organic particles, bacterial and micro-organism activity, photo-oxidation, etc. The so-called "leave alone" option, or non-response, should be viewed as a technique in the same way as any other response technique. It should be considered systematically in the event of a small spill in areas where response may be more harmful than the oil, due entirely to biological biotope sensitivity (reefs and mangroves for instance). It is all the more justified for a site that has not been heavily oiled and that has a good self-cleaning potential and that otherwise may present a safety hazard for responders (very wave beaten rocky headland or a barrier reef, for instance).

CONDITIONS OF USE
Pollution: all types of pollutant (if it is a small spill). Substrate: all types. Site: very exposed, difficult to access, or ecologically fragile.

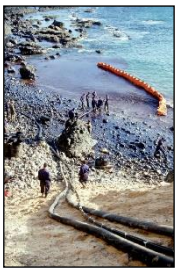
IMPACT ON THE ENVIRONMENT
Physical: in the event of major accumulations, risk of formation of a crust of stones, for instance, causing the stones to be unable to absorb the shock of waves, and therefore no longer protecting against erosion. Biological: persistence of the toxic effects of oil must not be underestimated; such effects will last for a variable amount of time and will need to be compared with the effects caused by response.

PERFORMANCE	
Yield: N/A Waste: N/A	The persistence of the pollutant is mainly dependent on its nature and the extent to which it traps, infiltrates or burrows in addition to the degree of exposure of the site to waves and other weathering agents.

OBSERVATIONS
- Often the best solution on sensitive sites. - Only concerns small spills. - Will require surveying of the affected size and monitoring of the pollution. - Do not underestimate the persistence of some pollutants or the efficiency of natural clean-up, especially when the sea hardly ever reaches the heights required to clean the oiled surfaces.

7.1.2 N 02 - SKIMMING/PUMPING AT THE WATER'S EDGE, Cedre

SCOPE
Substrates: all types Pollution: heavy to very heavy Pollutant: all types (pumpable) Sea: with or without tides



EQUIPMENT NEEDED	
Basic equipment: - Skimmer, skimming head - Pump, vacuum truck - Storage facilities	Extra equipment: - Floating boom - Worksite boom, sorbent boom - Small boat (where necessary)

DESCRIPTION/PRINCIPLE
Consists of skimming/pumping large accumulations of floating oil by the water's edge from the shore. Pumping units will be needed (pumps or vacuum trucks) fitted with a floating skimmer, a floating suction head or a flat nozzle. The oil will have to be contained in a floating boom, where necessary a shore-sealing boom. Containment may consist of a boom laid in herringbone mode to intercept drifting slicks (choose the right place depending on drift and storage facilities) or a containment boom to encircle the slick and stop it from leaving a creek, for instance. In places where tidal activity is minimal, laying a boom preventively along the water mark on a slightly exposed site can prevent the pollutant from stranding and yet will allow pumping. The pollutant must be jetted towards the suction head with small worksite booms, if necessary from a dinghy.

CONDITIONS OF USE
Pollution: pumpable oil; massive arrivals or heavy pollution. Substrate: good load bearing capacity; access for bringing equipment onto the beach. Site: Accessible to farm tractors, public works machinery, sanitation trucks. Try to use the inshore current patterns to deflect the oil towards ditches or booms.

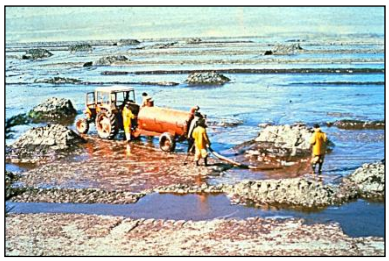
IMPACT ON THE ENVIRONMENT
Physical/biological: light to moderate, depending on circulation of machinery on the beach and to a possible transfer of the pollution; potentially serious impact if storage pits are dug on the upper foreshore or back beach.

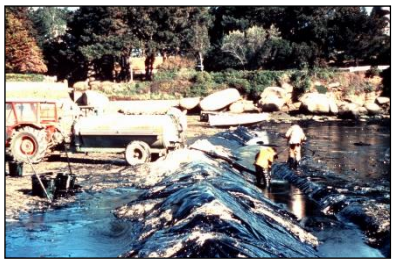
PERFORMANCE
Yield: variable (from a few m^3 to several dozen m^3 per hour) depending on the pumping/skimming means used and pollutant viscosity. Count on anywhere between 1/4 and 1/5 of the theoretical pumping rate for downtime owing to various factors (clogging, blocking, solid waste, agitation of the water surface, etc.), in addition to pressure losses due to the viscosity of the pollutant and the height and length of suction or delivery. Minimum workforce required: 2 to 3 people per recovery/storage unit. Waste: oil, emulsified to a varying extent, pollutant containing free water, with sediment and diverse debris in varying quantities depending on the system used and the location.

OBSERVATIONS
- Prioritise selectivity: thicken slicks for suction. - The emulsion may be broken at this stage on the beach, by injecting an emulsion breaker into the pollutant if tests prove that it is worthwhile. - Ensure that the pump is suited to the characteristics of the pollutant and the site. - Always make sure you install a protective liner for substrates (use tarpaulins) and traffic lanes so as to mitigate the spreading of pollution. - Consider the need to demobilise equipment and personnel every day from the scene of operations depending on prevailing local characteristics and tidal conditions during the response. - Plan on removing storage facilities (specialised tanks are preferable to ditches).

7.1.3 N 03 - PUMPING ON THE FORESHORE (TRENCHES OR BUNDS), Cedre

SCOPE
Substrates: sand Pollution: heavy to very heavy Pollutant: fluid to slightly viscous Sea: with or without tides





EQUIPMENT NEEDED	
Basic equipment: - Pump - Vacuum tanker - Storage facilities	Extra equipment: - Power shovel (digging trenches, forming bunds) - Plastic sheeting, geotextile (protection) - Machine with front rubber scraper blade - Manual scraper (as used in pig sties)

DESCRIPTION/PRINCIPLE
Consists of pumping accumulations of oil concentrated at collection points: - (case 1) on the mid-foreshore, in a shore-sealing boom or a bund (a small embankment) on a slope, or in shallow pits if the foreshore is subhorizontal. - (case 2) on the upper foreshore, in a trench with a bund. In the first case, the fluid oil is scraped, mechanically or manually, towards trenches around 0.5 m deep. In the second case, a trench is dug at low tide along the high tide mark of the day, the sand is removed to form a protective bund on the land side of the trench and the trench is covered with a tarpaulin.

CONDITIONS OF USE
Pollution: pumpable oil with low to moderate viscosity – heavy pollution Substrate: tamped, fine-grain sand, good load-bearing capacity, sufficient thickness of sediment (for trenches/bunds). Site: accessible to public works machinery; very wide foreshore (case 1); small relatively sheltered beach (case 2).

IMPACT ON THE ENVIRONMENT
Physical: digging trenches: risk of temporary formation of quicksand after filling by the following tides. Biological: toxic effects in the long term if the pollutant persists in the trenches after filling; otherwise temporary disturbance; recolonisation in the long run.

PERFORMANCE
Yield: variable according to the pumping means used. Minimum workforce required: 2 to 3 workers per pumping unit; more if scraping is manual. Waste: pollutant mixed with varying quantities of sand.

OBSERVATIONS
- Case 1 should only be considered in the case of a major spill of a fluid pollutant and exclusively on a foreshore where a large area is uncovered by the tides. - Case 2 = difficult to implement; accurately assess the day's high tide level and the sea state; protect bunds or trenches using a tarpaulin in order to prevent the bund from collapsing and to restrict the mixing of sand and oil in the trench. - Clean out the trenches and remove the tarpaulins before leaving the worksite. - Pumping using vacuum trucks is the most appropriate method: use vacuum trucks which can be opened to remove the sand. - Assess the possibility of injecting a demulsifier during pumping.

7.1.4 N 04 - SCRAPING USING EARTHMOVING EQUIPMENT, Cedre

SCOPE
Substrates: sand Pollution: very heavy Pollutant: fluid to slightly viscous Sea: tidal

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EQUIPMENT NEEDED	
- Basic equipment: - Tractor or loader with front blade	Extra equipment: - Front-end loader (for removal) - Front blade fitted with a rubber scraper, snow plough design.

DESCRIPTION/PRINCIPLE
Consists of bringing the pollutant together in order to facilitate its removal from the beach. Scraping is carried out using a tractor or earthmoving equipment fitted with a front blade in an oblique position. According to the viscosity of the pollutant, two options are available: - (case 1) fluid pollutant: radial or converging scraping towards a collection point on the foreshore; removal by pumping - (case 2) more viscous pollutant: concentration to form windrows, by successive slightly curving passes parallel to the water line; removal of windrows using a loader.

CONDITIONS OF USE
Pollution: heavy pollution, continuous slick, fluid to slightly viscous oil. Substrate: vast, flat foreshore with wet fine-grain sand (very damp to saturated), and a good load-bearing capacity, without ripple marks). Site: accessible to earthmoving equipment, sufficiently vast to allow vehicles to manoeuvre.

IMPACT ON THE ENVIRONMENT
Physical: normally only removes the pollutant, but some sediment may also be taken with it (if the operator is poorly supervised or inexperienced), especially if used on light pollution or an unsuitable site; high risk of disturbance due to traffic and mixing of oil with sediment. Biological: limited disturbance (except in the case of excessive removal of sediments or a lot of oil and sediment mixing).

PERFORMANCE
Yield: variable Minimum workforce required: 2 people per vehicle (1 driver + 1 assistant) Waste: oil mixed with a varying quantity of sediment; but can very rapidly become unselective if scraping is carried out on moderate pollution (should be avoided).

OBSERVATIONS
- Should only be carried out on heavy pollution; do not use on moderate to light pollution. - Restricted window of use. - Inform and supervise operators; use experienced operators. - Work methodically. - Set up traffic lanes on the beach in order to reduce oil and sediment mixing. - The bucket of the loader used to evacuate the pollutant should be filled no more than 2/3 full to prevent spillages during transportation. - Ensure safety on the worksite.

7.1.5 N 05 - SCRAPING/PUMPING USING SPECIALISED MACHINERY, Cedre

SCOPE
Substrates: sand Pollution: heavy Pollutant: fluid to slightly viscous Sea: tidal

Polluge skid-mounted suction unit

EQUIPMENT NEEDED	
Basic equipment: - (case 1) Skid-mounted suction unit (Polluge) - (case 2) V-shaped scraping/concentrating system	Extra equipment: - Farm tractor - Slurry spreader (possibly scrapers or earthmoving equipment for concentration) - Sanitation truck

DESCRIPTION/PRINCIPLE
Consists of using a vacuum truck (agricultural or sanitation truck) fitted with a front or lateral suction nozzle: - (case 1) a flat suction head mounted on runners ('Polluge' type) - (case 2) a front or lateral V-shaped scraping/concentration system.

CONDITIONS OF USE
Pollution: low to moderate viscosity; fresh oil; thick continuous or artificially concentrated slick. Substrate: fine-grain sand, firm ground, saturated with water, flat surface with few or no ripple marks. Site: good load-bearing capacity, accessible to farm tractors and small vans.

IMPACT ON THE ENVIRONMENT
Physical/biological: little disturbance, other than that due to the intensive passage of tyres (risk of mixing and burying).

PERFORMANCE
Yield: estimate the actual rate as equivalent to around 1/4 or 1/5 of the theoretical instantaneous rate of the pumping means used or the multiplication of the strip width (# 1m) x speed (1 to 3 km/h) x average deposit thickness. Minimum workforce required: 2 people (1 driver + 1 assistant). Waste: oil + heavily polluted sand containing at least 50% oil.

OBSERVATIONS
- Selective pumping, but removal of sand is inevitable: use a truck which can open. - Restricted window of use. - Existing models are rare. - Can also be used at the water's edge to reduce the removal of sand (while pumping).

7.1.6 N 06 - SCRAPING USING SPECIALISED MACHINERY, Cedre

SCOPE
Substrates: sand Pollution: heavy Pollutant: fluid to slightly viscous Sea: with or without tides

Egmolap scraper

EQUIPMENT NEEDED	
- Basic equipment: - Land-based EGMOLAP scraper	Extra equipment: - Loader - Vacuum tanker

DESCRIPTION/PRINCIPLE
Land-based Egmolap scrapers are made up of a conveyor belt mounted on the hydraulic arm of a small loader, which removes the oil by scraping it from the sand saturated with water or at the water's edge. A settling tank fitted to the back of the loader ensures the separation of oil and water. The oil is then pumped by a vacuum tanker coupled with a loader.

CONDITIONS OF USE
Pollution: fluid to moderately viscous, in a thick continuous slick. Substrate: good load-bearing capacity; flat, regular surface; wet to saturated sand. Site: vast and accessible to small earthmoving equipment, without blocking traffic.

IMPACT ON THE ENVIRONMENT
Physical: little superficial disturbance due to the circulation of machinery. Biological: little to none (surface scraping) mainly due the compacting of the sand; possibility of sand mixing with the pollutant if the traffic is poorly organised.

PERFORMANCE
Yield: ¼ [(speed (1 to 3 km/h) x (average strip width (#1 m) x thickness)]. Minimum workforce required: 3 people (2 drivers + 1 assistant) Waste: oil + sediment with high oil content (at least 50%).

OBSERVATIONS
- Very selective collection. - Very restricted window of use. - Can also be used at the water's edge on floating oil. - Existing models are very rare.

7.1.7 N 07 - REMOVAL/ADHERENCE USING SPECIALISED EQUIPMENT, Cedre

SCOPE
Substrates: sand Pollution: light to heavy Pollutant: moderately to highly viscous Sea: with or without tides

EQUIPMENT NEEDED	
Basic equipment: - Roller	Extra equipment: - Tractor (model may vary): loader, farm tractor, self-propeller crawler - Loader for waste disposal.

DESCRIPTION/PRINCIPLE
Involves using specially designed rollers to take advantage of the adherence and trapping capacities of certain coatings for viscous pollutants. There are different sizes of rollers; the larger ones are pushed by farm or earthmoving machinery; the smaller ones are fitted with caterpillar tracks and can be self-propelled or pushed along by hand. The materials used to cover rollers range from geotextiles (*Bidim* or *Enkamat* types) to simple carpet fabric. Some small models are not covered with material, but rather the oil is collected using nails or wire. A scraper automatically removes the pollutant from the surface of the cylinder, and it is then transferred into a receptacle. This technique is particularly effective on scattered viscous pollutant.

CONDITIONS OF USE
Pollution: moderate to very high viscousity; fresh oil; micro tar balls to patties, or even small patches if using large rollers. Substrate: flat surface with few ripple marks and without solid waste (obstructing contact); fine- to coarse-grain sand; firm ground saturated with water. Site: good load-bearing capacity and accessible to large machinery; slightly to moderately sloping.

IMPACT ON THE ENVIRONMENT
Physical/biological: none

PERFORMANCE
Yield: variable according to equipment, pollutant and pollution, sites... Minimum workforce required: 1 person (1 driver). Waste: pollutant generally mixed with little sand (viscous pollutant); if the pollutant is relatively fluid: heavily polluted sand containing at least 50% oil.

OBSERVATIONS
- Very selective recovery. - Complements sand screening. - Very restricted window of use (fresh pollutant; wet, hard, fine- to coarse-grain sand). - Only a few models, varying in size, available on the market.

7.1.8 N 08 - SAND SCREENING USING SPECIALISED MACHINERY, Cedre

SCOPE
Substrate: homogeneous fine-grain sand Pollution: light to heavy Pollutant: viscous to highly viscous Sea: tidal or non-tidal

Adaptation of a pick-up

EQUIPMENT NEEDED	
- Basic equipment: - Sand screeners (large and small) - Tractor	- Extra equipment: - Tractor with loader (for removal)

DESCRIPTION/PRINCIPLE
Involves screening the surface layer of the beach in order to selectively remove clusters of pollutant and various soiled debris. This technique is carried out using sand screeners, often used to clean tourist beaches. Two sizes of machines exist: large screeners, usually towed by farm tractors, and small self-propelled screeners. The large screeners function in two successive stages: a vibrating blade digs into the sediment to lift up the surface layer, which is then pushed onto a mesh conveyor belt (must models are equipped with a threshing/loosening system, or a clawed pick-up, to aid the pick up process) where the screening occurs. Elements which are larger that the size of the mesh are dropped in a receptacle at the end of the belt. The small screeners function in a similar way, obviously with a lower output, and are fitted with finer mesh (5 to 15 mm, instead of 15 to 28 mm for the large ones). They do not reach as great a depth (5 cm instead of 20 cm for the larger ones). They allow finer screening operations, especially in sections which cannot be accessed by large screeners.

CONDITIONS OF USE
Pollution: exclusively on clusters of viscous pollutant (tar balls to patties) and soiled debris; for use during final stage of clean-up, but also during initial recovery, requiring an adaptation of material and methods. Substrate: homogeneous sand, not too coarse, free from too many large elements (stones, shells); not too compact (slightly humid to dry). Good to moderate load-bearing capacity. Site: access possible for farm machinery; large enough and free of obstructions to allow easy manoeuvrability.

IMPACT ON THE ENVIRONMENT
Physical: in the event of poor usage, possibility of disproportionate removal of clean sediment; deconstruction and destabilisation of the foot of the dune (upper end of beach); eventual erosion. Biological: low impact on slightly sensitive psammophilous fauna in dry sand. Potentially great impact in the event of poor practices or overuse: destruction of the embryonic dune and the associated pioneer vegetation berm in front of the dune, decrease in biodiversity and fertility by reduction of the low water mark.

PERFORMANCE
Efficiency: varies according to the site, pollution, machinery, drivers etc.; repeated runs are generally necessary; for large screeners: ¼ [(speed (0.3 to 3 km/h) x average width (#2m) x depth]. The depth is adjustable (0 to 20 cm). Minimum workforce required: 1 driver Waste: varied solid waste, tar balls, patties of oil with a small quantity of sand; overall oil content: at least 20% (but very much less in the case of poor implementation).

OBSERVATIONS
- Equipment is widely available, especially in popular tourist areas. - Requires tractors which work at low speeds (0.3 km/h), are powerful enough (120 cV mini) and are fitted with suitable tyres. - Can tend to fragment the pollutant in certain conditions. - Phase 1 and 2 technique: the material must be adapted to optimise the equipment in the initial clean-up phase: pick-up claws can be replaced with flexible flaps. - Requires brief training beforehand on the necessary adaptations to material (initial clean-up), specific operational modes and the potential ecological impact. - Follow environmental and operational instructions. Do not use at the foot of a dune.

7.1.9 N 09 - MANUAL COLLECTION, Cedre

SCOPE
Substrates: all Pollution: very light to very heavy Pollutant: all Sea: with or without tides

EQUIPMENT NEEDED	
- Basic equipment: - Scrapers, rakes, brushes, forks, etc. - Landing nets, shovels etc.	Extra equipment: - Big-bags, bins, bags - Tractor with loader (for removal)

DESCRIPTION/PRINCIPLE

The pollutant, polluted sediment and debris are removed by hand or with the help of manual tools and then stored for disposal.
The waste can be in bulk or put in bags, plastic rubbish bags, big-bags (providing the transport facilities and the intermediary storage facilities can cope with them) and is then disposed of by hand or better still with assistance from flat-bottomed boats.

CONDITIONS OF USE

Pollution: all types; most often scattered pollution; on widespread pollution, only if use of other techniques is impossible.
Substrate: all types; sufficient load bearing capacity for pedestrians and possibly light machinery.
Site: all types if they are sufficiently workable and providing they can cope with a high level of trampling.

IMPACT ON THE ENVIRONMENT

Physical: impact ranges from insignificant to high depending on the substrates. Risk of deconstruction of soil on marshland. Erosion.
Biological: same applies. Potentially destructive effects on flora (dunes, marshland).

PERFORMANCE

Yield: this will vary with the type of pollution and the site (from 0.2 to 2 m^3 at the most per day per person).
Minimum workforce required: (order of magnitude for average sandy beach, 100 to 200 linear metres per day per team of 10 workers, including waste removal).
Waste: polluted debris and sediments with variable oil-content: 10 to 30% on scattered pollution but much more, especially during the first few days, in the case of a massive HFO spill.

OBSERVATIONS

- Ensure responders have at least the minimum in terms of protective clothing: overalls, boots, gloves, etc. depending on the nature of the pollutant, exposure and responder activity.
- Difficult working conditions: aim for optimum comfort in terms of equipment (innovate if necessary), logistics, supplies (water, coffee, meals…)
- This is a very selective technique, although it requires a lot of time and personnel.
- Organise the response: give the responders well-defined responsibilities (collection, raking, piling in heaps, putting waste in rubbish bags and disposal) and have strike teams rotate. The use of a loader replaces the latter two positions: the waste collected is directly placed in the loader and is then evacuated to an intermediate storage facility.
- Organise a chain to evacuate waste in places that are hard to reach.
- Ensure personal safety (signposting, supervision, no isolated individual should be out of sight etc.).
- Restrict the spreading of the pollution: set up traffic lanes, protect ground (geotextile), provide a decontamination area near the worksite exit.
- Always comply with environmental and safety instructions.

7.1.10 N 10 - SURFWASHING, Cedre

SCOPE
Substrate: sand, stones Pollution: slight to very heavy Pollutant: various Sea: tidal

EQUIPMENT NEEDED	
Basic equipment: - Front loader - Bulldozer	Extra equipment: - Quarry truck - Recovery means (nets, sorbents)

DESCRIPTION/PRINCIPLE

Consists of moving sediments towards the lower end of the beach, to subject them to the natural cleaning action of the sea. Wave action breaks down the piles, separates the pollutant from the sediment, spreads out the sediment over the beach and cleans it by agitation and abrasion, while moving it back up to its original location. This technique can be used both in phases 1 and 2.

In phase 1, the aim is to separate the pollutant from the sediments. The freed pollutant is deposited along the low water mark, necessitating surface recovery as quickly as possible. The pollutant can be recovered manually on the foreshore, possibly after being trapped by a material such as straw or sorbents, spread along the beach beforehand. In the case of a viscous pollutant, recovery is best carried out using nets spread out over the foreshore and anchored at one end, further up the foreshore from the piles or windrows.

In phase 2, surfwashing is used for different purposes:

- to directly clean slightly oiled stones or finish the previously undertaken washing operations (no recovery needed)
- as an alternative to sand screening (for example, where sand screeners are no longer effective on micro tar balls of heavy fuel oil): plan for the possible recovery of dropped clusters (from nets or manual recovery)
- to accelerate washing of sand contaminated by a light crude oil: recovery is generally not possible (pollutant in the form of a soiled foam or concentrated sheen).

CONDITIONS OF USE

Pollution: very light to very heavy
Substrate: stones and sand
Site: access possible for public works equipment; well exposed to the sea's energy

IMPACT ON THE ENVIRONMENT

Physical: temporary disruption to beach's layout: obvious geomorphological risk (erosion of coastline) in the event of poor assessment or operations not being carried out correctly.
Biological: limited except in the event of erosion; possible recontamination of the foreshore by freed pollutant.

PERFORMANCE

Efficiency: depends on the beach's characteristics (size, manoeuvrability, exposure) and on the pollution.
Minimum workforce required: at least 2 people (1 driver + 1 assistant).
Waste: varies depending on phase: clusters, nets polluted to varying extent, sorbents etc.

OBSERVATIONS

- Due to geomorphological risks, this technique requires approval by a geomorphological expert (assessment of possible risks of shoreline erosion, ensure the feasibility of the operation and organise it).
- Deposit stones in piles or windrows (not in a layer).
- Repeat the operation depending on results of washing.
- Restrict the volume involved to what is strictly necessary.

7.1.11 N 11 - TEMPORARY REMOVAL OF SEDIMENTS, Cedre

SCOPE
Substrates: stones and sand Pollution: light to very heavy Pollutant: all types Sea: with or without tides

EQUIPMENT NEEDED	
- Basic equipment: - Earthmoving equipment: front-end loader, power shovel - Manual: shovels etc. or low pressure hoses	Extra equipment: - Skips and trucks (waste disposal)

DESCRIPTION/PRINCIPLE
This operation is carried out: ▪ to remove a layer of clean sediments in order to reach a buried layer of pollutant and treat it ▪ or to temporarily remove a layer of lightly polluted sediments (but sufficiently contaminated to hinder the uses of the beach) in order to: - clean them immediately on another part of the beach (surfwashing) or offsite (washing, sand screening) - or temporarily store them (in the summer on the upper beach for instance) with a view to treating them at a more suitable later date (deferred autonomous surfwashing for example). This technique can be implemented in a number of ways: using earthmoving equipment (large volumes), shovels or low pressure hoses (to reach the polluted base of a rock temporarily covered with sediment for example).

CONDITIONS OF USE
Pollution: buried heavy pollution or light or residual pollution temporarily hinder the uses of the beach. Substrate: fine to very coarse sediments. Site: accessible to earthmoving equipment (suitable in terms of the load-bearing capacity of the ground).

IMPACT ON THE ENVIRONMENT
Physical: possibility of limited, temporary instability of the balance of the beach (in the case of large volumes). Biological: possibility of limited disturbance (in the case of large volumes).

PERFORMANCE
Yield and minimum workforce required: variable according to the site, the volume of sediments in question and the means used. Waste: layer of pollutant mixed with varying quantity of sediment.

OBSERVATIONS
- This process is different from withdrawing layers of sediments as it only involves temporarily removing sediments which remain or will be rapidly returned to the beach. - Only remove the necessary volumes: carry out an in-depth survey (on the surface and in the depths), inform the operators, assist the drivers. - Reduce the risks: take advice from experts beforehand to assess, organise and plan the operation (especially in the case of surfwashing). - Ensure safety on the worksite, especially if using heavy duty machinery.

7.1.12 N 12 - FLUSHING, Cedre

SCOPE
Substrate: all Pollution: little to very heavy Pollutant: all Sea: tidal and non-tidal

EQUIPMENT NEEDED	
- Basic equipment: - Fire hose or Impact hose - Transfer pump (approx. 30 m^3/h; 4 to 8 bars)	- Extra equipment: - Direct water supply at sea, or alternatively via tanks - Recovery: small worksite booms, shore-sealing boom, planks, pump, sorbents

DESCRIPTION/PRINCIPLE

This technique is used for a number of different purposes:
- to remove surface layer of thick accumulations on various hard surfaces (rocks, quays etc.)
- to dislodge clusters trapped in cavities of rocks, boulders, riprap etc.
- to displace accumulations and effluents on the surface of the beach of water and channel them to a collection point.

CONDITIONS OF USE

Pollution: freshly deposited oil in thick accumulations, residual clusters and effluents.
Substrate: (displacement) fine sediments, wet to saturated with water; (dislodgement) rocks, boulders, stones.
Site: direct sea water supply available (possibly via channels) or access possible for machinery.

IMPACT ON THE ENVIRONMENT

Physical: can force the oil into the sediment (if spray is too powerful or misdirected); temporary disturbance.
Biological: can contaminate populations in the underlying foreshore if recovery is not carried out properly.

PERFORMANCE

Efficiency: varies considerably according to the site, pollutant, degree of pollution (a few tens to a few hundreds of m^2/h for displacement on the beach, from 1 to 5 m^2/h in the case of dislodgement).
Minimum workforce required: 5 to 6 hoses per team of 10 people.
Waste: pumpable waste with high oil content; possibly saturated sorbents.

OBSERVATIONS

- Provide the necessary protective equipment: overalls, oilskins, boots, gloves, head gear, glasses, masks. Users are exposed to a lot of dirt, from pollutant and effluent spray.
- Set up an effluent recovery system beforehand.
- Adapt the pressure used to the nature of the substrate. The same goes for the spraying mode: flat nozzle or solid water jet.
- The spraying angle should be small, especially on sediments, in order to limit erosion (thin layer of sediment) and deep burying of oil as far as possible. Consider carrying out a flooding operation (shingle bar) in parallel.
- Risk of emulsification with certain pollutants (factor which increases viscosity); use hot water hoses in parallel especially on stones.
- Operating a hose for an extended period of time is tiring: rotate users (spraying/monitoring supply, pump and effluent recovery system).

7.1.13 N 13 - FLOODING, Cedre

SCOPE
Substrate: coarse sediment, stones, boulders Pollution: medium to very heavy Pollutant: fluid to slightly viscous Sea: tidal or non-tidal

EQUIPMENT NEEDED	
- Basic equipment: - High speed transfer pump (approx. 100 m^3) - Drainage pipe or pierced tube	Extra equipment: - Direct water supply at sea: pontoons, support vessel - Hoses (cold/hot water, high/low pressure) - Recovery: small worksite booms, stranding boom, planks, pump, sorbents

DESCRIPTION/PRINCIPLE
This technique involves saturation by flooding. This is carried out using a flexible perforated pipe (drainage pipe or pierced tube) which is laid longitudinally above the shingle bar and is supplied with seawater by a high speed pump. The procedure involves setting up a laminar flow, from the upper end of the foreshore, to flood the part of the shingle bar to be cleaned. This technique is used in conjunction with flushing or washing operations to restrict the deep infiltration of pollutant due to the pressure of hoses and to improve drainage towards the lower end of the bar.

CONDITIONS OF USE
Pollution: fresh oil, low to moderate viscosity, heavy pollution. Substrate: course sediment, stones. Site: particularly on narrow foreshores with moderate slope; small shingle bar, on rocky substrate, at the foot of a rocky cove for example.

IMPACT ON THE ENVIRONMENT
Physical: reworking of shingle bar to greater or lesser extent; subsequent regain of natural balance. Biological: slight risk of vertical infiltration of oil into shingle bar; possible contamination of lower beach if effluents are not immediately caught at the foot of the bar.

PERFORMANCE
Efficiency: very variable (according to substrate, degree of pollution…) Minimum workforce required: 10 people per worksite. Waste: oil emulsified to a varying extent, possibly mixed with fine sediments.

OBSERVATIONS
- Use a flexible pipe in order to best adapt to the formation of the beach. - Avoid polluting the lower levels: set up an effluent recovery system at the foot of the bar, restrict run-off of effluents on the foreshore. - Proceed methodically, in sections. - To be used in conjunction with washing with hot or cold water, using low or high pressure according to the case in hand.

7.1.14 N 14 - CONTAINMENT & RECOVERY OF EFFLUENTS ON WATER SURFACE, Cedre

SCOPE
Substrates: all types Pollution: light to very heavy Pollutant: all types Sea: with or without tides

EQUIPMENT NEEDED	
- Basic equipment: - Small floating booms, worksite booms, shore-sealing booms - Skimmers/pumps - Sorbents, landing nets	Extra equipment: - Land- or sea-based logistical support (equipment deployment, waste disposal…)

DESCRIPTION/PRINCIPLE
Involves setting up a system to recover effluents floating in front of worksites where washing operations are being carried out. Containment is conducted using floating booms attached to the shore, set up in a U-shaped configuration. The oil is recovered by absorption or pumping from within the boom from the beach (using weir or oleophilic skimmers…) or from the water surface (using a barge/pontoon, a conveyor belt skimmer or weir skimmer etc., with an integrated or coupled storage capacity). The size of the system will depend on the volume of pollutant and the size of the worksite.

CONDITIONS OF USE
Pollution: moveable and pumpable oil. Substrate: all types. Site: relatively sheltered (at least during operations), for preference constantly underwater or narrow foreshore.

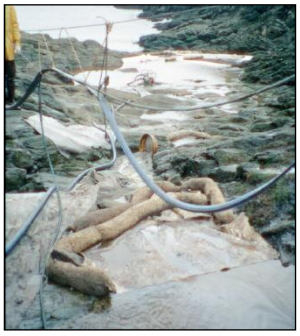
IMPACT ON THE ENVIRONMENT
Physical: light to none Biological: very light (except for the spreading of pollution to the lower foreshore if the effluents have to travel over too great a distance before reaching the water, or oil mixed with sediments flowing into a subtidal zone).

PERFORMANCE
Yield: variable according to the volume of oil mobilised, the site and the recovery means. Waste: emulsified oil, polluted water, fine sediments and various types of oiled debris.

OBSERVATIONS
- Requires massive logistic support (mobile recovery/waste disposal area) plus a methodical organisation of the worksite so as not to oil coastal areas that have already been cleaned up, or not yet been oiled. - The concomitant use of bulk or conditioned sorbents on the water surface and the foreshore can be beneficial especially if the sediments are fine or the water turbid. - Should only be considered for narrow beaches.

7.1.15 N 15 - CONTAINMENT AND RECOVERY OF EFFLUENTS ON THE FORESHORE, Cedre

SCOPE
Substrates: all types Pollution: light to very heavy Pollutant: all types Sea: tidal



EQUIPMENT NEEDED	
- Basic equipment: - Shore-sealing boom - Shovels, power shovels, planks - Skimmers/pumps, sorbents, landing nets	Extra equipment: - Storage tanks/bins - Land-based logistical support (to deploy equipment/for waste disposal…)

DESCRIPTION/PRINCIPLE
Consists of recovering effluents from washing and draining operations on the beach. The aim is to channel the effluents to a pumping/skimming point. The effluents are channelled using trenches (protected with tarpaulins) and planks set up in a V-shaped configuration towards the lower foreshore. Retention should be as close to the worksite as possible to reduce the distance over which the effluents must flow. The effluents can be contained using shore-sealing booms, windrows made of sand and covered with tarpaulins or simple pits protected with geotextiles. Recovery is carried out by absorption or pumping, depending on the volume of pollutant.

CONDITIONS OF USE
Pollution: moveable and pumpable oil Substrate: all types Site: all types

IMPACT ON THE ENVIRONMENT
Physical: very limited, temporary disturbance to the areas where channels are dug. Biological: risk of residual pollution if the pollutant is not recovered or becomes buried, due to the collapse of trenches or pits; delayed recolonisation in these areas.

PERFORMANCE
Yield: variable Waste: emulsified oil, polluted water, fine sediments and various types of oiled debris.

OBSERVATIONS
- The retention/recovery phase should be defined and the system put in place before the washing/draining phase. - Anticipate the need for plastic sheeting and geotextiles along the run-off channels and containment pits in order to reduce the infiltration of the pollutant and reinforce the system (prevent collapse).

7.1.16 N 16 - UNDERWATER AGITATION, Cedre

SCOPE
Substrates: sand, stones Pollution: light to very heavy Pollutant: various Sea: with (or without) tides

EQUIPMENT NEEDED	
Basic equipment: - Fire or PVC impact hoses - Pumps (30 m^3/h – 4 to 8 bars)	Extra equipment: - Effluent recovery system - Skimming/effluent absorption means - Storage facilities

DESCRIPTION/PRINCIPLE

Involves remobilising oil trapped in sediments by mixing vigorously the substrate underwater using hoses. The resurfacing oil is recovered within a small boom using either sorbents or a skimmer.
This technique is generally conducted by individual operators on foot, using impact hoses supplied by a small light pump unit.

CONDITIONS OF USE

Pollution: light oil (preferably) emulsified to a varying degree – pollution buried up to 40 – 50 cm deep.
Substrate: fine to coarse sediments; water depth of 0.5 to 3 m.
Site: accessible via a barge/pontoon, relatively calm during operations.

IMPACT ON THE ENVIRONMENT

Physical: temporary disturbance to the first 60 centimetres of sediment (loosening, quicksand).
Biological: potential impact on the macrofauna living in the sand; temporary disturbance, recolonisation in the short term.

PERFORMANCE

Yield: very variable depending on the pollution and the sediment.
Minimum workforce required: 10 people (including recovery): 1 to 3 per hose.
Waste: pumpable or absorbable emulsified oil (oil content of cleaned sand < 1g/kg).

OBSERVATIONS

- Provide responders with the necessary protective clothing: overalls, oilskins, boots, gloves, head gear, glasses, masks. Users are exposed to a lot of dirt (spray of large particles of pollutant).
- Manual technique but its mechanisation has been, and still can be, considered in view of increasing the yield. Either using a series of hoses mounted on a motor boat (pontoon type) or from the beach using a mobile device (fitted with a sweeping arm).
- Operation of hoses is tiring; provide hoses with handholds and rotate personnel (hose, water supply, effluent recovery).
- Can also be used to remove patches of submerged heavy fuel oil (using extended hoses where necessary, as used during the *Erika* pollution for instance).
- Systematically provide a recovery system.

7.1.17 N 17 – TILLING, Cedre

SCOPE
Substrates: fine to coarse sediments Pollution: light to heavy Pollutant: various Sea: with (or without) tides

EQUIPMENT NEEDED	
Basic equipment: - Farm machinery (harrow, rotovator, plough)	Extra equipment: - Effluent recovery system - Skimming/effluent absorption means - Storage facilities - Sand screener

DESCRIPTION/PRINCIPLE
This technique fulfils different objectives depending on whether it is carried out in or out of the water: - Case 1: frees fluid oil trapped in the sediment by agitation: the sand is scoured in shallow waters as the tide rises and frees the oil, which is then recovered at the water surface (alternative version of underwater agitation carried out with hoses). - Case 2: promotes natural breakdown of oil in situ by increase aeration and exposure to UV rays: tilling of the upper beach if it is lightly contaminated, or stained, by fluid oil. - Case 3: to assist sand screening operations, using a plough in order to cause patches of viscous pollution buried under a thick layer of clean sand to resurface.

CONDITIONS OF USE
Pollution: (case 1) light to heavy, in the form of localised pockets of oil. (case 2) light pollutant which is no longer in the form of mobilisable accumulations but of a homogeneous coloration which may be marked to a varying extent. (case 3) buried clusters of heavy fuel oil. Substrate: fine- to coarse-grain sand. Site: access possible for farm machinery; not too exposed to the sea's energy.

IMPACT ON THE ENVIRONMENT
Physical: loosening of the surface layer of the beach; ground temporarily deconstructed. Biological: may be significant for macrofauna but recolonisation is rapid.

PERFORMANCE
Yield: variable according to the site; relatively rapid work rate in cases 1 and 2, but slow speed required for case 3 to prevent clusters from being pulverised. Waste: (case 1): liquid waste and polluted sorbents; (case 2): N/A; (case 3): diverse clusters of heavy fuel oil blended with sand.

OBSERVATIONS
- Cases 1 to 3: operation generally needs to be repeated depending on the degree of contamination of the sediment. - Case 1: underwater tilling is similar to the principle of underwater agitation; the two can also be combined. Recover the freed floating oil. - Case 2: this process can be coupled, if deemed necessary, with a bioremediation operation (spreading nutrients). - Case 2: can be applied in the Mediterranean on polluted beaches in the event of a storm surge.

7.1.18 N 18 – DRAINAGE, Cedre

SCOPE
Substrates: fine to coarse sediments (marsh, limited) Pollution: moderate to heavy Pollutant: fluid Sea: tidal

EQUIPMENT NEEDED	
- Basic equipment: - Manual tools (shovels etc.) - Mechanical machinery (farm ploughshare, power shovel) - Possible water supply (pump)	Extra equipment: - Effluent recovery system - Skimming/effluent absorption means - Storage facilities

DESCRIPTION/PRINCIPLE
Consists of digging drainage trenches on the beach to improve natural drainage. The trenches are oblique and converge at a lower collection point (shore-sealing boom, bund with geotextile, planks, pit etc.). The water entrains the oil trapped in between grains of sand and is recovered at a collection point where it is treated by absorption or pumping. In the case of limited natural drainage, it can be increased by saturating the upper beach (flushing or flooding) in order to encourage the washing of the sediment.

CONDITIONS OF USE
Pollution: moderate to heavy, buried fluid pollutant. Substrate: fine- to coarse-grain sand. Site: more favourable when the pollutant re-emerges on the foreshore; accessible to small earthmoving machinery.

IMPACT ON THE ENVIRONMENT
Physical: limited, temporary disturbance (possible formation of quicksand in the trenches). Biological: little disturbance.

PERFORMANCE
Yield: very variable according to substrate, degree of pollution and natural drainage Waste: liquid hydrocarbons, fine polluted sediments and oiled sorbents.

OBSERVATIONS
- Low yield; technique generally needs repeated. - Use of hoses is not necessary on beaches where there is a lot of surface run-off of ground water.

7.1.19 N 19 - HIGH PRESSURE WASHING USING HOT WATER (with/out products) , Cedre

SCOPE
Substrate: stones, boulders, rocks, infrastructures Pollution: slight to very heavy Pollutant: all types Sea: tidal or non-tidal

EQUIPMENT NEEDED	
- Basic equipment: - Thermal pressure washer	- Extra equipment: - Direct water supply at sea; seawater storage - Recovery: small worksite booms, stranding boom, planks, sorbent, skimmer, pump - Washing agents (possibly)

DESCRIPTION/PRINCIPLE
This technique should only be carried out once the initial clean-up phase has been completed and the sides have been scraped. It involves washing oiled hard surfaces with hot water at high pressure. Washing implies the recovery of effluents; this means a specially designed system must be set up before the washing operations can begin. Heat and high pressure can be detrimental to certain environments. The temperature and pressure should therefore be adjusted depending on the nature and fragility of the substrate, and also to obey the specific restrictions and recommendations which may exist for certain ecologically sensitive sites.

CONDITIONS OF USE
Pollution: thin layer; moderately to highly weathered oil. Substrate: mechanically resistant surfaces (stones, rocks, quays). Site: access possible for washing equipment.

IMPACT ON THE ENVIRONMENT
Physical: possibility of impact on very crumbly rock; risk of landslide on fragile ground/cliffs (not to be carried out on crumbly cliffs). Biological: risk of sterilisation of surfaces and possibility of impact on surrounding sedimentary fauna.

PERFORMANCE
Yield: varies depending on the site (a few m²/h per machine). Minimum workforce required: 10 people for 3 to 4 machines (not including recovery of effluents). Waste: liquid effluents; oil emulsified to varying extent.

OBSERVATIONS
- Provide the necessary protective equipment: overalls, oilskins, boots, gloves, head gear, glasses, masks. Users are exposed to a lot of dirt, containing potentially toxic particles (aerosols). - Assess the need to wash, taking into account the degree of pollution and the ecological sensitivity of the site, e.g. presence of lichen and vegetation growing in cracks. - Do not uproot vegetation or scrape the soil (lithosol in cracks). - Recover loosened oil; protect the surrounding area (using geotextiles). - Use thermal washers which are suitable for seawater and can be easily transported. - Rotate users (on the following basis: 1 spraying, 1 monitoring machine and water supply, 1 recovering effluents). - Plan for maintenance/repairs on site (1 mechanic for 10 machines). - Using hot water without high pressure can be a good solution. - Using a washing agent is not always necessary. Tests can however be carried out to assess the potential gain. The decision to use a washing agent requires approval: only use a product that has been tested by a recognised organisation (for efficiency, toxicity, biodegradability).

7.1.20 N 20 - WASHING ON CAGES, Cedre

SCOPE
Substrate: stones Pollution: moderate to heavy Pollutant: all types Sea: tidal and non-tidal

EQUIPMENT NEEDED	
Basic equipment: - Cage (structure incorporating wire grids) - Thermal washers (hot water + rinsing) - Geomembranes	Extra equipment: - Stone supply (manual) - Water supply (pump + tanks) - Effluent recovery system - Solvents (possibly)

DESCRIPTION/PRINCIPLE
Consists of washing polluted stones using a pressure washer inside a structure which separates the effluents from the stones using wire grids and contains effluents, aerosols and various sprays. This “cage” is a light metal frame with a perforated sheet iron base, on which the stones are washed, and three lateral sides, covered with geotextile, to contain the spray of effluents and oil. All the washing effluents pass through the base and are collected in a recovery device set up under the booth (drainage ditch protected with geotextile, with filtering and absorption means etc.). Small stones can be placed in plastic mesh bags, such as oyster bags, which are turned over during washing, to stop them from being projected out of the cage. The use of a washing agent is not always necessary.

CONDITIONS OF USE
Pollution: all types, preferably fresh or little weathered oil. Substrate: stones. Site: all sites.

IMPACT ON THE ENVIRONMENT
Physical: none (do not wash stones from very crumbly shale rocks). Biological: possible risk connected to the residual presence of pollutant and products or the destruction of vegetation on stones at the top of the shingle bar.

PERFORMANCE
Yield: variable. Waste: water, oil, soiled fine sediment (+ possibly solvent).

OBSERVATION
- Provide the necessary protective equipment: overalls, oilskins, boots, gloves, head gear, glasses, masks. Users are exposed to a lot of dirt, containing potentially toxic particles (aerosols). - Very little space required, quick to set up. - The polluted stones are collected by hand and returned to the lower end or middle of the beach to be finished by natural cleaning. - Extremely heavily polluted sediments will need to be scraped beforehand. - Recover the released oil. - Rotate users (on the following basis: 1 spraying, 1 monitoring machine and water supply, 1 recovering effluents). - Use thermal washers which are suitable for seawater and can be easily transported. - Plan on maintaining and repairing washers on site. - Using hot water without high pressure can be a good solution for releasing the pollutant without “blasting” it. - Using a washing agent is not always necessary. Tests can however be carried out to assess the potential gain. Only use a product that has been tested by a recognised organisation (for efficiency, toxicity, biodegradability).

7.1.21 N 21 - WASHING IN WIRE MESH TANKS, Cedre

SCOPE
Substrate: stones Pollution: medium to heavy Pollutant: all types Sea: tidal or non-tidal

EQUIPMENT NEEDED	
- Basic equipment: - Wire mesh tank - Watertight skips - High pressure washers	Extra equipment: - Stone supply (loader) - Water supply (pump) - Skimming/effluent absorption means - Effluent pumping/storage/settling system

DESCRIPTION/PRINCIPLE
The sediments are washed off site in wire mesh tanks positioned over watertight skips. The stones collected are laid in thin layers in the tanks and are washed at high pressure with hot water using thermal washers. The effluents are collected in the skip, where the settling and skimming is carried out.

CONDITIONS OF USE
Pollution: all types, preferably fresh or little weathered oil. Substrate: stones polluted to a varying extent. Site: locally polluted shingle bar; washing offsite.

IMPACT ON THE ENVIRONMENT
Physical: none (do not wash stones from very crumbly shale rocks). Biological: possible risk connected to the residual presence of pollutant and products or the destruction of vegetation on stones at the top of the shingle bar.

PERFORMANCE
Yield: variable (1 to 3 m^3/h depending on the size of the stones, the degree of pollution, the pollutant and the site). Waste: water, oil, soiled fine sediment (+ possibly solvent).

OBSERVATIONS
- Requires a work area (car park, open space) on the back beach, relatively quick to set up. - Limited output; concerns small volumes needing to be cleaned. - Management of effluents necessary. - Provide an anti-spray system on the edge of the skip. - Requires good management (turnover, supply, storage and evacuation of sediments). - Extremely heavily polluted sediments will need to be scraped beforehand. - Operate a tight flow: continual removal and return of sediments to beach as soon they have been washed. - The washed sediments are subjected to surfwashing to finish the cleaning. - Using a washing agent is not always necessary. Tests can however be carried out to assess the potential gain. Only use a product that has been tested by a recognised organisation (for efficiency, toxicity, biodegradability).

7.1.22 N 22 - WASHING USING A CONCRETE MIXER, Cedre

SCOPE
Substrate: stones Pollution: medium to heavy Pollutant: all types Sea: tidal or non-tidal

EQUIPMENT NEEDED	
- Basic equipment: - Concrete mixer - Solvents (possibly) - Thermal washers (hot water + rinsing) - Wire mesh tanks (rinsing)	- Extra equipment: - Stone supply (manual) - Water supply (pump) - Skimming/effluent absorption means - Effluent recovery system

DESCRIPTION/PRINCIPLE
The sediments are washed in cold water (or possibly lukewarm using thermal washers) for 5 minutes inside the concrete mixer. When using a washing agent, pre-mix the sediment with the undiluted solvent (petroleum fraction) for 3 to 5 minutes. At the end of the cycle, fill the concrete mixer with water in order to skim floating oil off using an overflow which is channelled into a designated tank. Alternatively, the entire contents of the mixer can be poured into a wire mesh tank. The washing water is skimmed, filtered, then reused after settling. The stones are rinsed in hot water on the grid over the tank, then returned to the beach (surfwashing). Slightly soiled stones can simply be mixed with sand (abrasion). With certain viscous pollutants, simply mixing them with water can sometimes be enough to recover the auto-amalgamated oil in the form of clusters of pure pollutant.

CONDITIONS OF USE
Pollution: all types, preferably fresh or little weathered oil. Substrate: polluted to a greater or lesser extent. Site: can be at the same beach, or else offsite, and always with an effluent recovery system.

IMPACT ON THE ENVIRONMENT
Physical: none (do not wash stones from very crumbly shale rocks). Biological: possible risk connected to the residual presence of pollutant and washing agents or the destruction of vegetation on stones at the top of the shingle bar.

PERFORMANCE
Yield: variable Waste: water, oil, oiled fine sediment (+ possibly solvent).

OBSERVATIONS
- Very little space required; quick to set up. - Operate a tight flow. - Requires good management (turnover, supply, storage, evacuation of sediments). - The washing operation may have to be repeated on heavily polluted sediments. - Extremely heavily polluted sediments will need to be scraped beforehand. - The washed sediments are subjected to surfwashing to finish the cleaning. - Provide anti-noise helmets. - Using a washing agent is not always necessary. Tests can however be carried out to assess the potential gain. Only use a product that has been tested by a recognised organisation (for efficiency, toxicity, biodegradability).

7.1.23 N 23 - WASHING IN A CONCRETE MIXER DRUM, Cedre

SCOPE
Substrate: stones Pollution: medium to heavy Pollutant: all types Sea: tidal or non-tidal

EQUIPMENT NEEDED	
- Basic equipment: - Concrete mixer drum, 5 or 7 m^3 - Agents (solvents) - Thermal washers (hot water + rinsing) - Settling tanks - Wire mesh tank (rinsing)	- Extra equipment: - Sediment supply (loader, hopper tank) - Water supply (water tank + pump) - Skimming equipment - Logistical equipment: deployment of materials /sediment and waste management

DESCRIPTION/PRINCIPLE
The sediments are mixed for 5 minutes with a pure solvent (petroleum fraction), then washed in cold water (or lukewarm water using thermal washers) for 10 to 15 minutes inside the drum. At the end of the cycle, the drum is filled with water using a hose in order to skim floating oil off using an overflow which is channelled into a designated tank. The washing water is reused after settling. The stones are rinsed in hot water on a grid placed over a tank, then put back on the beach (surfwashing).

CONDITIONS OF USE
Pollution: all types, preferably fresh or little weathered oil; polluted up to approximately 100g/kg. Substrate: heavily polluted stones. Site: back beach, can imply quite a vast open area due to the amount of space the system requires.

IMPACT ON THE ENVIRONMENT
Physical: slight temporary risk of erosion (during washing operations) in the event of a storm: assess this risk. Biological: possible risk connected to the residual presence of pollutant and washing agents (rapid recolonisation after operations if sediment is well rinsed and returned to its original location) or the destruction of vegetation on stones at the top of the shingle bar.

PERFORMANCE
Yield: stones: 4 to 6 t/h Waste: water, oil, solvent, soiled fine sediment.

OBSERVATIONS
- Site coverage: mainly restricted to the concrete mixer drum and settling tanks. - Relatively quick to set up. - Operate a tight flow to limit the site coverage and more importantly the temporary sediment deficit. - Requires good management (turnover, supply, storage, removal of sediments). - Washing operations may need to be repeated for heavily polluted sediments. - Extremely heavily polluted sediments should be washed roughly beforehand (wire mesh tank). - Washed sediments should be returned to their original location as quickly as possible. - Do not wash stones from very crumbly shale rocks. - Provide anti-noise helmets. - Only use products which have been tested by a recognised organisation (for efficiency, toxicity, biodegradability); carry out a test on site.

7.1.24 N 24 - WASHING AT A POLMAR PLANT, Cedre

SCOPE
Substrates: sand, stones Pollution: moderate to very heavy Pollutant: all types Sea: with or without tides

EQUIPMENT NEEDED	
- Basic equipment: - Washing plant - Feed hopper and conveyor belt, crane - Boiler (1 t/h, heat exchanger) - Generator (150 kVA) - Agents (solvents, flocculants) - Settling tanks	Extra equipment: - Loader, tractor + trailers - Skimming equipment - Land-based logistical equipment: deployment of materials /sediment and waste management

DESCRIPTION/PRINCIPLE
This datasheet is based on the plant at the Polmar stockpile in Brest. The sediments are supplied to the plant using a hopper and a conveyor belt. They are washed in hot water inside a sludge trap (after impregnation with solvent and blending inside the trap) for 12 to 18 minutes for sand and 3 minutes for stones. When the sediments are removed from the sludge trap, they are then rinsed on a rotary screen, which sorts them: oversized elements (> 5mm) are removed. The rest is pumped into a hydrocyclone, where separation is carried out (water/hydrocarbons/solids) by centrifugation and gravity, so that sediments >200µm can be removed. The remaining mixture (water/oil/fine solid particles) is sent to settling tanks where the floating oil is skimmed off.

CONDITIONS OF USE
Pollution: all types of, preferably fresh or little weathered, oil; polluted up to approximately 100g/kg. Substrate: stones and sand. Site: on the back beach, can imply quite a vast open area due to the amount of space the system requires.

IMPACT ON THE ENVIRONMENT
Physical: (due to removal of sediments) slight temporary risk of erosion (during washing operations) in the event of a storm: assess this risk. Biological: possible risk connected to the residual presence of pollutant and products (rapid recolonisation after operations if sediment is well rinsed and returned to its original location) or the destruction of vegetation on stones at the top of the shingle bar.

PERFORMANCE
Yield: sand 15m^3/h; stones 20m^3/h with variable pollutant content from 20 to 100 g/kg. Efficiency of washing: oil content > 1g/kg Waste: skimmed oil, soiled fine sediment, washing effluents.

OBSERVATIONS
- Dosage of cleaning agent: sand: 500l/h; stones 60 to 100 l/h (agent to pollutant ration between 20 and 50% in weight). - Extremely heavily polluted sediments should be washed beforehand in a wire mesh tank for instance. - Operate a tight flow (to reduce the risk of erosion in the event of a storm due to excessive sedimentary deficit). - Washed sediments should be returned to their original location as quickly as possible. - Implementation of this technique implies a large volume of polluted stones on the one site; otherwise, another solution is preferable. - Do not wash stones from very crumbly shale rocks. - Provide anti-noise helmets. - Requires a relatively large open space.

7.1.25 N 25 - SEDIMENT REMOVAL FOR OFF-SITE TREATMENT, Cedre

SCOPE
Substrates: sand, stones Pollution: light to very heavy Pollutant: all types Sea: with or without tides

EQUIPMENT NEEDED	
- Basic equipment: - Front loader - Shovels, power shovels - Skimmers/pumps, sorbents, landing nets - Storage tanks/bins	Extra equipment: - Land-based logistical support to deploy equipment/for waste disposal… - Screening (mine screening) or washing installation (concrete mixer, concrete mixer drum etc.)

DESCRIPTION/PRINCIPLE
Involves removing polluted sand and stones (with a view to treating them by screening or washing at a nearby installation) then returning them to their original location as quickly as possible.

CONDITIONS OF USE
Pollution: all types (preferably not very weathered oil). Substrate: sand, stones. Site: site that is accessible to earthmoving machinery and has an open space on the back beach which is close and large enough to accommodate the installation and logistics to wash or screen the sediments.

IMPACT ON THE ENVIRONMENT
Physical/biological: related to the traffic of heavy duty machinery and the removal of sediments; temporary risk of erosion of the site (the impact can be extremely detrimental or even irreversible if this risk is not properly assessed); risk of destruction of the vegetation on stones at the top of the shingle bar.

PERFORMANCE
Yield: variable according to the means used and the characteristics of the site and the pollution. Minimum workforce required: 1 person per machine + 1 supervisor. Waste: N/A

OBSERVATIONS
- In the case of large volumes of sediments and a long worksite duration: accurately assess the risks of erosion (for instance in the event of a storm) or the rupture of the shingle bar, or even flooding of the hinterland: seek advice from a geomorphologist beforehand. - Be selective during removal (to restrict the volume which will need to be cleaned). - Remove sediments gradually and compensate for the loss by returning clean sediments as you go along (tight flow). - Sediments must be returned to the site from which they were removed. - Consider the possibility of surfwashing to complete washing operations.

7.1.26 N 29 - BIOREMEDIATION, Cedre

SCOPE
Substrates: all types (sheltered) Pollution: light to residual Pollutant: fluid to viscous (biodegradable) Sea: with (or without) tides

EQUIPMENT NEEDED	
Basic equipment: - Bioremediation agents (nutrients) - Spraying equipment	Extra equipment: - Motorised machinery to assist in spraying operations

DESCRIPTION/PRINCIPLE
Involves increasing the quantity of nutrients (N, P, K fertilisers) in the polluted area so as to promote/increase natural breakdown by bacteria and other specialist micro-organisms. The addition of nutrients causes the populations of indigenous bacteria to grow and increases their specialised breakdown activity. The introduction of selected exogenous bacteria should not be considered on the shoreline, as it has not proved to be efficient enough.

CONDITIONS OF USE
Pollution: residual; degradable pollutant Substrate: all types Site: relatively sheltered

IMPACT ON THE ENVIRONMENT
Physical: none Biological: possible risk, in the case of large-scale treatment and overdosage, of a temporary eutrophication of adjacent waters.

PERFORMANCE
Yield: variable according to the pollutant, the bioremediation agent, the temperature (season, latitude), the substrate and the chemical and bacteriological quality of local waters. Waste: N/A

OBSERVATIONS
- All the components of oil are not biodegradable; in particular biodegradation is limited for heavy aromatics, resins and asphaltenes. - A prior scientific assessment procedure now exists to evaluate on a case by case basis the potential contribution of this technique (International Maritime Organization guide). - Ensure responders have at least the minimum in terms of protective clothing: overalls, oilskins, boots, gloves, head gear, glasses, masks. Operators may be exposed to spray of vapours and powders. - Bioremediation should often be considered in association with a sediment aeration operation (e.g. tilling).

OIL SPILL CONTINGENCY PLAN

OPERATIONAL SUPPORT N°9:

USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**NVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

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Markings:

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ⓘ *Link to external document or information, not part of the TEP Liban OSCP*

TABLE OF CONTENTS

1. SHORELINE CLEANUP & ASSESSMENT TECHNIQUE (SCAT)

EXCEL source file of the SCAT forms “SCAT form.XLSX” is available in:

…\Vol Ops Support\Op Sup 9 Doc

1.1 Shoreline Oiling Survey form (SOS)

SHORELINE OILING SURVEY (SOS) FORM — for _____ Spill Page 1/3

Version 11/07/2015.

C:\Users\Utilisateur\Documents\[Copie de TEPA SOS FORM.XLSX]SOS

1 GENERAL INFORMATION	Date (dd/mm/yy)	Time (24h):	Tide time and height	SOS # ref:
Segment ID:				
Operations Division (ACP?):		hrs to hrs	rising / falling	
Survey by: Foot / ATV / Boat / Helicopter / Overlook / _____		Sun / Clouds / Fog / Rain / Snow / Windy / Calm		

2 SURVEY TEAM # _____	Organization	Contact phone number
Name		

3 SEGMENT **Total Segment Length** _____ **m** **Segment Length Surveyed** _____ **m**

Start GPS: LATITUDE _____ deg. _____ min. LONGITUDE _____ deg. _____ min.

End GPS: LATITUDE _____ deg. _____ min. LONGITUDE _____ deg. _____ min.

4A SHORELINE TYPE *Select only one primary (P) oiled shoreline type and any secondary (S)*

BEDROCK : ____ **MAN-MADE SOLID :** ____ **SEDIMENT BEACH :** Sand ___ **SEDIMENTS FLATS :** Mud Flats ___

cliff/vertical ____ sloping ____ platform ____ Pebble-Cobble ___ Boulder ___ Sand Flats ___ Sand-Gravel ___

Winter Only: Ice Foot ____ Snow ____ Mixed Sand-Gravel ___ **MARSH :** ___ Peb-Cob ___ Boulder ___

4B COASTAL CHARACTER *Backshore character — select only one primary (P) and any secondary (S)*

CLIFF or HILL : _____ Est. height _____ m Beach ____ Delta ___ Tidal inlet ___ Marsh/Wetland ___

Slope: gentle (<5°)___ medium ___ steep (>30°)___ Barrier beach ____ Dune ___ Channel ___ Other _____

Notes.

5 OPERATIONAL FEATURES Debris Y / N Oiled? Y / N Debris amount: _____ bags OR _____ trucks

Direct backshore access Y / N Suitable backshore staging Y / N

Alongshore access from next segment Y / N Access restrictions _____

Notes.

6 SURFACE OILING CONDITIONS *Begin with "A" in the lowest tidal zone*

OIL ZONE ID	TIDAL ZONE				OIL COVER (1)			OIL THICKNESS (2)					OIL CHARACTER (3)								SUBST. TYPE(S)
	LI	MI	UI	SU	Length m	Width m	Distrib. %	PO	CV	CT	ST	FL	FR	MS	TB	PT	TC	SR	AP	NO	
A																					

(1) Trace <1%, Sporadic <1-10%, Patchy 11-50%, Broken 51-90%, Continuous 91-100%

(2) Pooled Oil (fresh oil or mousse > 1 cm thick), CV Cover (oil or mousse from >0.1 cm to <1 cm), CT Coat (visible oil <0.1 cm, can be scraped off with fingernail), ST Stain (visible oil, cannot be scraped off with fingernail), FL Film (transparent or iridescent sheen or oily film)

(3) FR Fresh Oil (unweathered, liquid oil), MS Mousse (emulsified oil over broad areas), TB Tarballs (<10 cm in diameter), TC Tar (highly weathered oil, nearly solid), SR Surface Oil Residue (non-cohesive, oiled surface sediments), AP Asphalt Pavements (cohesive, heavily oiled surface sediments), No No oil

8 COMMENTS	Cleanup recommendations. Ecological/recreational/cultural/economic issues & constraints. Wildlife observations	Page 2/3

Provide comments. If no further comments, write "None".
- wave exposure (high/ medium/ sheltered, very shelterred), tidal currents (directions up & down, speed);
- resource sensitivities observed or known to be present (ecological, recreational, cultural, commercial or any other socio-economic interests);
- any notable wildlife observations, particularly any casualties;
- estimates of total volume of oil in the segment, based on the dimensions of stranded oik oberserved;
- storms surges which may have deposited above the high tide water mark;
- recommendations for the clean-up or other treatment, recommended techniques, suggested scale of operations, practical constraints, etc.;
- recommendations for end-points clean-up.

9 SKETCH **Segment ID:** **Date:** Page 3/3

Check list - North arrow - Width & length - Oil thickness - Scale - Shoreline type - Pit locations
- Oiled zones - Oil character - % cover - Segment boundary - Local features - Photo/ video locations

1.2 Shoreline Treatment Recommendation form (STR)

SHORELINE TREATMENT RECOMMENDATIONS (STR) FORM — for _____ Spill Page 1/1

Version 11/07/2015.

C:\Users\Utilisateur\Documents\[Copie de TEPA SOS FORM.XLSX]STR

1 GENERAL INFORMATION	Segment ID:	Operational Permit To Work:	STR # ref:

2 SEGMENT **Total Segment Length** _____ **m**

Start GPS: LATITUDE _____ deg. _____ min. LONGITUDE _____ deg. _____ min.

End GPS: LATITUDE _____ deg. _____ min. LONGITUDE _____ deg. _____ min.

Shoreline type/ primary: **Secondary:**

Coatal character - backshore/ primary: **Secondary:**

3 OILED AREAS FOR TREATMENT *Short description: Zone: Shoreline Type, L x W, Oil % Dist, Oil Character, Oil Thickness, Oiling Cat.*

4 CLEAN-UP RECOMMENDATIONS *Use standard terms and definitions*

5 KEY RESOURCES REQUIRED *Use standard terms and definitions*

6 STAGING &/OR LOGISTICS ISSUES *Use standard terms and definitions*

7 WASTE ISSUES	*Use standard terms and definitions*

8 SAFETY CONCERNS	*Use standard terms and definitions*

Attachments: ☐ Segment Map ☐ Sketch ☐ SCAT Form ☐ Fact Sheet ☐ Other

Prepared by:	Submitted to PLANNING:	Submitted to OPERATION:
Date prepared:		
Final Approval by Local Rep.	By National Rep.	By TEPA Rep.
Final Approval by Local Rep.	By National Rep.	By TEPA Rep.

1.3 Shoreline Inspection Report form (SIR)

SHORELINE INSPECTION REPORT (SIR) FORM — for _____ Spill Page 1/2

Version 11/07/2015.

C:\Users\Utilisateur\Documents\OTRA\Bulgarie TEPBG\[SCAT form.XLSX]SIR

1 GENERAL INFORMATION	Date (dd/mm/yy)	Time (24h):	Tide time and height	SIR # ref:
Segment ID:				
Operations Division (ACP?):		hrs to hrs	rising / falling	
Survey by: Foot / ATV / Boat / Helicopter / Overlook / _____		Sun/ Cloud/ Fog/ Rain/ Snow/ Windy/ Calm		

2 SURVEY TEAM # _____ **Survey completed on entire segment? YES / NO**

Name	Organization	Signature
	Local	
	Local	
	National	
	National	
	TEPA	
	TEPA	
	Other	

3 SEGMENT **Total Segment Length** _____ **m** **Segment Length Surveyed** _____ **m**

Start GPS: LATITUDE _____ deg. _____ min. LONGITUDE _____ deg. _____ min.

End GPS: LATITUDE _____ deg. _____ min. LONGITUDE _____ deg. _____ min.

Shoreline type/ primary: **Secondary:**

Coatal character - backshore/ primary: **Secondary:**

3 TREATMENT END-POINTS CRITERIA *Refer to the Shoreline Treatment Recommendations approved.*

4 INSPECTION RESULTS *Justify. Use standard terms and definitions*

Is treatment or further treatment required? (circle one)

YES **Justify, compared to agreed end-points.**	**NO FURTHER TREATMENT REQUIRED.**

5 FURTHER TREATMENT? *Use standard terms and definitions*

Define specific treatment action(s) and specific locatinos within the segment where required.

Provide sketches, maps, GPS coordinates.

6 SKETCH **Segment ID:** **Date:** Page 2/2

Check list *- North arrow* *- Width & length* *- Oil thickness* *- Scale* *- Shoreline type* *- Pit locations*
- Oiled zones *- Oil character* *- % cover* *- Segment boundary* *- Local features* *- Photo/ video locations*

2. PORT RESPONSE EQUIPMENT

Having access to adequate and sufficient equipment at the logistics base (to respond to spill on land and in waters close to the quayside in the Beirut port) is the responsibility of the contracted Base Manager.

To complement the above, port response equipment available from Total Liban M&S (mainly port boom and skimmer) may be moved to the logistics base during the drilling campaign of TEP Liban.

The Beirut naval base (Lebanese Navy) located in Beirut Port facing the TEP Liban Logistics base holds some oil spill response equipment.

Equipment available at the logistics base, from Total Liban M&S, in the port of Beirut, at national level (Navy and Civil Security) etc. is listed in:

Operational Support n°11, section "TEP LIBAN OIL SPILL RESPONSE RESOURCES"

Refer to operating procedures and instructions provided by the manufacturer/ provider of equipment.

OIL SPILL CONTINGENCY PLAN
OPERATIONAL SUPPORT N°10:
COASTAL SENSITIVITY ATLAS

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
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TABLE OF CONTENTS

1. INTRODUCTION

Objectives of coastal oil spill sensitivity maps are to:

- Provide knowledge of coastal environment to prepare protection operations, shoreline survey and plan shoreline clean-up operations.
- Provide a mapping of the sensitive resources, at risk in the event of an oil spill and which have the potential to suffer the greatest damage and/ or recovery time.
- Locate the sensitive resources, areas and sites to protect in priority (by direct protection, displacement, re-enforcement of nearshore response etc.) or to clean-up in priority if protection is not feasible.

Note. Sensitivity mapping to oil spill is not an exhaustive mapping of all physical, biological, environmental and socio-economic features in the area of study.

The maps are developed using an internationally recognized methodology ("Sensitivity mapping for oil spill response", published by IMO-IPIECA-IOGP, 2016) outlined in:

"Sensitivity mapping methodology - Overview", p.12

Six types of information are used:

- **Sensitive sites**, that may be protected, are also located on the coastal sensitivity maps.
- **Shoreline type and sensitivity** (for all coastline): identification of the types of shore and of their relative sensitivity to oil spill based on the likely persistence of oil, ease of clean-up and possible ecological impacts (Environmental Sensitivity Index ESI, 1 to 10);
- **Biological resources** (punctual): marine and coastal species, high value habitats and protected sites or species which could be affected by an oil spill (sea mammals, sea birds, reptiles, Marine Protected Areas, etc.);
- **Socio economic activities and human-use** (punctual) which could be affected by an oil spill (fishing, aquaculture, commercial ports, tourism, cultural heritage sites, water intakes for industries, etc.);
- **Operational and logistical features** relevant for oil spill response (punctual) access to the shore, locations of OSR equipment stockpile, command posts, waste storage sites, etc.
- **Baseline information**.

The sensitivity maps cover all Lebanese coastal areas.

2. MAPS

2.1 Overview

The table below summarizes the maps produced:

	Users	Nbr of maps	File in: …\Vol Ops Support\Op Sup 10 Doc	Size	Scale	Format
STRATEGIC MAPS	IMT/ Planning	2	*Strategic maps - V1.pdf*	A3	1/300.000	MXD, PDF
COASTAL SENSITIVITY MAPS	IMT/ Operations	15	*Coastal sensitivity maps - V1.pdf*	A3	1/50.000	MXD, PDF
OPERATIONS & LOGISTICS MAPS	IMT, CMC & Total HQ		*Operations & logistics maps - V1.pdf*			MXD, PDF

Maps are produced with ArcGIS 10.5 software and GIS databases provided by Total and the one developed for this project: LB_2019_OSCP_W84N36.gdb. Original format of the maps (PDF format) is A3.

GIS development to produce the maps is outlined in:

"GIS development – Overview", p.13

Maps production is outlined in:

"Maps production", *p.14*

GIS deliverables are presented in:

"GIS deliverable", p.15

2.2 Base map information

The base maps include:

- Capital and Main cities;
- Districts limits;
- National Boundaries;
- Hydrography;
- Network (road);
- Bathymetry;
- Block limits;
- Satellite imagery or Openstreet Map (ESRI service).

GIS data is detailed in .

"Base map information", p.15

2.3 Coastal sensitivity maps

"Coastal sensitivity maps - V1.pdf" in …\Vol Ops Support\Op Sup 10 Doc

2.3.1 Shoreline type and Environmental Sensitivity Index (ESI)

The sensitivity of the different types of shorelines is defined according to the:

- **shoreline type** (grain size, slope) which determines the capacity of oil penetration and/or burial on the shore, and movement;
- **exposure to waves** (and tidal energy) which determines the natural persistence time of oil on the shoreline; and
- **general biological productivity and sensitivity**.

The ESI classifies shorelines according to their sensitivities to oil spills, 1 – lowest, to 10 – highest sensitivity.

ⓘ *NOAA Technical Memorandum NOS OR&R 11. Environmental Sensitivity Index Guidelines, Version 3.0, March 2002*

Shorelines classified with an index 10 may be given high priority for protection, by booming for example.

ESI RANKING*	TYPE OF SHORELINE
1A	Exposed rocky shores
1B	Exposed, solid man-made structures
1C	Exposed rocky cliffs with boulder talus base
2A	Exposed wave-cut platforms in bedrock, mud, or clay
2B*	Exposed scarps and steep slopes in clay
3A	Fine- to medium-grained sand beaches
3B*	Scarps and steep slopes in sand
4*	Coarse-grained sand beaches
5	Mixed sand and gravel beaches
6A	Gravel beaches (pebble, cobble and boulders)
6B	Riprap
7	Exposed tidal flats
8A	Sheltered rocky shores, scarps in bedrock, mud, or clay
8B	Sheltered, solid man-made structures
8C	Sheltered riprap
8D*	Sheltered rocky rubble shores
9A**	Sheltered tidal flats
9B**	Vegetated low banks
9C**	Hypersaline tidal flats
10A**	Salt- and brackish-water marshes
10B**	Freshwater marshes Swamps
10D**	Mangroves

** Symbology was simplified for mapping information*

*** Not identified in the National Oil Spill Contingency Plan (2017)*

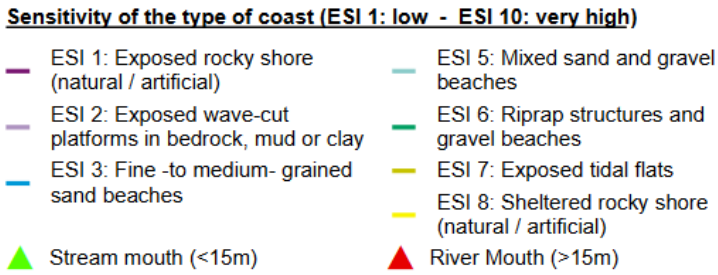


Figure 1: Legend of environmental sensitivity index in the maps

In addition to ESI classification: river mouths (>15m of width) and stream mouths (<10m of width) were mapped.

GIS data is detailed in .

"Shoreline type and Environmental Sensitivity Index (ESI)", p.16

2.3.2 Biological resources

The following information is mapped.

- Areas covered by local, national, or international legislation, or with a special environmental status (defined according to the protected, rare, and endangered animal and plant species):
  - Marine Protected Areas (National Oil Spill Contingency Plan - 2017))
  - Proposed Marine Protected Areas. (Lebanon's Marine Protected Area Strategy : Supporting the management of important marine habitats and species in Lebanon. Beirut, Lebanon, Gland, Switzerland y Malaga, Spain: the Lebanese Ministry of Environment / IUCN. 64 pp - 2012
  - Specially Protected Areas of Mediterranean Importance (Barcelona Convention) (World Database Protected Area)
  - RAMSAR Site, Wetland of International Importance (World Database Protected Area)
  - Nature Reserve
- Seagrass (World Conservation Monitoring Centre WCMC)
- Important Bird Area (http://datazone.birdlife.org)

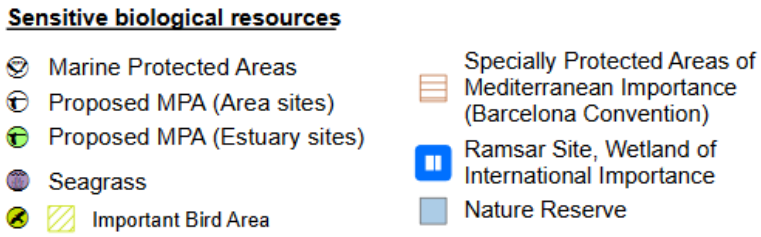


Figure 2: Legend of sensitive biological resources in the maps

GIS data is detailed in .

"Biological resources", p.16

2.3.3 Socio-economic activities and human use resources

Sensitive Human use resources include:

- Fishing activity: Fishing Community; Fishing Areas (Professional & Recreational) Fishing Port
- Tourist activities: Marina; Municipal and Private Beaches resort; Scuba Diving; Tourist accommodation
- Sensitive industrial activities: Industrial Port; Power Plant (Water intake / Reject)
- World and National Heritage Sites, Place of Worship (graveyard – religious site)
- Particular infrastructures: Salt Production

All main information on the sensitive economical resources comes from

- the maps produced for the National Oil Spill Contingency Plan (2017)
- complemented by information coming from *Lebanon's Marine Protected Area Strategy: Supporting the management of important marine habitats and species in Lebanon. Beirut, Lebanon, Gland, Switzerland y Malaga, Spain: the Lebanese Ministry of Environment / IUCN. 64 pp – 2012*

GIS data is detailed in .

"Socio-economic activities and human use resources", p.16

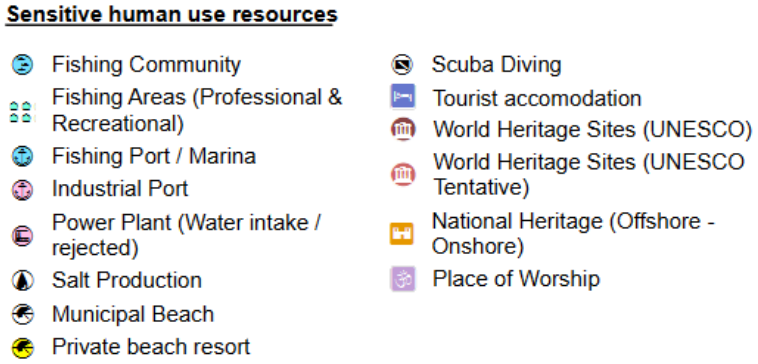


Figure 3: Legend of sensitive human use resources in the maps

2.4 Operations & logistics maps

"Operations & logistics maps - V1.pdf" in …\Vol Ops Support\Op Sup 10 Doc

Logistics and operational maps include information which can facilitate or complicate response operations:

- Type of coast and river/stream mouth
- Particular infrastructures (onshore)
  - United Nations Interim Force in Lebanon Hospital
  - Medical Facility
  - Public Services/Facility/Space
  - School/Educational Facility
  - Tourist areas
  - Airport
  - Military sites

- Informal Settlements of Refugees
- Pipeline (IHS): Abandoned Oil pipeline; Operating Gas pipeline and Questionable Project for Gas pipeline

- Other relevant infrastructure (offshore): Prominent shipwreck and Submarine cables
- Protectable sensitive coastal sites - Beirut to North
- Geographic limit for the use of dispersant

GIS data is detailed in .

"Logistics and operational features", p.16

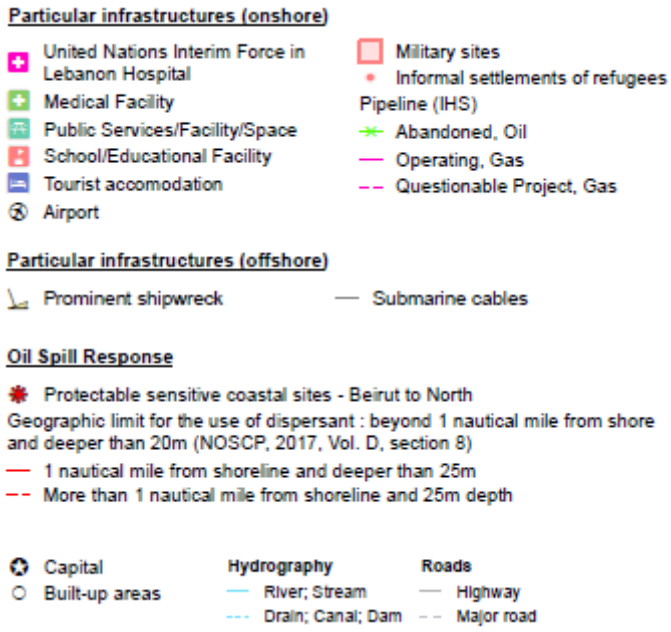


Figure 4: Legend of Operations & logistics maps

2.5 Sensitive sites & resources in Lebanon and Protectable sites North of Beirut

Refer to:

Operational Support n°7, section "Sensitive sites and resources in Lebanon".

2.6 Strategic maps

"Strategic maps - V1.pdf" in …\Vol Ops Support\Op Sup 10 Doc

The Strategic maps covers the overall project area. A simplification of sensitivities identified (see chapters above) was carried out as follow:

Synthesis of physical environment

- ESI classes were grouped to simply and highlight the most sensitive coastline
  - Low sensitivity ESI 1 and 2
  - Medium sensitivity ESI 3 to 5

- High sensitivity ESI 6 and 7
- Very High sensitivity ESI 8 - (*ESI 9 and 10 was not identified at the scale of the study*)

- The river mouths have very high sensitivity compared to stream mouths.

Synthesis of sensitive biological resources

- The synthesis simplifies the display of key information (protected sites and areas)
- The synthesis displays also "High priority sites" coming from the Project: "*Environmental Resources Monitoring in Lebanon - ERML" – August 2012 Component A (i): Improved Understanding, Management and Monitoring in the Coastal Zone Submitted by: Marine Resources and Coastal Zone Management Program and Institute of the Environment – University of Balamand*

Synthesis of sensitive human use resources

- The synthesis simplifies the display of key information.

Synthesis of Oil Spill Response and logistic features

- The key information is kept on the strategic maps:
  - Protectable sensitive coastal sites - Beirut to North Border
  - Geographic limit for the use of dispersant: beyond 1 nautical mile from shore and deeper than 20m (NOSCP, 2017, Vol. D, section 8)

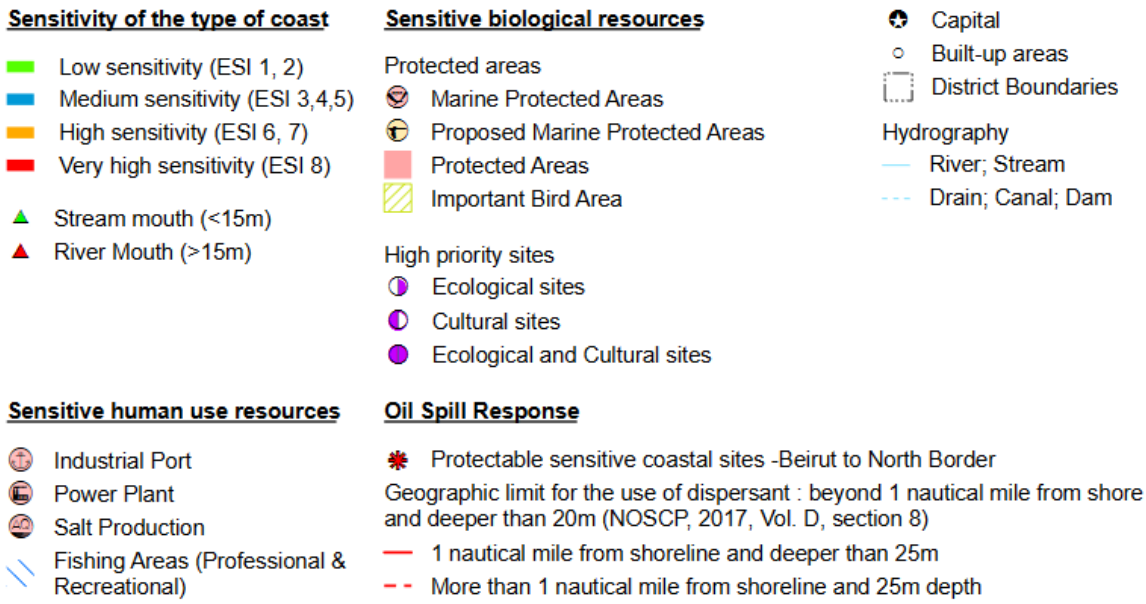


Figure 5: legend of the strategic maps

3. APPENDICES

3.1 Sensitivity mapping methodology - Overview

Sensitivity mapping of the various types of environments and resources potentially exposed to oil spills enables the identification of the most sensitive sites or resources, thus providing a basis for the definition of priorities for protection and clean-up, and information to plan the best-suited response strategy.

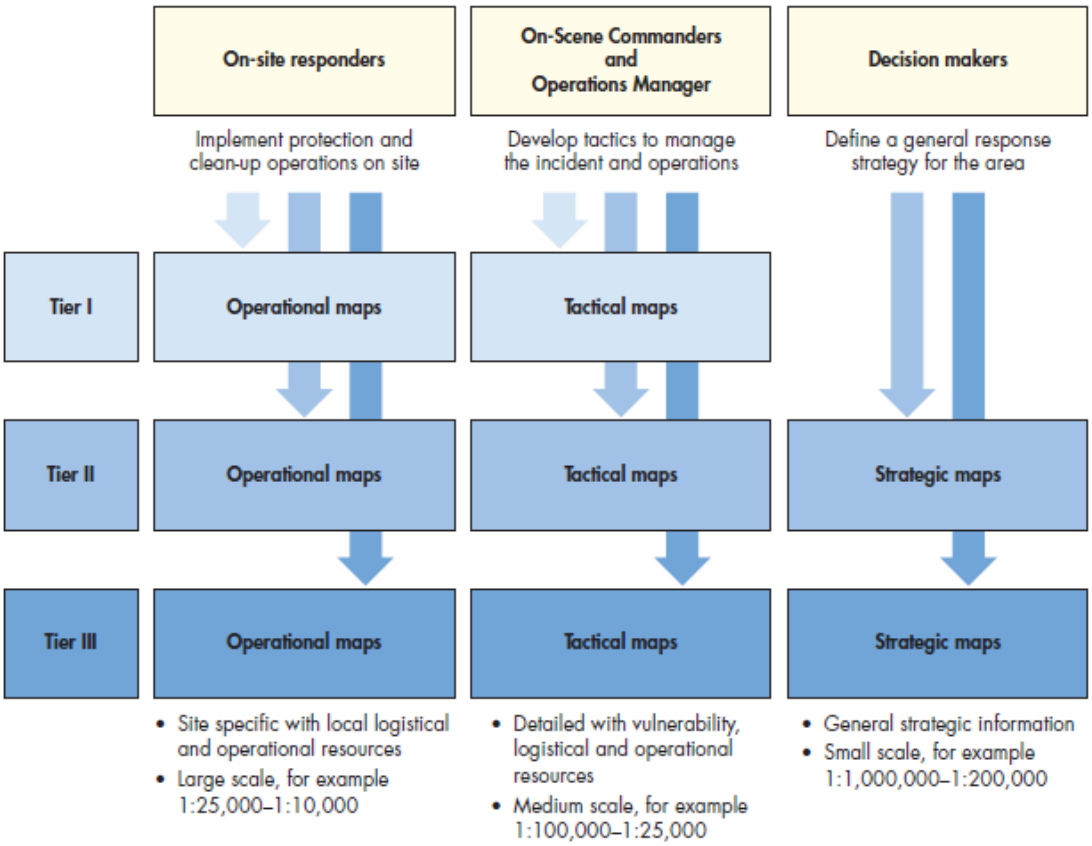
The sensitivity mapping includes:

- physical environment,
- biological and ecological resources sensitive to oil spills,
- Activities and customary practices sensitive to oil pollution,
- A synthesis which highlights the most sensitive sites to be protected in priority,
- The logistic and operational features.

Depending on the scale of the event, specific levels of incident management systems would be mobilized:

- Decision makers (Incident Commander): define general response strategy at national or regional levels (mobilized for Tier II and III oil spills only),
- On-Scene Commanders (Local ICs) and Operations Managers: develop response tactics to respond to an oil spill and manage operations in the field,
- On-site responders: implement operations on site.

The types of maps, scale and level of details are adapted to each user's needs.



Source: IPIECA-IMO-IOGP, 2011: Sensitivity mapping for oil spill response

USERS	MAPS	NEEDS
Decision makers and IMT personnel (*Incident Commander and Planning section*)	Strategic maps • Strategic map – overall project area • Strategic map – for each modelled oil flow of well pads	• Identify the most sensitive sites / areas and adapt response strategies (protection, priority cleaning, sacrificial areas) • Know the justification of sensitivity in order to make immediate decisions according to the importance of the emergency (and be able to justify them)
Operations Managers in IMT (*planning and operation section*) Local IC post personnel	Tactical maps • Sensitivity mapping • Logistics and operational mapping	• Locating sensitivities • Organize response operations (survey, protection, cleaning) ○ Choice of techniques and equipment ○ Number and organization of sites (access, evacuation, available resources, security, etc.) • Follow the operations (number of people, volume of waste)
On-site response leaders	Protection Plan = Operational maps and instructions for the protection of the most sensitive sites*	• Implement response operations

Note: Not developed in the framework of the OSCP.

3.2 GIS development – Overview

STEPS	DESCRIPTION	REFERENCES
1 **Data collection, assessment**	Data Collection (GeoDatabases and shapefile) • From TOTAL Head Quarter (LB_2019_TOTAL_GIS_W84N36.gdb and empty LB_2019_OSCP_W84N36.gdb • From RSK (LB_2019_ESIA_Block4Block9_W84_N36.gdb and LB_2019_TOTAL_GIS_W84N36.gdb) • From internet as well as report and maps developed by national and international organizations	Sections: 2.2, 2.3, 2.4 And 3.3
2 **Data screening, integration, update and, creation**	• Screening the relevant existing features classes from existing TOTAL and RSK database • Filling database LB_2019_OSCP_W84N36.gdb with relevant data downloaded by OTRA • Update some existing features classes (ex:ESI) • Digitalizing the missing relevant information for the project	

STEPS	DESCRIPTION	REFERENCES
3 **Synthesis for identification of the most sensitive site**	• Development of method to highlight the most sensitive sites and area	Section 2.5 & 2.6
4 **Mapping project**	• Creation of Mapping project with relevant data and GIS layers with adapted symbology	Section 3.3
5 **GIS consolidation**	• Consolidation of the geodatabase LB_2019_OSCP_W84N36.gdb and reporting. • Note : The database already populated by RSK and TOTAL were not updated	Section 3.4

3.3 Maps production

Mapping projects are created from ArcGIS 10.5.

- They are saved in relative path to access the data more easily.
- Symbology used refer to ESRI font and the main icons are recommended by IPIECA /IMO / IOGP (IPIECA-IMO-IOGP, 2011: Sensitivity mapping for oil spill response)

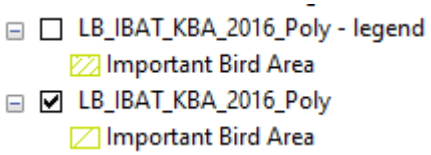
Atlas production

- The maps use the ArcGis 10.5 "Dynamic Pages" application to create an atlas of maps from feature classes :
  - "LB_MAP_50000_G" composed 15 polygons to produce automatic maps at scale 1/50.000.
  - "LB_MAP_300000_G" composed 2 polygons to produce automatic maps at scale 1/300.000.

Layer and Legends

- The MXD projects for producing maps in paper format are composed by some layers repeated for improving the quality of the display of the entities on the maps and the display of symbology in the legends. To differentiate the layers displayed on the map and layers displayed for the legend, an indication was provided in the title of the layers. Without this technic, some legends don't properly display the symbology used on the map. This technic influences the updates of the symbology (change of colour / type of symbology) as the action shall be repeated for the "legend layer" when done for the layer displayed on the map.

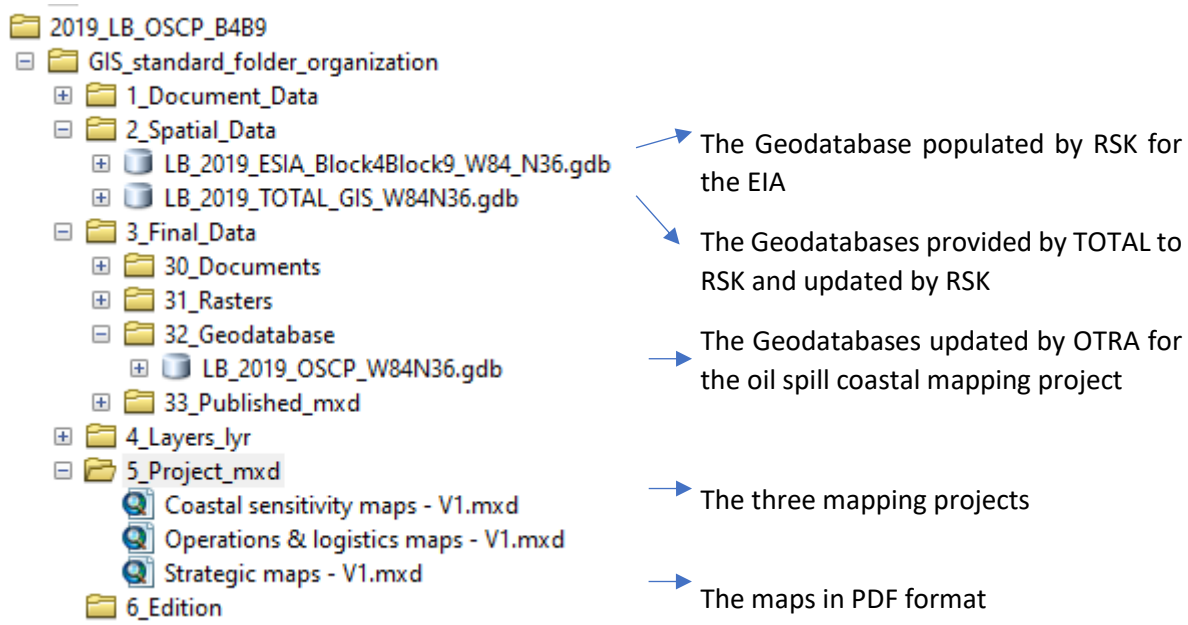
  Example:



Note : the background for the maps "Coastal sensitivity maps " and "Operations & logistics maps" use respectively the service provided ESRI: *« **World Imagery** - Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community »* and *OpenStreetMap (and) contributors, CC-BY-SA.*

3.4 GIS deliverable

The structure used for the mapping project comes from the GIS package sent by TOTAL (as per the GS_EP_ENV_501_EN):



Note 1. The Database LB_2019_OSCP_W84N36.gdb:

- *Uses the projected coordinate system : WGS_1984_/_UTM_zone_36N_33E.*
- *Compares to the template databased sent by TOTAL in the GIS package, only the feature classes with GIS information are kept in the final database.*

Note 2. The database LB_2019_ESIA_Block4Block9_W84_N36.gdb was not updated by OTRA

Note 3. The database LB_2019_TOTAL_GIS_W84N36.gdb provided by TOTAL is not consistent with the GS EP ENV 501. OTRA didn't update the attribute tables.

3.5 GIS data production

3.5.1 Base map information

LB_ADMIN_G (Countries / Province / District): Integration of data coming from www.gadm.org

LB_BATHY_L (Bathymetry): OTRA complemented the initial feature class (LB_2019_TOTAL_GIS_W84N36.gdb / LB_EMODNET_Contours50) by the 25m isobaths downloaded from https://www.opendem.info

LB_HYDRO_L (Hydrography): OTRA consolidated information from internet (OpenStreetMap data - https://download.geofabrik.de)

3.5.2 Shoreline type and Environmental Sensitivity Index (ESI)

LB_COASTAL_SENS_L (ESI)

OTRA consolidated the existing features class from LB_2019_TOTAL_GIS_W84N36.gdb into LB_2019_OSCP_W84N36.gdb. The ESI was digitalized in 2017 for the development of the National Oil Spill Contingency Plan.

OTRA updated the ESI feature classes when the coastline was different (new coastal infrastructures such as port) or not digitalized in the initial database (some islands).

LB_PART_HYDRO_P (Particular hydrography)

OTRA digitalized river and stream mouths using ESI World Imagery service.

3.5.3 Biological resources

The data used comes from the following databases:

- LB_2019_ESIA_Block4Block9_W84_N36.gdb
- LB_2019_TOTAL_GIS_W84N36.gdb
- LB_2019_OSCP_W84N36.gdb
  - **LB_PROTECTED_AREA_P** features class comes from LB_2019_ESIA_Block4Block9_W84_N36.gdb with a differentiation for the source in order to map the sites identified in the report:

Lebanon's Marine Protected Area Strategy: Supporting the management of important marine habitats and species in Lebanon. Beirut, Lebanon, Gland, Switzerland y Malaga, Spain: the Lebanese Ministry of Environment / IUCN. 64 pp.

3.5.4 Socio-economic activities and human use resources

The data used comes from the following databases:

- LB_2019_ESIA_Block4Block9_W84_N36.gdb
- LB_2019_TOTAL_GIS_W84N36.gdb
- LB_2019_OSCP_W84N36.gdb
  - LB_ECO_ACTIVITY_P:
    - OTRA consolidated in this feature class information from LB_2019_ESIA_Block4Block9_W84_N36.gdb and LB_2019_TOTAL_GIS_W84N36.gdb.
    - OTRA digitalized some sensitive industrial activities using ESI World Imagery service (complement port location and Power Plant)

3.5.5 Logistics and operational features

The data used comes from the following databases:

- LB_2019_ESIA_Block4Block9_W84_N36.gdb
- LB_2019_TOTAL_GIS_W84N36.gdb
- LB_2019_OSCP_W84N36.gdb
  - **LB_COASTAL_SENS_L**: see **Error! Reference source not found.**
  - **LB_PART_HYDRO**_P: see **Error! Reference source not found.**

- **LB_INFRA_P**: OTRA digitalized airport using ESI World Imagery service
- **LB_PRO_PRIOR_P:** OTRA digitalized site using ESI World Imagery service
- **LB_OPERATION_SITE_L**: OTRA digitalized the Geographic limit for the use of dispersant based on 1 nautical mile from shoreline and the isobath 25m (data for the 20m depth was not available for the project)

3.6 GIS data catalogue

See next pages.

	DATA AVAILABILITY: - YES (GIS format) - YES (MAP paper) - No	DATABASE	DATA NAME: If GIS data exists, name of shapefile/ database/featureclass	DATA TYPE: Raster, point, line, polygon or paper map	FOOTPRINT Country / partial / arround well pad / etc.	DIGITALIZATION SCALE / SPATIAL RESOLUTION	DATE OF INFORMATION (not the date of the GIS data)	GEODESY	SOURCE
Base Map									
Administrative boundaries									
Countries	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_ADMIN_G	Polygon	Country	unknown		WGS_1984_UTM_Zone_36N	www.gadm.org
Province (Lebanon)	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_ADMIN_G	Polygon	Country	unknown		WGS_1984_UTM_Zone_36N	www.gadm.org
District (Lebanon)	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_ADMIN_G	Polygon	Country	unknown		WGS_1984_UTM_Zone_36N	www.gadm.org
Bathymetry	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_BATHY_L	Line	Country	unknown		WGS_1984_UTM_Zone_36N	LB_EMODNET_Contours50m from LB_2019_OSCP_W84N36.gdb complemented by https://www.opendem.info
Hydrography (river, stream) – specify if navigable	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_HYDRO_L	Line	Country	unknown		WGS_1984_UTM_Zone_36N	https://download.geofabrik.de OpenStreetMap
Cities (main tow – trading centre – etc)	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_BUILT_UP_AREA_Localities_P	Point	Coastal area	unknown		WGS_1984_UTM_Zone_36N	EIA
Network (road – national/local/track/etc., --- details on trafficability are required)	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_NETWORK_OSM_Roads_L	Line	Country	unknown		WGS_1984_UTM_Zone_36N	EIA
Satellite images	YES : GIS			raster		unknown		WGS4	ESRI service
Topographic maps	YES : GIS			raster		unknown		WGS4	OpenStreetMap (ESRI service)
Rectangle - Maps area for atlas	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_MAP_50000_G LB_MAP_300000_G	Polygon	Area of study	unknown	2019	WGS_1984_UTM_Zone_36N	OTRA
Coastline & ESI									
Nature & sensitivity of Coastline to oil spill - ESI	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_COASTAL_SENS_L	Line	Country	unknown	2017	WGS_1984_/_UTM_zone_36N_33E	NOSCP : Table 6.1: Proposed Marine Protected Areas of Lebanon - D-58->D-67 - page 65 -> 74 /108 Updated by OTRA for new coastal features
Location of inlet / river mounth	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_PART_HYDRO_P	Point	Country	unknown	2019	WGS_1984_/_UTM_zone_36N_33E	OTRA - digitalization using ESRI service
Sensitive biological resources									
Sensitive species (to a pollution…): fauna (IUCN list, rare, threatened, etc.) / - nesting site / - resting site / water supply point / Migration axis / Seasonality of species-use of site						unknown			
Offshore/ Shore birds important coastal areas	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_IBAT_KBA_2016 LB_IBAT_KBA_2016_Poly	Polygon	Country	unknown	2018	WGS_1984_UTM_Zone_36N	IBAT
Sea Grass meadows	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_Seagrasses_WCMC_P LB_Seagrasses_WCMC_Poly	Point	Country	unknown		WGS_1984_UTM_Zone_36N	WCMC
Regulatory protections									
Marine Protected Areas In force and Proposed Marine Protected Areas (sites & estuaries)	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_PROTECTED_AREA_P	Point	Country	unknown		WGS_1984_/_UTM_zone_36N_33E	==> EIA : Figure 5.52: Protected and proposed coastal sites - page 240/553 '==> EIA : Figure 5.70: Protected areas and proposed protected areas (excluding estuarine sites and UNESCO sites), in relation to Block 4 - page 277/553
Nature Reserves	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_WDPA_Polygon	Polygon	Country	unknown unknown		WGS_1984_UTM_Zone_36N	NOSCP : Table 6.1: Proposed Marine Protected Areas of Lebanon - D-21 - page 28/108 Figure A1- 11: Marine Protected Areas and proposed Marine Protected Areas - D-68 - page 75/108 **PRIMARY SOURCE:** Lebanon's Marine Protected Area Strategy - page 28
RAMSAR	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_WDPA_Polygon	Polygon	Region	unknown		WGS_1984_UTM_Zone_36N	WDPA
Specially Protected Areas of Mediterranean Importance (Barcelona Convention)	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_WDPA_Polygon	Polygon	Region	unknown		WGS_1984_UTM_Zone_36N	WDPA

Sensitive socio-economic / human use resources									
Fishing / acquaculture activity									
Fishing community	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_SAMPLING_P	Point	Country	unknown		WGS_1984_UTM_Zone_36N	==> EIA : Figure 5.86: Fishing community, page 322 /553
Fishing Areas (Professional)	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_ECO_ACTIVITY_G	Line	Country	unknown		WGS_1984_UTM_Zone_36N	==> EIA : Figure 5.86: Distances travelled to fishing grounds, page 322 /553
Fishing Port / Marina	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_ECO_ACTIVITY_P	Point	Country	unknown		WGS_1984_/_UTM_zone_36N_33E	EIA complemented by OTRA using ESRI Service
Salt Production	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_ECO_ACTIVITY_P	Point	Country	unknown		WGS_1984_/_UTM_zone_36N_33E	EIA
Tourist activities									
Fishing Areas (Recreational)	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_ECO_ACTIVITY_G	Line	Country	unknown		WGS_1984_UTM_Zone_36N	==> EIA : Figure 5.86: Distances travelled to fishing grounds, page 322 /553
Tourist accomodation/ hotel (on the coast)	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_INFRA_OSM_POI_P	Point	Coastal Area	unknown		WGS_1984_UTM_Zone_36N	==> EIA : Figure 5.74 - 5.81: Land use and infrastructure page 298 - 305 /553 LB_2019_OSCP_W84N36.gdb
Municipal beach Private beach resort Scuba Diving	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_ECO_ACTIVITY_P	Point	Country	unknown		WGS_1984_/_UTM_zone_36N_33E	==> EIA : Figure 5.87: Beach resorts in Lebanon - page 326/553 LB_2019_OSCP_W84N36.gdb
Industrial activities (industrial water intake, sensitive industries)									
Power Plant	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_ECO_ACTIVITY_P	Point	Coastal Area	unknown		WGS_1984_/_UTM_zone_36N_33E	NOSCP : Figure A1- 13: Socio-economically sensitive sites - D-71 - page 78/108 OTRA - digitalization using ESRI service
Industrial Port	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_ECO_ACTIVITY_P	Point	Country	unknown		WGS_1984_/_UTM_zone_36N_33E	==> EIA : Figure 5.74 - 5.81: Land use and infrastructure, page 298 - 305 /553 NOSCP : Figure A1- 13: Socio-economically sensitive sites - D-71 - page 78/108
Archaeological sites, cultural site, point / water well for the populations, Zone or military site, etc.									
World Heritage Site (UNESCO) + tentative WHS	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_UNESCOlist_2017 LB_UNESCOtentative_2017	Point	Country	unknown	*2017*	WGS_1984_UTM_Zone_36N	UNESCO
National Cultural Heritage sites, onshore and offshore	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_HERITAGE_P	Point	Country	unknown		WGS_1984_UTM_Zone_36N	UNESCO
	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_INFRA_OSM_POI_P	Point	Country	unknown		WGS_1984_UTM_Zone_36N	==> EIA : Figure 5.89: Priority and ranking of culturally sensitive sites in Lebanon - page 342/553
Place of Worship	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_INFRA_OSM_POI_P	Point	Country	unknown		WGS_1984_UTM_Zone_36N	==> EIA : Figure 5.89: Priority and ranking of culturally sensitive sites in Lebanon - page 342/553

Logistical and Operational Resources									
Particular infrastructures (onshore)									
United Nations Interim Force in Lebanon Hospital	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_CIVIL_SOCIETY_P	Point	Coastal Area	unknown		WGS_1984_UTM_Zone_36N	EIA
Medical Facility	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_INFRA_OSM_POI_P	Point	Coastal Area	unknown		WGS_1984_UTM_Zone_36N	EIA
Public Services/Facility/Space	*idem*	*idem*	*idem*	*idem*	Coastal Area	unknown		idem	*idem*
School/Educational Facility	*idem*	*idem*	*idem*	*idem*	Coastal Area	unknown		idem	*idem*
Tourist Accomodation	*idem*	*idem*	*idem*	*idem*	Coastal Area	unknown		idem	*idem*
Airport	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_INFRA_P	Point	Coastal Area	unknown		WGS_1984_/_UTM_zone_36N_33E	OTRA - digitalization using ESRI service
Military sites	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_INFRA_OSM_Landuse_G	Polygon	Coastal Area	unknown		WGS_1984_UTM_Zone_36N	EIA
Informal Settlements of Refugees	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_COMM_GRP_UNHCR_Informal Settlements_P	Point	Country	unknown		WGS_1984_UTM_Zone_36N	EIA
Pipeline (IHS)	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_Pipelines_IHS	Line	Region	unknown		WGS_1984_UTM_Zone_36N	EIA
Particular infrastructures (offshore)									
Prominent shipwreck	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_HERITAGE_P	Line	Coastal Area	unknown		WGS_1984_UTM_Zone_36N	EIA
Submarine cables	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_2019_SubmarineCables	Line	Region	unknown		WGS_1984_UTM_Zone_36N	EIA
Geographic limit for the use of dispersant	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_OPERATION_SITE_L	Point	Country	unknown		WGS_1984_/_UTM_zone_36N_33	OTRA using bathymetry and distance from the coast
Oil industry									
Wells and Plateform									
WELL - TEP LIBAN	YES : GIS	lb_2019_esia_block4block9_w84_n36.gdb	LB_STUDY_AREA_ExploratoryWells_P	Point	Country	unknown		WGS_1984_UTM_Zone_36N	TOTAL
Block									
All Blocks	YES : GIS	lb_2019_esia_block4block9_w84_n36.gdb	LB_STUDY_AREA_OffshoreBlocks_G	Polygon	Country	unknown		WGS_1984_UTM_Zone_36N	TOTAL
TEP Liban Block	YES : GIS	LB_2019_TOTAL_GIS_W84N36.gdb	LB_Block4_Block9	Polygon	Country	unknown		WGS_1984_UTM_Zone_36N	TOTAL
Sensitive sites									
Protectable sensitive coastal sites -Beirut to North Border	YES : GIS	LB_2019_OSCP_W84N36.gdb	LB_PRO_PRIOR_P	Point	Partial - Beirut to North Border	unknown		WGS_1984_/_UTM_zone_36N_33E	OTRA - digitalization using ESRI service
Culturally sensitive + Cultural and Ecological priority sites	YES : GIS	LB_2019_ESIA_Block4Block9_W84_N36.gdb	LB_PROTECTED_AREA_ERMLHighPrioritySites_P	Point	Country	unknown		WGS_1984_UTM_Zone_36N	UNEP – ERML: Improved Understanding, Management and Monitoring in the Coastal Zone-August 2012 Figure 4: Priority and ranking of identified sensitive sites based on cultural criteria. page 62/118 + Figure 7: Clustered high priority sites - page 69/118 LB_2019_ESIA_Block4Block9_W84_N36.gdb
Miscellaneous									
N/A						unknown			

OIL SPILL CONTINGENCY PLAN

OPERATIONAL SUPPORT N°11:

INVENTORY OF OIL SPILL RESPONSE RESOURCES

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published
01	12/02/2020	Updated section 2.2

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**INVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

Preamble

Present document was developed by OTRA company based on the information provided by the client (TEP Liban), and scientific and technical data available, as well as applicable rules and regulations.

Responsibility of OTRA company cannot be engaged if erroneous and/ or incomplete information have been provided.

Advice, recommendations, guidelines or similar in the present documents are provided as aid-decision tool. OTRA company is not involved in the decision process for any activities (preparedness, response etc.). Therefore, responsibility of OTRA company cannot replace that of the client and cannot be engaged.

The client will use the present document if and when needed, under its sole responsibility. The client will modify, complete, update etc. the present document under its sole responsibility.

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Markings:

/!\ Warning

🗎 *Link to other documents of the TEP Liban OSCP*

ⓘ *Link to external document or information, not part TEP Liban OSCP*

TABLE OF CONTENTS

1. TEP LIBAN OIL SPILL RESPONSE RESOURCES

1.1 Oil spill response kits on Drilling unit

Refer to the SOPEP document of the Drilling unit.

1.2 Offshore boom & skimmer system

TEP Liban will secure the rapid access (range of 48 hrs) to offshore containment and recovery equipment, e.g.:

- 250m of offshore inflatable boom;
- Offshore weir skimmer.

Specifications available from TEP Liban upon request.

1.3 Equipment in Logistics Base

FAST BOLLORE equipment list available from TEP Liban upon request.

FAST BOLLORE contacts:

Patrick HARFOUCHE – OPS MGR

- p.harfouche@fast-bollore.com

- +961 3 412 370

Pierre MOUTON – Base Mgr

- p.mouton@fast-bollore.com

Samir HOCINE – Pipe Yard Mgr

- s.hocine@fast-bollore.com

- + 961 76 888 506

2. RESOURCES IN LEBANON

2.1 Government equipment

The list of equipment maintained by government agencies is provided in Vol. D, Annex 5 of the NOSCP (see next pages).

Lebanese Armed Forces (LAF) equipment is located at the Beirut Naval Base.

Civil Defence equipment is mainly at Jounieh Marine Rescue Base and small stockpiles at Jiyeh and Tyre.

Item Description		Naval Base	Civil Defense
Pomp GMP B3 x RA 10 HP		1	0
Absorbent booms		191	143
Flexi 900 fence oil boom (345 m)		0	2
Flexi 900 fence oil boom (405 m)		0	2
Flexi 900 fence oil boom (225 m)		1	0
Towing end (pulling head) for the fence boom		0	4
Repair kit bag for the fence boom		1	4
Magnetic connectors for the fence boom		2	8
ASTM connectors for the fence boom		0	8
RCY Coastal boom 450 m (5 mooring kits, 1 reparation kit, 1 inflating gun, 1 manometer)		1	0
Geoland Coastal boom (100 m)		4))	0
RCY Canarie Coastal boom (100 m)		0	5
Expanding Booms 4300		1	0
Power Generation (13 KVA)		1	0
Inflatable buoys for anchors		0	47
Other buoys		0	-
Hoe Anchors (15 Kg)		6	68
Ropes for anchor buoys		20	100
Buoys with lights		6	20
Inflatable buoys for anchors diameter: 60 cm		4	0
Other buoys diameter 50 cm long 20 cm		10	[
Dismountable oil recovery basin 4m3		0	4
Lamor skimmer minimax 10 + power pack	Skimmer	0	4
	Power pack	0	4
Harbor oil boom NOFI 250 EP (25 m length sections)		0	7 sections
Oil boom oil-stop NRC (100 feet length sections)		0	8 sections
Coastal oil boom Oil Stop NRC (100 feet length sections		24 sections	0
Reparation & maintenance kit for oil boom oil-stop NRC		0	1
Harbor oil boom NOFI 250 EP (25 m length sections)		13 sections	0
Galvanized steel storage platform double height		4	1
Galvanized steel storage platform single height		0	1
Antifriction geotextile mat		0	1

Item Description	Naval Base	Civil Defense
Gasoline air blowers Benza BA500K	3	1
Plastic cans 5L gasoline 3% oil, for blowers	3	1
Weir skimmer Foilex TDS 150	0	1
Diesel power pack (Lamor Lpp 30)	1	0
Hydraulic hose 3/4 degree	0	60 m
Discharge oil hose 3 degree with Camlock coupling	20 m	20 m
Kit of spare parts for Foilex TDS skimmer	0	1
Collapsible tanks, easy tank 10 m³ capacity	2	0
Belt skimmer Lamor minimax 30	1	0
Anchor lines, 45 kg anchor, ready to use	30 pcs	0
Plastic storage box Arca system	6	0
Absorbent mat or roll 450	0	3
Shovels	118	420
Boots	600	1580
Gloves PVC	1680	1680
Nylon braided rope (4m)	25	0
Steel chain (5.80 m long)	24	0
Steel chain (7.40 m long)	25	0
Steel chain (9.70 m long)	5	0
Shackle 3 cm	4	0
Shackle 2.5 cm	42	0
Shackle 6 cm	20	0
Shackle 4 cm	14	0
Shackle 2 cm	51	0
Defense (diameter: 5.35 cm)	24	0
Defense (external diameter: 110 cm)	6	0
Defense (external diameter: 80 cm)	6	0
Defense (external diameter: 45 cm)	24	0
Buoys for rope	48	0
Fiber rope (14 mm diameter; 37 m long)	4	0
Fiber rope (14 mm diameter; 36 m long)	6	0
Fiber rope (14 mm diameter; 36 m long)	3	0
Fiber rope (14 mm diameter; 32 m long)	6	0
Fiber rope (14 mm diameter; 30 m long)	7	0
Fiber rope (14 mm diameter; 20 m long)	1	0
Fiber rope (14 mm diameter; 3 m long)	12	0
Fiber rope (14 mm diameter;4.5 m long)	5	0
Fiber rope (14 mm diameter; 5 m long)	1	0
Fiber rope (14 mm diameter; 3.5 m long)	7	0
Fiber rope (21 mm diameter; 28 m long)	25	0

Item Description		Naval Base	Civil Defense
Fiber rope (21 mm diameter; 30 m long)		4	0
Fiber rope (21 mm diameter; 25 m long)		1	0
Fiber rope (21 mm diameter; 5.4 m long)		10	0
Fiber rope (21 mm diameter; 5 m long)		3	0
Fiber rope (21 mm diameter; 4.4 m long)		2	0
Fiber rope (21 mm diameter; 4 m long)		8	0
Barrels of chemical dispersants		4	3
High Pressure Cleaners (Karcher)		3	1
Hand tools for beach cleanup	Beach hand tools	10	0
	Fork piece	0	12
	Shovel piece oval	0	4
Aggregates	power pack - HYDAC	0	0
Pipes and maneuver panels	Manual skimmers square	18	0
	Manual skimmers circular with bag	0	17
	Manual skimmers circular without bag	10	7
	Manual skimmers circular incomplete	1	0
	Yellow boxes for big bags	5	5
	Big white bags 80 cm x 100 cm	82	232
	White bag 1200 kg	16	0
	Halogen projectors	9	0
	Shovels aluminum	6	0
	Big funnel aluminum	4	3
	Funnel stand aluminum	4	3
	Shovel sticks t-shaped	34	20
Near shore boats (Foxbarges)		1	1

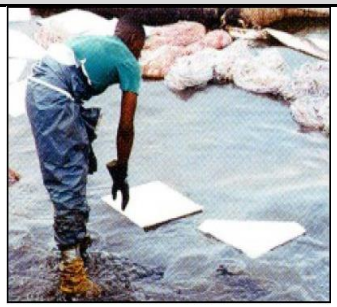
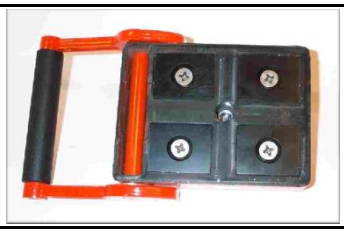
2.2 Total Liban M&S

Total M&S holds the following list of port equipment at its terminal facilities in Dora. This equipment will be mobilised by TEP Liban if necessary, to respond to an oil spill incident at the logistics base.

ⓘ http://www.total-liban.com/

Equipment	Quantity in 2010	Inventory 07/ 2019	Illustration
CONTAINMENT			
Foam filled boom, total height 80/100 cm + possibility of storage on reel	150 m (25 m sections)	**1**	
Sorbent boom	100 m	9 bags	
Yellow boom (connectable)	103 m	103 m	 

RECOVERY	Quantity in 2010	Inventory 07/ 2019	
Self adjusting weir skimmer + Hydraulic power pack + Transfer pump + Flexible hoses	1	*1*	
STORAGE	**Quantity in 2010**	**Inventory 07/ 2019**	
Temporary storage tank with frame 10 m^3	1	1	
IBC 1 m3, with decantation valve at bottom	3	60	
Storage box: sorbent pads & booms, etc.	4	4	
Water tight big bags (1 m^3)	10	10	

SORBENT	Quantity in 2010	Inventory 07/ 2019	
Sorbent pads (100 unit per bag)	10 bags	15	
Sorbent roll	2	2 rolls	
ANCILLARIES	**Quantity in 2010**	**Inventory 07/ 2019**	
Anchors		Min. 4	
Magnetic anchors	2 pairs	4	
Buoys	4	8	
Shackles & snap hook (buoy/ anchor connection)	4	4	
Rope (polyethylene)	200 m	100+	
Boat hook	2	2	
PERSONAL PROTECTION EQUIPMENT	**Quantity in 2010**	**Inventory 07/ 2019**	
Goggles	10 pairs	10	
Helmets	10	20	
Boots	10 pairs	29	
Gloves vinyl	10 boxes	22	
Raincoat + trousers	10	10	
Disposable coveralls	20	42	
Lifejackets	20	15	
Waders	10 units	10	
Explosimeter	1	1	

2.3 Other oil industry in Lebanon

Medco

ⓘ https://www.medco.com.lb/facts

Oil distributor in Lebanon. It holds a 62 000 m3 oil Terminal in the Port of Beirut with five different sea lines and more than 30 seashore-based tanks of varying capacities. The terminal can accommodate tankers with a draft of up to 33 feet.

IPT (Issa Petrol Trade)

ⓘ https://www.iptgroup.com.lb

IPT is specialized in the import and storage of petroleum products including gasoline, diesel oil, LPG, and lubricants.

Consolidated Group For Industry & Commerce (COGICO)

ⓘ http://www.cogico.com.lb

Company carries out in Lebanon and abroad activities related to the trade, import, export, storage and distribution of oil products. COGICO has its own storage facilities built over the reclaimed area of 40 000 m2 on sea side of Jiyeh town (20 Km) south of Lebanon with total capacity of 55,000 m3 to store asphalt, gasoline, gasoil , fuel oil and L.P.G. The storage facilities are fully equipped and protected according to the international standards for oil process provided with two sea line 500 m long to receive full load of vessels up to 35,000 m3.

Zahrani Oil Installations (ZOIL)

Source: http://www.leboilinst.com

Consists of two sites located at 45 km to the South of Beirut: a terminal and a refinery. The installations import fuel oil and gas oil, through the terminal, store it in reservoirs, then treat and distribute derivatives in the local market through distribution companies

Tripoli Oil Installations (TOIL)

ⓘ http://www.leboilinst.com

Consists of two sites located at 70 km to the North of Beirut: a terminal and a refinery. Same as ZOIL, the installations import fuel oil and gas oil and distribute derivatives in the local market through distribution companies.

Wardieh

ⓘ http://www.wardieh.com

Distributor of refined products including gasoline, diesel and petroleum-based chemicals.

United Petroleum Company

ⓘ http://www.unitedpetroleumco.com/

Distributor of refined products in Lebanon, it holds retail gas stations, petroleum storage amenities, logistical supply and distribution networks, servicing amenities, bunkering services and petroleum bi-product innovation

Hypco

ⓘ http://www.hypco.net

Oil distributor in Lebanon with a network of petrol stations in the country.

2.4 Oil spill response companies

There are no known companies with spill response capabilities in Lebanon although oil terminals and storage facilities are expected to hold some equipment.

2.5 Access to support vessels (with contract/ agreement in place)

Additional support vessels can be sourced by TEP Liban via the agreement in place between Total and Clarksons Platou (marine brokers & charterers).

2.6 Ports

ⓘ https://lebanesemarineagency.webs.com

Commercial ports in Lebanon include:

Ports	Description
Saida/ Sidon Port	• 5 berths + 1 berth with Max. Draft 8 metres • Dry cargo port • Maximum draught: 15 feet
Jiyeh Terminals	25 Miles South of Beirut Port. Operate under an independent Customs Authorities/ Independent Pilot Station but are managed under Beirut Port Authority. There are 2 (Two) Terminals, as follows: • Levant Oil/Cogico Terminal: Maximum Draft - 9.50M • Discharge Only
Zahrani Terminals:	They operate under Sidon Port Authority. There are 2 (Two) Terminals, being as follows: • Zahrani Oil Installations: Maximum Draft: 15M (Discharge Only) • Zahrani Power Plant: Maximum Draft: 15M (Discharge Only)
Beirut Port	• Beirut dry cargo port offers deep water quays and entrance channels, with a maximum draft of 13 metres and 16 metres respectively. • Vessels up to 60,000 DWT can be received and up to 25 ships can be accommodated at a time. • the port company inaugurated in 2000 the new Port and Customs Administration Complex.
Dora Terminals	2-5 Miles North of Beirut Port. There are 8 private Terminals at Dora all under the jurisdiction of Beirut Port Authority. • Medco Terminal: Maximum Draft - 10.50M ; Operations - Discharge Only • MPC Terminal: Maximum Draft - 11M ; Operations - Discharge Only • Jirco Terminal: Maximum Draft - 9M ; Operations - Discharge Only (Closed) • Coral Oil Terminal: Maximum Draft - 10M; • Wardieh Terminal : There are 2 Berths. Berth 1: Maximum Draft 12M (Discharge Only). Berth 2: Maximum Draft 9M (Discharge only) • Uniterminals Terminal: Max Draft 13.50M; Operations (Discharge Only) • Gas Liban Terminal : Maximum Draft (Discharge Only) • Total Terminal : Max Draft 11M (Discharge Only)
Chekka Port	Dry cargo port, 2 quays: • 1st quay: Length - 40 metres; water depth -30 feet • 2nd quay: Length - 45 metres; water depth -30 feet
Amchit	Amchit is situated North of Beirut. Discharge of Clean Oil Products. There are 2 Terminals in Amchit, as follows: • IPT Terminal : Max Draft - 12.70M; Ops - Discharge Only • Universal Gas Terminal: Max Draft - 12.70M; Ops - Discharge Only

Zouk terminal	10 Miles North of Beirut and 5 Miles South. Operates under Independently but is managed by Beirut Port Authority. • There is 1 terminal, Zouk EDL Power Station Terminal: Max Draft - 12.50M (Discharge only)

Tripoli Port & Terminals	• Dry cargo port
	  ○ Maximum draught: 22.06 feet
	• Tripoli Oil Installations: Situated 5 Miles North of Tripoli Port.
	  ○ Discharge of Petroleum Products.
	  ○ Maximum Draft – 20 m (Open Sea)
	• Falcon Terminal: Discharge of Mogas
	  ○ Discharge only
	  ○ Maximum Draft: 8 m
	• Apec Terminal: Discharge of Mogas
	  ○ Maximum Draft: 9m
	  ○ Discharge Only
	• Deir Ammar Power Plant: Discharge of Petroleum Products
	  ○ Maximum Draft: 25m
	  ○ Discharge only

2.7 Airport handling

Logistics support for aerial freight can be sourced in Liban via FAST BOLLORÉ (having agreement in place to access lifting/ handling: transport equipment).

2.8 Waste treatment

Treatment plants in Lebanon are limited to composting and anaerobic digestion (http://www.charbelnahas.org)

The main disposal method in Lebanon is landfilling, which covers an estimated 53% of generated wastes. Currently there are three main landfills operational in Lebanon: the Naameh and Bsalim landfills serving Beirut and Mount Lebanon, and Zahle landfill located in the Bekaa valley.

There are no specific facilities identified in country for the disposal, recycling or treatment of hazardous wastes.

The following table provided in a study published in 2011 by the International Labour Organization (ILO) summarizes waste management activities and respective operators in Lebanon[1].

Other potential facilities have been identified during the 2007 study after the Jyeh power plant spill. Refer to:

Operational Support n°7, section "OIL SPILL WASTE MANAGEMENT"

[1] https://www.ilo.org/global/topics/green-jobs/publications/WCMS_168091/lang--en/index.htm

Operational facilities for Sorting, Composting and Sanitary Landfilling and Employment

Mohafaza	Caza	Waste Treatment Facilities			
		Location	Type	Capacity (t/day)	Managed / Funded by
Beirut	Beirut	Aamrousieh	S	758	Averda
		Qarantina	S	1,476	Averda
		Coral (Qarantina)	C	300	Averda
Mount Lebanon	Metn	Bsalim	BL	120	CDR-MoE
	Chouf	Naameh	SL	2,300	CDR-MoE
North Lebanon	*Currently no operating facilities*				
South Lebanon	Sour	Sour	S – C	150	OMSAR-EU
Nabatiyeh	Bint Jbayl	Kherbet Silim	S – C	8	Pontifical mission
		Aitaroun	S – C	8	EU-ESFD Program
		Chacra	S – C	5	Pontifical mission
		Bint Jbeil	S – C	10	Pontifical mission
	Marjeyoun	Khiam	S – C	15	OMSAR-EU
		Taybeh	S – C	10	YMCA
		Qlaiaa	S – C	5	Pontifical mission
		Qabrikha	C	75	OMSAR
	Nabatiyeh	Ansar	S – C	10	OMSAR
		Arab Selim	S	5	UNDP – Italian Coop.
		Kfar Sir	S – C	7.5	Pontifical mission
Bekaa	Zahle	Haouch El Oumara	S	300	CDR-MoE
			SL	180	
Total					

S = Sorting; **C** = Composting; **SL** = Sanitary Landfilling; **BL** = Bulk landfilling

3. REGIONAL RESOURCES

3.1 REMPEC

www.rempec.org

Source: http://www.rempec.org/rempec.asp?theIDS=1_91&theName=ABOUT%20REMPEC&theID=6&daChk=1&pgType=1

Mandate of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea

"…The "Regional Oil Combating Centre" (ROCC) was originally established in 1976 by the decision of the Contracting Parties (to the Barcelona Convention) with the mandate to strengthen the capacities of coastal States in the Mediterranean region and to facilitate co-operation among them in order to combat massive marine pollution by oil, particularly by developing national capacities to combat oil pollution and by establishing a regional information system with a view to dealing with marine pollution emergencies. The Centre's mandate was extended over the years in conformity with the decisions of the Contracting Parties with a view to addressing relevant emerging issues and the respective global developments with a particular focus on preventive measures against pollution from ships. In 1989, the name of the Centre was changed to the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC). REMPEC is administered by the International Maritime Organization (IMO) in cooperation with UNEP/MAP.

In 2001, with a view to the adoption of the new Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, combating Pollution of the Mediterranean Sea (Prevention and Emergency Protocol, 2002), the Contracting Parties reaffirmed the involvement of the Centre in activities related to prevention of, preparedness for and response to marine pollution…"

Objective and mission Statement

"…The objective of REMPEC is to contribute to preventing and reducing pollution from ships and combating pollution in case of emergency. In this respect, the mission of REMPEC is to assist the Contracting Parties in meeting their obligations under Articles 4(1), 6 and 9 of the Barcelona Convention; the 1976 Emergency Protocol; the 2002 Prevention and Emergency Protocol and implementing the Regional Strategy for Prevention of and Response to Marine Pollution from Ships(2016-2021), adopted by the Contracting Parties in 2016, which key objectives and targets are reflected in the Mediterranean Strategy for Sustainable Development (MSSD). The Centre will also assist the Contracting Parties which so request in mobilizing the regional and international assistance in case of an emergency under the Offshore Protocol…"

Address	Contacts
REMPEC MARITIME HOUSE LASCARIS WHARF VALLETTA VLT 1921 MALTA	Tel: +356 21 337 296/7/8 Fax: +356 21 339 951 Mail: rempec@rempec.org Emergency line: +356 - 79 505 011 Emergency mail: emergency@rempec.org

3.2 Spill monitoring company: CypruSUBSEA (Cyprus)

Company	Contacts
CYPRUS SUBSEA CONSULTING & SERVICES 34A Paragogikotitas St. Lakatamia, 2326 Nicosia, Cyprus	Tel +357 22750073 Web https://cyprus-subsea.com Mail info@cyprus-subsea.com

"*CSCS was founded in December of 2012 in Nicosia, Cyprus by Daniel Hayes, Ph. D. Numerous subcontractors have assisted over the years on a project by project basis. With our academic and technical background, as well as our seagoing and survey experience, we have been serving the public and private sector with data collection, analysis, and reporting services. Our specialty is marine robotics and autonomous systems, such as gliders, AUVs, ROVs, moorings, and landers as well as operational forecasting and observing systems*."

3.3 Spill response companies

3.3.1 VSS-EPE (Cyprus)

VSS-EPE Environmental Protection Services Ltd. is the local branch of the Greek company: Environmental Protection Engineering (EPE) S.A. part of the POLYECOGROUP

ⓘ http://www.polyecogroup.com

Company	Contacts
75 Mari-Vasiliko Str. 7736, Mari, Larnaca, Cyprus Mailing Address: 95 Arch. Makariou III Ave. Charitini Building, 5th floor, Flat/Office 501 1071 Agios Antonios, Nicosia, Cyprus	T +357 9697 3300 – 3400 F +30 210 4634411 E-mail: vss-epe@epe.gr

Full inventory (2019) of equipment and vessels of EPE (in Cyprus) is in document:

ⓘ *"Cyprus end Greece Inventory 1.pdf" in …\Vol Ops Support\Op Sup 11 Doc\EPE*

3.3.2 ENVIRONMENTAL PROTECTION ENGINEERING - EPE S.A. (Greece)

Company	Contacts
Head office 24 Dervenakion Str. 185 45, Piraeus, Greece	T +30 210 40 60000 (24/7 line) F +30 210 46 17423 Email: epe@epe.gr

EPE provides the following range of services:

- *OIL & HNS RESPONSE*
- *WASTE MANAGEMENT*
- *PORT RECEPTION FACILITIES*
- *INVENTORY OF HAZARDOUS MATERIALS (IHM)*
- *DAMAGED & DISTRESSED CARGO*
- *PROTECTION PREPAREDNESS & CONSULTANCY*

Regarding "OIL & HNS RESPONSE":

"…*EPE has successfully responded to more than 2000 marine pollution incidents that occurred over the last four decades, offering a wide range of services addressing to waste management, oil/chemical spill response, protection & preparedness and ancillary environmental services.*

An integrated worldwide network of facilities, stockpiles and personnel enables EPE to provide services of superior quality to all kind of onshore and offshore facilities including oil terminals, refineries, shipyards, recycling yards, pipelines, power stations, industries, ports and marinas, in accordance with relevant legislation.

EPE also maintains a contract with the European Maritime Safety Agency (EMSA), since 2007, providing the readiness and availability of antipollution Tanker Ship «AKTEA OSRV» based in Greece. The vessel can be mobilized to face major pollution disasters following EMSA's instructions.

It is the policy of EPE to operate all its business activities in a responsible manner, which assures the health, safety and security of people, preservation of the environment, quality of the services and products while remaining in accordance with all relevant HSEQ and legal requirements in the countries of operation. EPE strives to continuously improve its HSEQ performance through the establishment of measurable HSEQ targets…"

Full inventory (2019) of equipment and vessels of EPE (in Greece) is in document:

ⓘ *"Cyprus end Greece Inventory 1.pdf" in …\Vol Ops Support\Op Sup 11 Doc\EPE*

3.3.3 NEW NAVAL (Greece)

Company	Contacts
Head office 2nd km Lavriou-Souniou Avenue, Lavrio, Attiki 195 00, Greece Website: www.oilspillresponse.gr	T + 30.22920.27936 (24/7 line)

New Naval provides the following services:

- OSR Services
- Training Services
- OSR Equipment
- Marine Solutions

Including:

Source: https://www.oilspillresponse.gr/services-main.php?cid=2

*"…**Emergency Response Services 24/7, 365 Days a Year***

In the event of an incident, especially in the first hours of a response, reliable infrastructure and support is vital. New Naval prides itself in maintaining dedicated response-ready personnel and state-of-the-art equipment that can be rapidly activated to provide primary and secondary response support in the case of an incident when a call-out is received. No incident is too small for New Naval when the environment is threatened or harm is imminent.

Equipment Solutions for All Types of Operations

New Naval has a variety of equipment options designed to fit the needs and the budget for the operation at hand. Rental and leasing options are ideal solutions for temporary and short-term projects that may call for support or emergency response equipment. Individual equipment, pre-packed containers built for specific OSR operations and custom packages based on customer needs are available for rental and leasing. Training, equipment commissioning and support personnel are also available for any and all operational needs.

New Naval equipment comes prepared for emergency or stand-by operations. Rental equipment packages contain carefully selected items that are paired together to provide ideal response resources that can be rapidly deployed at a moments notice. Packages are complete systems that include all necessary items to properly operate in the designated environment. All of New Naval's services are supported by experienced and trained personnel.

Equipment Services include:

- Equipment Rental

- Equipment, Logistics and Commissioning

- Post-Operation Maintenance

- Maintenance Scheduling & Service Plan

A variety of pre-packaged, containerized scenario-based systems are available including:

- Pumping/Transfer Operations Container

- Offshore Containment & Recovery Container

- Nearshore/Port Response Container

- Shoreline Response Container

- On-Shore Response Container

- Dispersant Container

- Command Station Container

- Consumables & Support Container

For Oil and Gas use, DNV Offshore Certified 10' or 20' containers are available depending on client requirements…"

3.3.4 MEKE MARINE (Turkey)

Company	Contacts
MEKE Atık Toplama ve Deniz Temizliği San. Tic. A.Ş. Cumhuriyet Cad. Sark Apt. No: 1/4 Taksim 34437 Beyoğlu, İstanbul http://www.mekemarine.com/Home	Tel: +90 444 63 53 Fax: +90 212 293 43 20 E-mail: info@mekemarine.com 7/24 EMERGENCY RESPONSE LINE +90 444 MEKE (6353) +90 532 287 22 20 +90 533 688 10 11

Within the scope of Law on Protection of the Sea and Environment from Oil and Other Hazardous Substances numbered 5312, we provide our services with our expert team, a large fleet and our products to the shoreline facilities such as ports, shipyards, refineries and marinas. The services supplied by the company rendering service in the sector for long years are:

Oil spill response at sea / at nearshore / on land

Pipeline spill response

Dangerous waste collection and management at sea and on land

Manufacture of Oil and Chemical Spills Emergency Response Vessels and Equipment

Open sea services

Preparation of emergency plans and risk analysis for shoreline facilities

Preparation of Sensitive Zone Maps

Preparation of Geographical Response Plans

Trainings for Managers and Response teams

Expansion Modeling, MekeSlik ®

Technical consulting

Emergency Management

3.3.5 MAVI DENIZ (Turkey)

Company	Contacts
Bağdat cd Yeni Turku Sk No: 12 Guzelyalı, Pendik, Istanbul – Turkey 34903 https://mavideniz.com.tr/	Tel +90 216 392 41 43 Tel +90 216 392 14 04 Fax +90 216 392 47 00 E-mail: info@mavideniz.com.tr Emergency Response 24/7 Mail: emergency@mavideniz.com.tr Tel +90 533 460 38 66

Mavideniz provides a response, dredging, training, and consultancy services. Also dealing with the effects of pollution from hazardous, and noxious substances such as oils, chemicals, aquatic weed, algae, and mud sediments. With a wide range of experience in coastal, harbor and offshore operations.

3.3.6 OSRA INTERNATIONAL Ltd (Malta)

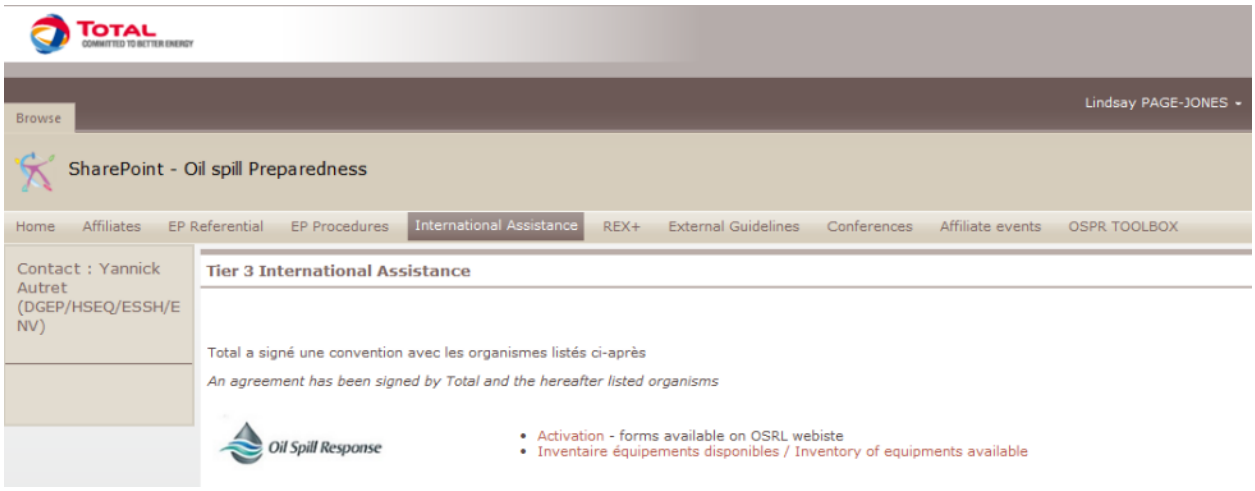
Company	Contacts
Commercial Office (Malta HQ) KW14, Kordin Industrial Estate, PLA3000 Paola, Malta	E-mail: commercial@osraint.com Tel :+356 21380941 Contact: Sandro Sammut (Director) Emergency response line +356 99666 000
East Mediterranean Office (Greece) Iroon Polytechniou 2, Neo Ikonio (Πολυτεχνείου, 2, Νέο Ικόνιο) Perama (Πέραμα), Greece	E-mail: response@osraint.com Tel: +30 21045 18200 Contact: Paul Xiradakis

OSRA International is (…) a regional environmental and emergency response service provider for the Mediterranean region. We offer an end-to-end Mediterranean region solution under one agreement, one tariff and through one emergency phone number. We are present from the Straits of Gibraltar to the Suez canal. We are capable of offering our Services in-country as well as to multi-national operations which benefit from a cost-effective Mediterranean solution

4. INTERNATIONAL ASSISTANCE

4.1 Total Group resources

Oil Spill Response collaborative website



For updated information on resources available from Total other affiliates, and activation procedure for external resources, consult the Oil Spill Response collaborative website:

http://lutte-antipollution.ep.corp.local/sites/oil-spill/SitePages/Welcome.aspx

http://collaboratif.ep.corp.local/sites/lutteantipollution/default.aspx

FOST

FOST Office TOTAL SA Tour Coupole 26E55, 2, place de la Coupole La Défense 6 92078 PARIS La Défense CEDEX	Tel : + 33 (0)1.47.44.82.29 (office time) Fax : + 33 (0)1.47.44.62.05 E.mail : mail.fost@total.com
FOST Depot GIE FOST Quartier de la Tete Noire, Route Nationale 113 ROGNAC 13340	**Tel : + 33 (0)4.42.87.59.37 On Call 24/7** Fax : + 33 (0)4.42.87.59.38 E.mail : fost2@wanadoo.fr
General presentation of equipment of FOST. http://www.fost.total.com/fr/presentation/centre-de-materiel	
Detailed list of equipment of FOST http://www.fost.total.com/sites/fastoilspillteamfost/files/atoms/files/liste_materiel_fost_fr.pdf	

4.2 Technical advice (with contract/ agreement in place)

Oil Spill Response Ltd (U.K. / Bahrain) Lower William Street, Southampton SO14 5QE, United Kingdom www.oilspillresponse.com	**Europe, Middle East & Africa** **+44 (0)23 8033 1551** **Asia Pacific** **+65 6266 1566** **Americas** **+1 954 983 9880** E Mail : dutymanagers@oilspillresponse.com
CEDRE 715, rue Alain Colas, CS 41836, F 29218 BREST CEDEX 2 FRANCE	**Tel: +33 (0) 2 98 33 10 10 On Call 24/7** Fax: +33 (0) 2 98 44 91 38 E mail: contact@cedre.fr

4.3 Modelling/ Forecast (with contract/ agreement in place)

CLS (Collecte Localisation Satellites) ARGOS CLS - 11 rue Hermès - 31520 Ramonville - France Tel : +33 (0)5 61 39 47 15 Fax : +33 (0)5 61 39 47 97 E-mail : useroffice@cls.fr http://www.argos-system.org - http://www.cls.fr	**Yann BERNARD** Head of Environmental Monitoring Department Geopositioning & Data Collection Systems email : ybernard@cls.fr phone : +33 (0)5 6139 3909
SAT-OCEAN 53, Boulevard de la Reine, 78000 VERSAILLES, FRANCE	**Dr Xavier Vigan** (et **F. Olivier**) Tel.: +33 (0) 1 39 53 99 75 Cel.: +33 (0) 6 61 12 98 41 Fax: +33 (0) 1 39 53 98 06 Email: Xavier.Vigan@sat-ocean.com Email: franck.olivier@sat-ocean.com

4.4 OSRL (with contract/ agreement in place)

4.4.1 Technical advisor

A team of 5 advisors (from SORL) can be mobilized for the first 5 days free of charge.

ⓘ *File "tis-techadvisoryservice.pdf" in …\Vol Ops Support\OSRL Equipment & Mob Plan*

4.4.2 Response equipment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COMMAND EQUIPMENT 4
DISPERSANT SYSTEMS 5
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COLDER REGION COMPATIBILITY

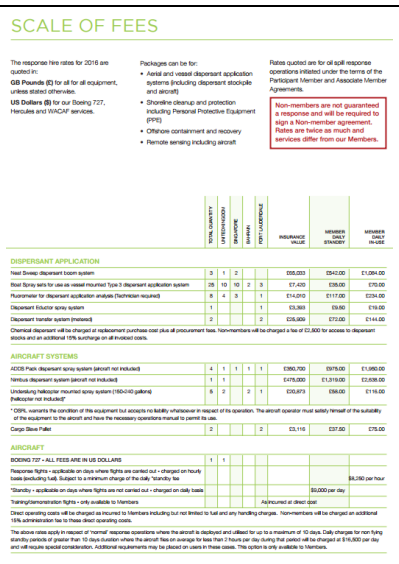
EQUIPMENT PAGES LEGEND

Logistical Requirement
Technical Complexity
Manpower

Equipment in 2018 (latest available)

ⓘ *File "2018-equipment-list-final.pdf" in …\Vol Ops Support\OSRL Equipment & Mob Plan*

Source: https://www.oilspillresponse.com


SCALE OF FEES

DISPERSANT APPLICATION

AIRCRAFT SYSTEMS

AIRCRAFT

Fees 2019 (latest available)

ⓘ *File "scale-of-fees-2019.pdf" in …\Vol Ops Support\OSRL Equipment & Mob Plan*

Source: https://www.oilspillresponse.com

4.5 Dispersant stockpiles

See:

🗎 *Operational Support n°4*

4.6 Dispersant providers

Provider of dispersants	Product	Capability
Total Fluides Speciaux TFS	FINASOL OSR 51 / 52	125 m^3 to max. 175 m3/ week
Dasic International	DASIC SLICKGONE NS	+/- 100 m3/week after 1 week ramp up.

4.7 Specialized equipment & response service providers

Ro-Clean Desmi
Head office of DESMI Ro-Clean A/S
Hestehaven 61, DK-5260 Odense S, Denmark
Phone: +45 65 48 16 10
Fax: +45 65 48 16 15
E-mail: Denmark.ro-clean@desmi.com

Vikoma International Ltd
Kingston Works, Kingston Road, East Cowes, Isle of Wight, PO32 6JS. UK
Tel: +44 (0)1983 200560
Fax: +44 (0)1983 200561
email: sales@vikoma.com
Reg. England & Wales No: 3015615

Lamor Corporation UK Ltd.
3 Medina Court, Arctic Road, Cowes, Isle of Wight, PO31 7XD, UNITED KINGDOM
Tel: +44 1983 280 185 Fax: +44 1983 280 056
Email: info@lamor.com

Le Floch Dépollution
ZA de Pen Prat, 29600 SAINTE-SEVE, FRANCE
PO Box: BP 97371 - 29673 MORLAIX – FRANCE
Standard : +33 (0)2 98 15 11
Fax : +33 (0)2 98 15 11 14
Tel : 00 33 6 64 64 58 53 on call 24/7

Breamer Howells Ltd
The MPSC, Miford Haven, SA 73 3AQ, Pembrokeshire – U.K.
Standard : +44 (0)164 66 97 041
Fax : +44 (0)164 66 63 705

NRC
Witan Court, 304 Witan Gate, Witan Gate West, Milton Keynes, MK9 1EJ
www.nrcc.com

SWIRE
Swire Emergency Response Services (Pte) Limited
3rd floor, Office Block B, Mazaya Centre
Sheikh Zayed Road, Dubai, U.A.E.
Web: www.swire-ers.com
24/7 Hotline Pollution : +971 50 6564 900
24/7 Hotline Sauvetage: +65 6309 3699

4.8 Tools & PPE providers

France Sécurité Rue Alain Colas 29218 BREST Cedex 1 +33 2 98 80 25 35 http://www.france-securite.fr	Contact with Total
Groupe RG 74, rue du docteur Lemoine 51100 Reims +33 03 26 02 24 28 http://www.groupe-rg.com	Contact with Total
Mabéo 18 avenue Arsène d'Arsonval 01000 Bourg-en-Bresse +33 4 74 45 75 75 http://www.mabeo-industries.com	
44 Rue des Forges 13010 Marseille +33 4 91 78 74 55 http://www.workstore.com	

4.9 Oiled wildlife

SEA ALARM Rue du Cyprès 7-B10, 1000 Brussels, Belgium www.sea-alarm.org www.oiledwildlife.eu	**Hugo Nijkamp** T. +32.2.2788744 F. +32.2.5027438 M. +32.494900012 Email: nijkamp@sea-alarm.org Skype: hugo.nijkamp **Saskia Sessions** Senior Technical Adviser Tel: +32 2278 8744 Mobile: +32 499 624 772 Email: saskia@sea-alarm.org Skype: sea.alarm

5. DOCUMENTS & INFORMATION

5.1 General documentation

IMO - http://www.imo.org/

FIPOL - http://fr.iopcfund.org/index.html

IPIECA - http://www.ipieca.org/

ITOPF - http://www.itopf.com/

NOAA Office of Response & Restoration - http://www.response.restoration.noaa.gov/index.html

5.2 Mapping & satellite images

Bing Map - https://www.bing.com/maps/

Google Earth - http://earth.google.com/

5.3 Environment

International Bird Rescue Research Centre - http://www.ibrrc.org/

United Nations Environment Program World - http://www.unep-wcmc.org/

5.4 MetOcean conditions

NOAA - http://polar.ncep.noaa.gov/waves/index2.shtml

Windy.com: Wind, wave, precipitation, temperature, pressure etc. global model: https://www.windy.com

Earth, a global model of wind, waves and currents - https://earth.nullschool.net/

Windguru for Beirut: https://www.windguru.cz/173

OIL SPILL CONTINGENCY PLAN
OPERATIONAL SUPPORT N°12:
EMERGENCY DIRECTORY

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	Date	Description
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
0	**INTRODUCTION**	Purpose & Scope, relation with other emergency documents, Distribution list, Content of the OSCP, Internal & external related documents, Definitions, abbreviations.	All
	ACTION PLANS	**Object**	**Users**
1.1	**TEP Liban TIER 2 & 3 ACTION PLAN**	"Who does what?" during a Tier 2 or 3 oil spill: • Response organizations. • Immediate actions (alert, notification and mobilisation). • Spill management & Job tickets.	CMT, IMT & Local IC Post (Tier 2 & 3)
1.2	**DRILLING UNIT ACTION PLAN**	"Who does what?" on the drilling rig during a spill.	Local IC Post on drilling unit
1.3	**LOGISTICS BASE GUIDANCE PLAN**	"Who does what?" at the logistics base during a spill.	Local IC Post at logistics base
	OPERATIONAL SUPPORTS	**Object**	**Users**
1	**OILS AND PRODUCTS**	Characteristics of hydrocarbon products which could be involved in a spill.	IMT
2	**FACILITIES**	Description of Lebanon and facilities for the drilling campaign: Drilling unit, helicopters, supply vessels, location maps.	IMT
3	**FATE AND BEHAVIOUR OF OIL AT SEA**	MetOcean conditions. Fate & behaviour of hydrocarbon products when spilled at sea. Modelling key results.	IMT, Local IC Post
4	**OFFSHORE SPILL MONITORING & RESPONSE STRATEGIES AND COORDINATION**	Offshore monitoring & modelling, response tactics for instantaneous spills & blow-outs: mechanical mixing, containment & recovery, subsea dispersant injection. Coordination of operations for Tier 2 & 3 spills. Mobilisation of external assistance.	IMT
5	**OFFSHORE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for offshore response. Containment and recovery operations.	IMT, Local IC Post
6	**USE OF OFFSHORE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of offshore response equipment and monitoring/ evaluation/ modelling tools.	Local IC Post
7	**SHORELINE SPILL SURVEY & RESPONSE STRATEGIES AND COORDINATION**	Oiled shoreline surveys. Shoreline protection and clean-up techniques. Waste management recommendations. Coordination of operations for Tier 2 & 3 spills.	IMT
8	**SHORELINE SPILL RESPONSE TACTICS AND SITE COORDINATION**	Safety for shore protection and clean-up. Oiled shoreline surveys. Shoreline clean-up protection and operations on site.	IMT, Local IC Post
9	**USE OF SHORELINE MONITORING & RESPONSE TOOLS/EQUIPMENT**	Instructions for deployment and use of shore response equipment and shoreline survey (SCAT).	Local IC Post
10	**COASTAL SENSITIVITY ATLAS**	Coastal Sensitivity Maps & priority sites for protection.	IMT
11	**INVENTORY OF OIL SPILL RESPONSE EQUIPMENT**	Inventory of TEP Liban response resources and those available in country, in Mediterranean region and internationally.	IMT
12	**EMERGENCY DIRECTORY**	Lists of emergency contacts for oil spill.	IMT
13	**FORMS & TEMPLATES**	Forms & templates	IMT

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1. NATIONAL EMERGENCY CONTACTS FOR NOTIFICATION

Notification and form is only sent to JMOC. As per the NOSCP, JMOC cascades to the other entities.

Additional calls may be passed by TEP Liban to DGLMT, LPA and MoE to ensure notification is timely received and understood.

DEPARTMENT	CONTACT DETAILS	CONTACT PERSON
Joint Maritime Operations Chamber (JMOC)	navy.lb@army.gov.lb +9611983458 / +96170973797	Responsible person in the operations chamber
Lebanese Air Forces*	afoperations@army.gov.lb	Col. Boutros *Always copy LAF in notification emails to JMOC
Lebanese Petroleum Authority (LPA)	Lebanese Petroleum Administration Marfaa, 200 Building – First Floor Georges Akouri Street Beirut, Lebanon Tel: +961 1 998 780 Fax: +961 1 998 781 info@lpa.gov.lb assem.abouibrahim@lpa.gov.lb	Assem Abou Ibrahim Darine Mawla Grace Rachid
Ministry of Public Works and Transport – DGLMT (Directorate General of Land and Maritime Transport)	Ministry of Public Works and Transport, Directorate General of Land and Maritime Transport Starco Building, 3rd Floor Beirut, Lebanon Tel: +961 1 371 644/645 Telefax: +961 1 371 647	Eng. Abdel Hafeez KAISSI Director General of Land and Maritime Transport Cell: +961 3 312 385
Ministry of Environment (MoE)	Ministry of Environment Mid-Town – Lazarieh Building Block A 4 7th Floor (Room 7-49) P.O. Box 11/ 2727, Beirut Tel: +961 (1) 976 555 ext 412 Telefax: +961 (1) 976 512	Mr. Georges BERBARI Chief of Service of Regional Departments and Environmental Police Cell: +961 (3) 029 547

GENERAL NATIONAL EMERGENCY PHONE NUMBER

CIVIL DEFENCE	125
GENERAL SECURITY	1717
DOCTORS AT HOME	01 444400
ELECTRICITY OFFICES	01-571671
TELEPHONE DIRECTORY	120
INTERNATIONAL CALLS	100
AIRPORT	150
PORT OF BEIRUT	01 580211
POLICE	**112**
• Achrafieh	01 422000
• Baabda	05 920152
• Beirut	01 300575
• Jounieh	09 917000 - 09 930302
• Tripoli	06 430950
FIRE BRIGADE	**175**
• Bachoura	01 655 111
• Beirut	01 445000
• Jounieh	09 931725
• Sidon	07 720061
• Tripoli	06 431017
• Zahle	08 822222

2. NATIONAL AUTHORITIES & ORGANIZATIONS FOR OIL SPILL RESPONSE

	ROLE IN RESPONSE	Address	Contact details	Names/ Contacts
Lebanese Petroleum Authority (LPA) Within Ministry of Energy & Water	• NOSIC for offshore spills from oil E&P activities. • Responsibility for management of Tier 3 oil spill response. • Member of ICAG if not acting as NOSIC	Marfaa, 200 Building – First Floor Georges Akouri Street Beirut, Lebanon	Tel: +961 1 998 780 Fax: +961 1 998 781 info@lpa.gov.lb	Mr. Assem Abou Ibrahim, Head of QHSE Unit, Tel: 01-998780
DGLMT (Directorate General of Land and Maritime Transport) Within Ministry of Public Works and Transport	• Conducts Tier assessment with MOE • Transfers command to a suitable NOSIC in consultation with the Affected Ministry • Liaises with the relevant Sectoral Center within the Affected Ministry. • Assumes the role of NOSIC for spills in the public maritime domain (i.e. spills from shipping, shore side facilities, ports, from unknown sources, and originating from outside Lebanese waters). • Responsibility for the management of Tier 3 oil spill. • Member of ICAG if not acting as NOSIC.	Starco Building, 3rd Floor Beirut, Lebanon	Tel: +961 1 371 644/645 Fax: +961 1 371 647	Eng. Abdel Hafeez KAISSI Director General of Land and Maritime Transport Cell: +961 3 312 385
Ministry of Environment (MoE)	• Member of ICAG • When notified by JMOC conducts a Tier assessment with MOPWT-DGLMT. • Dispersant use approval process	Mid-Town – Lazarieh Building Block A 4 7th Floor (Room 7-49) P.O. Box 11/ 2727 Beirut, Lebanon	Tel: +961 (1) 976 555 ext 412 Fax: +961 (1) 976 512	Mr. Georges BERBARI Chief of Service of Regional Departments and Environmental Police Cell: +961 (3) 029 547

OIL SPILL CONTINGENCY PLAN
OPERATIONAL SUPPORT N°13:
FORMS & TEMPLATES

Level	General & Transverse
Type	Plan
Department	HSE

Rev.	**Date**	**Description**
00	01/10/2019	First published

Prepared By	Checked By	Approved By
		

		Object	Users
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13	**FORMS & TEMPLATES**	Forms & templates	IMT

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Markings:

/!\ Warning

🗎 *Link to other documents of the TEP Liban OSCP*

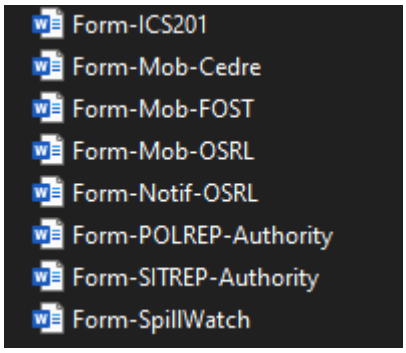
ⓘ *Link to external document or information, not part of the TEP Liban OSCP*

1. FORMS

See next pages.

All forms are available as independent files without header and footer in:

ⓘ *…\Vol Ops Support\Op Sup 13 Doc*



1.1 TEP Liban internal oil spill notification form

TEP LIBAN INTERNAL HYDROCARBON RELEASE NOTIFICATION FORM						
TO	**FROM**			**NOTIFICATION**		
TEP Liban Duty Officer	**Name:** …			**Notification ref:** …		
Tel: +	**Tel:** …			**Date:** …		
Email:	**Mail:** …			**Time:** …		
SEVERITY LEVEL (CRUDE OIL)						
☐ **TIER 1**	☐ **TIER 2**			☐ **TIER 3**		
INCIDENT DESCRIPTION						
Origin of spill						
Cause of spill						
Volume spilled (m3)						
Hydrocarbon spilled	Crude oil | Condensate | Marine Gas Oil | Drilling mud Other (specify) :					
SPILL DESCRIPTION						
Observation by	Rig | Vessel | Helicopter | Quayside | Land observer Other (specify) :					
Time of spill start	Date :			Time :		
Localization	Latitude :			Longitude :		
Slick dimension (m)	Width :			Length:		
Appearance at sea (BONN code)	Silver sheen %	Rainbow %	Metallic %	True colour discontinuous %	True colour continuous %	Other, specify mm %
Appearance on land						
WEATHER CONDITIONS ON SITE						
Sea conditions						
Wind	Direction *blowing from*:			Speed (Knot):		
Current	Direction *flowing to*:			Speed (Knot):		
MEASURES TAKEN						
☐ Source control	☐ Aerial surveillance		☐ Mechanical dispersion	☐ Other:		
☐ Chemical dispersion	☐ Contain't & Recovery		☐ Other:	☐ Other:		
RESOURCES USED						
Monitoring	Vessel | Helicopter | Drifting buoy | Sampling | Others:					
Mechanical mixing	Vessel:					
Containment & recovery	Vessel: Equipment deployed:					
Port operations	Equipment deployed:					
Others						

1.2 National authorities POLREP oil spill notification form

Source: Lebanese NOSCP VOLUME D SUPPORTING DOCUMENTS, V.2017

Spill report form “POLREP” is used to report spills to JMOC (extract from NOSCP 2017, Vol D. Annex 3 Forms).

Refer to TEP Liban oil spill alert and notification procedure in:

OSCP – VOL 1.1 TEP Liban ACTION PLAN FOR TIER 2 & 3 SPILLS

Guidelines to fill in the POLREP are provided after the table below.

/!\ It is reminded that all cells cannot be filled at the initial stage of the incident.

From	**François Bourillon, HSE Manager**, TEP Liban, Office: + 961 (0) 1 609923 Mobile: 961 (0) 70 582683 Mail: francois.bourrillon@total.com
To	**JMOC & LPA**
1. Date and Time	
2. Position	
3. Incident	
4. Outflow	
5. Position and/or extent of pollution on the sea	
6. Characteristics of pollution	
7. Source and cause of pollution	
8. Wind direction and speed	
9. Current direction and speed and/or tide	
10. Sea state and visibility	
11. Drift of pollution	

12. Forecast of likely effect of pollution and zones affected.	
13. Identity of observer/ reporter. Identity of ships on the scene	
14. Action taken	
15. Photographs or samples	
16. Names of other states and organizations informed	
17. Other information	
18. Request for assistance	
19. Cost	
20. Pre-arrangements for the delivery of assistance	
21. To where assistance should be rendered and how.	
22. Acknowledge	

Guidelines

From	
To	
1. Date and Time	*The day of the month as well as the time of the day that the incident took place or, if the cause of the pollution is not known, the time of the observation should be stated using 6 digits. It should be stated in GMT.*
2. Position	*Indicates the main position of the incident, the longitude and latitude in degrees and minutes, and may, in addition give the bearing of and the distance from a location known by the receiver.*
3. Incident	*The nature of the incident should be stated here, such as blowout, tanker grounding, tanker collision, oil slick etc.*
4. Outflow	*The polluting substance, such as crude oil, as well as the total quantity in tonnes of the outflow and/or the flow rate, and the risk of further outflow should be mentioned. If there is no pollution, but a threat of pollution, the words NOT YET followed by the substance should be stated.*
5. Position and/or extent of pollution on the sea	*Indicates the main position of the pollution in degrees and minutes of latitude and longitude, and may in addition give the distance and bearing of some prominent landmark known to the receiver if other than indicated in number 2. Estimated amount of pollution (e.g. size of polluted areas, number of tonnes of oil spilled if other than indicated in number 4)*
6. Characteristics of pollution	*Gives type of pollution and a description e.g. type of oil, viscosity, pour point etc.*
7. Source and cause of pollution	*Indicates the source of pollution e.g. from a vessel or other undertaking. If from a vessel, it should be notified whether the pollution is a result of a deliberate discharge or casualty. If the latter a brief description should be given. Where possible the name, type, size, call sign, nationality and port of registration of polluting vessel should be mentioned. If the vessel is proceeding on its way, course, speed and destination should be indicated.*
8. Wind direction and speed	*Indicates wind direction and speed in degrees and in m/sec. The direction always indicates from where the wind is blowing.*
9. Current direction and speed and/or tide	*Indicates current direction and speed in degrees and knots and tenths of knots. The direction always indicates the direction in which the current is flowing.*
10. Sea state and visibility	*Sea state indicates the wave height in meters. Visibility should be indicated in nautical miles.*
11. Drift of pollution	*Indicates drift course and speed of pollution in degrees and knots or tenths of knots.*
12. Forecast of likely effect of pollution and zones affected.	*Results of mathematical models could indicate e.g. arrival on beach with estimated timing.*
13. Identity of observer/reporter. Identity of ships on the scene	*Identifies who has reported the incident. If it is a ship, the name, home port, flag and call sign must be given. Ships on scene could also be indicated under this item by name, home port, flag and call sign, especially if the polluter cannot be identified and the spill is considered to be of recent origin.*
14. Action taken	*Mentions action taken for the disposal of the pollution.*
15. Photographs or samples	*Indicates if photographs or samples from the pollution have been taken. Contact numbers (including telephone numbers, email address, telefax, and telex numbers as appropriate) of the sampling authority should be given.*
16. Names of other states and organizations informed	
17. Other information	*For example results of sample or photographic analysis, results of inspections or surveyors, or statements of ship's personnel.*
18. Request for assistance	*Type and amount of assistance required in form of specified equipment, trained personnel.*
19. Cost	*Information on cost of delivered assistance to be notified to requested country.*
20. Pre-arrangements for the delivery of assistance	*Information concerning customs clearance, access to territorial waters in the requesting country.*
21. To where assistance should be rendered and how.	*Information concerning the delivery of the assistance, e.g. rendezvous at sea with information on frequencies to be used, call sign and name of On-Scene Commander of the requesting country or land based authorities with contact numbers and contact persons.*
22. Acknowledge	*When this number is used the telex/telefax/email should be acknowledged as soon as possible by the competent national authority.*

1.3 National authorities oil spill update form “SITREP”

Use the form provided below (or update the POLREP form).

MARINE POLLUTION SITUATION REPORT – SITREP	
Situation report	
Date:	Time:
SITREP n°:	Priority: Urgent | Immediate | Standard
Final SITREP? Y / N	Next SITREP on:
Notification reference (from): François Bourillon, HSE Manager, TEP Liban, Office: + 961 (0) 1 609923 / Mobile: 961 (0) 70 582683 Mail: francois.bourrillon@total.com	
Situation report prepared by	
Name:	Tel:
Company: TEP Liban	Mail:
Position:	Fax:
Incident update details	
Name:	Location Lat / Lon:
Brief Description of Incident and Impact	
Overall Weather conditions	
Summary of Response Actions to Date	
Current strategies	
Summary of Resources Available/ Deployed	
Agencies involved	
Expected Developments	
Other information	
Attachments?	Nb of pages attached:

1.4 SPILLWATCH Activation form

Requester information				
Name of subsidiary	**Total E&P Liban**			
Contact person / Function	**François Bourrillon / TEP Liban HSE Manager**			
Contact phone (Office)	**+ 961 (0) 1 609923**			
Contact phone (Mobile)	**+ 961 (0) 70 582683**			
Contact e-mail	**francois.bourrillon@total.com**			
Contact fax	**N/ A**			
Distribution list (Name/function/email)	*Reports to be send to :*			
Contact in CMC	*Name and Phone* **Same as above**			
Approved by (Call Out Authority)	**TEP Liban General Manager**			
Event details				
Type of Spill event	**X** *crude oil*	☐ *refined crude*	☐ *condensates*	☐ *chemicals*
Details on the event	*Date*	*(i.e. day/month/year)* **XX / XX / XXXX**		
	Event Local Time	**XXh XX Local Lebanese time**		
	Country	**Lebanon**		
	Position	**LAT : …° …' …" North** *(WGS 84)*	**LON: …° …' …" E** *(WGS 84)*	
	Depth (m)	**….** *deep (If subsea installation)*		
	Site / Block	**Block 4**		
	Source	☐ *Ship*	**X** *Offshore platform*	
		☐ *Pipeline*	☐ *Subsea installation*	
		☐ *Well blow out*	☐ *Continuous release*	
	Name of Well/Platform….	**Well: ….**		
	Release type **X**	☐ *continuous*	☐ *instantaneous*	
	Quantity (estim.)	**…** *m³*	☐ *tons*	☐ *m³ per hour* **……**
	Oil characteristics (density at minimum + as much as available)	*Density* **…** *Viscosity* **…** *Pour point* **…** *Wax content* **…** *Asphalten* **…**		
	Meteorological info onsite	*Current*	*Direction to* **…°**	*Speed* **… kts**
		Wind	*Direction from* **….°**	*Speed* **… kts**
		Water temperature	**…** *°C*	
		Air temperature	**…** *°C*	

1.5 OSRL Notification (Source OSRL, July 2018)

OSRL Notification Form (Initial Incident Information)

Warning! Please telephone the Duty Manager before e-mailing or faxing this form

To	Duty Manager		
OSRL Base	**Southampton, UK**	Loyang, Singapore	Fort Lauderdale, USA
Telephone	**+44 (0)23 8033 1551**	+65 6266 1566	+1 954 983 9880
Emergency Fax	**+44 (0)23 8072 4314**	+65 6266 2312	+1 954 987 3001
Email	dutymanagers@oilspillresponse.com		

Guidance: This information will be used to develop and recommend the most appropriate response strategy. If new information should become available, or the situation changes, please inform the Duty Manager as soon as possible.

Section 1 – Contact Details				
Member Company	**Total E&P Liban**			
Name of Person Notifying OSRL				
Job Title (Designation)				
Direct Phone Number	Country code	**+961**	Number	
Mobile Number	Country code	**+961**	Number	
Fax Number				
Email Address				
Command Centre Address	**TEP Liban** **Regus Mathaf – Building Le Bureau, 4th floor,** **Pierre Gemayel Street,** **Beirut, LEBANON**			
Date and Time of Notification	Date and Time		Time Zone	Eastern European Time (EET) +0200 UTC

Section 2 – Location					
Country / Region of Spill	**Republic of Lebanon**				
Latitude of spill (north/south)					
Longitude of Spill (east/west)					
Area Affected	☐ Offshore	☐ Subsea	☐ Shoreline	☐ Estuary	☐ Other
	☐ Port	☐ Harbour	☐ Inland	☐ River	
Water Depth (if applicable)					

See next page.

Section 3 – Spill Details						
Date and Time of Spill					Time Zone	Eastern European Time (EET) +0200 UTC
Source of Spill						
Cause of Spill						
Status of Spill		☐ Secured		☐ Uncontrolled		☐ Unknown
Product Properties	Product Name / Type					State Units **Provide an assay sheet if available.** ☐ **Assay sheet provided**
	Specific Gravity		API			
	Pour Point					
	Wax Content					
	Asphaltene	N/A				
	Sulphur Content	N/A				
	Viscosity		Reference Temperature			
Type of Release	Instantaneous Release	☐	Volume			State Units
	OR					
	Continuous Release	☐	Release Rate			

See next page.

Section 3 – Spill Details continued			
Description of Observed Spill	Estimated Quantity		State Units
	Size		
	Appearance		
	Direction of Travel		

Section 4 – Weather and Modelling				
Weather forecast provided? e.g. Excel/Word	☐ Yes	☐ No, OSRL to source a weather forecast		
Sea Temperature				State Units
Sea State				
Visibility				
Cloud Base				
Do you require Oil Spill Trajectory Modelling?	☐ Surface 2D	☐ Sub-surface 3D Additional time and costs apply		☐ Not at this time
Sub-surface 3D Modelling Information if requested	Gas to Oil Ratio	Sm^3/m^3	Release Hole Diameter	m

Section 5 – Safety and Security		
Highlight any known safety or security risks e.g. high levels of H_2S, high risk country		☐ Not Applicable
Describe security arrangements for OSRL staff		☐ Not Applicable

Section 6 – Resources at Risk (if available)		
Environmental or socio-economic sensitivities that may be impacted. Provide the relevant oil spill contingency plan and sensitivity maps if available.		☐ **Contingency plan included** ☐ **Sensitivity maps included**

Section 7 – Equipment (if available)	
Equipment already deployed or being mobilised (other than OSRL resources)	

Section 8 – Further Information

1.6 OSRL Mobilization Authorization (Source OSRL, July 2018)

Mobilisation Authorisation Form

Please do not hesitate in contacting the duty manager at the earliest opportunity in the event of an incident or potential incident. Please ensure you telephone the Duty Manager before e-mailing or faxing this completed form.

Safety and Security

Oil Spill Response Limited's safety policy requires us to work closely with the mobilising party to ensure all aspects of safety and security are addressed for our personnel.

To	Duty Manager		
OSRL Base	**Southampton, UK**	Loyang, Singapore	Fort Lauderdale, USA
Telephone	**+44 (0)23 8033 1551**	+65 6266 1566	+1 954 983 9880
Emergency Fax	**+44 (0)23 8072 4314**	+65 6266 2312	+1 954 987 3001
Email	dutymanagers@oilspillresponse.com		

Details of Authorised Contact				
Incident Name				
Mobilising Company	**Total E&P Liban**			
Name of Person Authorising OSRL	**Call-Out Authority**			
Position of Authorising Representative				
Direct Phone Number	Country Code	+961	Number	
Mobile Number				
Fax Number				
Email Address				

Invoice Address if available	**TEP Liban** **Regus Mathaf – Building Le Bureau, 4th floor,** **Pierre Gemayel Street,** **Beirut, LEBANON**
Purchase Order Number	

I, the above named Authorising Representative for the Mobilising Company, approve activation of Oil Spill Response Limited and its resources in connection with the above incident under the terms of the Agreement in place between the above stated Company and Oil Spill Response Limited.

Signature:		Date / Time:		

See next page.

If Oil Spill Response Limited personnel are to work under another party's direction please complete details below:

Directing Party's Details	
Company	**N/A**
Contact Name	**N/A**
Position in Incident	**N/A**
Direct Phone Number	**N/A**
Mobile Number	**N/A**
Fax Number	**N/A**
Email Address	**N/A**

1.7 Cedre Mobilization

LETTRE D'ACTIVATION DU CEDRE

Destinataire CEDRE – Ingénieur d'Astreinte

Numéro de fax: **02.98.44.91.38** (Tél. + 33 2 98 33 10 10)

Mail : contact@cedre.fr

Nom: *Ingénieur d'astreinte du Cedre*

Expéditeur

TEP Liban

Regus Mathaf – Building Le Bureau, 4th floor,

Pierre Gemayel Street, Beirut, LEBANON

Call out authority : ……

N° tél. direct :

N° Fax :

E-mail :

Date :

Nombre de pages : 1

Réf. Convention TOTAL S.A. – CEDRE (projet du 16/07/03)

Madame, Monsieur,

Suite à l'appel téléphonique de M. / Mme …….. de TEP Liban, le …….. …. je vous confirme la demande d'une assistance à l'IMT à distance/ Locale du CEDRE suite à (description accident).

Nous souhaitons que le CEDRE soit présent à distance / à Beyrouth (date) afin d'apporter conseils et expertise en matière de …….

Le point de contact pour le CEDRE au sein de l'IMT sera M / Mme …….

joignable au ……

La durée de l'intervention du CEDRE est estimée à l'heure actuelle à un minimum de …… et sera réévaluée quotidiennement en fonction de l'évolution de la situation.

En vous remerciant par avance de votre assistance,

A ……, le ……,

Nom : Signature :

Date :

1.8 FOST Mobilization request

CONFIRM FOST ASSISTANCE

Destinataire / To FOST	
Nom / Name	**FOST Manager** mail.fost@total.com
Numéro de Fax / Fax Numbe	**+ 33 (0)4.42.87.59.37 On Call 24/7**
Expéditeur / From	
Nom / Name	…….
Département / Department	
Ligne Directe / Direct Phone	
Numéro de Fax / Fax number	
E-mail	
Date Nombre de pages / Number of pages	

Dear Sir,

I am writing to confirm our request for assistance from FOST in order to deal with (description of accident).

We would like FOST equipment listed in the annex to this letter to be made available at on (date)_____. We have noted the terms and conditions that you sent us today and accept them unreservedly.

The FOST contact person will be Mr / Mrs _____ who can be reached on_____

Thanking you in advance for your kind assistance.

Adresse Postale : C/O TOTAL DTS/TM/ANT/ENV
Transports Maritimes – Sce Environnement & Lutte Antipollution
2, place de la Coupole – 92078 PARIS LA DEFENSE CEDEX
Tél : 33 (0) 1 47 44 82 29 – Fax : 33 (0) 1 47 44 62 05 – Télex : (042) 615 854

GIE F.O.S.T. – Siège Social :
Quartier de la tête noire – RN 113 – 13340 ROGNAC
Tél : 33 (0) 4 42 87 59 37 – Fax : 33 (0) 4 42 87 59 38
GIE FOST Groupement d'intérêt économique au capital de 1524 948€
RCS Aix Provence C 389 635 08

2. TEMPLATES

See next pages.

ICS 201 template form alone is available without header and footer in:

ⓘ *…\Vol Ops Support\Op Sup 13 Doc*

2.1 Incident Action Plan ICS 201 - Template for Oil Spill Response

Based on “ICS form 201, incident briefing (v2).pdf”, FEMA, July 2018

https://training.fema.gov/emiweb/is/icsresource/assets/ics%20forms/ics%20form%20201,%20incident%20briefing%20(v2).pdf

Total DG/PSR/HSE/GCA can provide the latest ICS forms – Refer to TEP Liban ERP 2019.

INITAL INCIDENT ACTION PLAN – OIL SPILL RESPONSE (ICS 201 template)	
INCIDENT NAME & REFERENCE	**DATE & TIME**
Name: Reference/ number:	Date start: Time start: Operational Period:
PREPARED BY	**APPROVED BY**
Name: Position: Date & time:	Name: Position: Date & time:
MAP / SKETCH OF SITUATION & PREDICTION	
(total area of operations, zoning of response operations, incident site/area, impacted and threatened areas, overflight results, observed wind and current, trajectories observed & forecasted, impacted shorelines, & other depicting situational status and resource assignment)	
SITUATION SUMMARY & HEALTH AND SAFETY BRIEFING	
(summary of situation, on-going & planned response operations, potential incident Health and Safety Hazards and measures)	
OBJECTIVES AND STRATEGIES FOR NEXT DAYS/ WEEK	
Description of response objectives in a succinct statement, and strategies to achieve the objectives.	

CURRENT & PLANNED MONITORING TACTICS FOR NEXT DAY(S)

Description of methods to monitor & model the spill with work/ action assignments.

Time:	Action:

CURRENT & PLANNED RESPONSE TACTICS FOR NEXT DAY(S) + RESOURCES NEEDED

Description of tactics and key resources (type and amount) engaged for the next day(s), and planned location.

Time:	Action:

RESPONSE & MONITORING TACTICAL MAPPING FOR NEXT DAY

Map here the zoning of operation for the next day: subsea, maritime, aerial, nearshore and on the shore.

CURRENT ORGANIZATION CHART

Display the EMT + Local Incident Command Posts & other facilities, with position, names & contacts details.

RESOURCES SUMMARY

Display the EMT + Local Incident Command Posts & other facilities, with position, names & contacts details.

Resource	Date/ time ordered	ETA	Arrived	Notes (location, assignment, status…)
			☐	
			☐	
			☐	
			☐	
			☐	
			☐	
			☐	
			☐	

ATTACHED DOCUMENTATION

If and when needed: weather forecast, waste management instruction, Health & Safety plan, etc. d.

2.2 Full Incident Action Plan for Tier 2 & 3 – List of ICS forms

The IAP for Tier 2 & 3 includes various ICS forms, detailed in the table below (ref. FEMA, 2017, U.S.A.).

Total DG/PSR/HSE/GCA can provide the latest ICS forms – Refer to TEP Liban ERP 2019.

KEY COMPONENT	FORM	TYPICAL CONTENT FOR OIL SPILL RESPONSE	PREPARED BY
Incident Objectives for operational period, usually 24 hrs.	202	- Incident information: Status and on-going response - MetOcean & weather information - Last assessments/ observations & predictions - Immediate / possible impacts (ref. PEARL approach) - Response objectives (ref. impacts identified with PEARL) - Duration of operational period (usually 24 hrs) - Strategy - IAP Table of contents	Incident Commander
Organization Assignment List or Chart	203, 207	- Full IMT organization chart with designated personnel, phone Nbr and back-up / rotational personnel - Full organization chart of Local Incident Command Post(s) and Logistical/ support locations	Resources Unit
Assignment List (tactics) for <u>each</u> division/ group	204	- Monitoring tactics, assignments per monitoring techniques - Recovery offshore tactics & assignments - Dispersant offshore tactics & assignments, etc. *Note. Offshore per group / type of operations. Division can be envisaged in case of spill on very large geographic area.* *Note. Onshore: per Division (geographical area)*.	Resources Unit
Incident Radio Communications Plan or Communications List	205, 205A	None oil spill specific.	Communications Unit
Medical Plan	206	None oil spill specific.	Medical Unit
Incident Maps		- Zoning of planned operations, aerial, maritime and subsea. - Latest slick observations (aerial), RADAR (interpreted), drifting buoys + sampling location - Weather forecast - Predicted drift of oil slick	Situation Unit
General Safety Message/Site Safety Plan	208	- Addition of specific safety measures on site.	Safety Officer
OTHER COMPONENTS	**FORM**	**TYPICAL CONTENT FOR OIL SPILL RESPONSE**	**PREPARED BY**
Air Operations Summary		- Planned aerial activities/ traffic - Aerial corridor in force in area of operations	Air Operations
Traffic Plan		- Planned traffic, routes, limitations etc.	Ground Support Unit
Decontamination Plan		- Instructions for decontamination of personnel offshore exposed to hydrocarbons (on vessels)	Technical Specialist

		- Instructions for decontamination for personnel onshore involved in the various types of shoreline clean-up and oily waste handling.	
Waste Management or Disposal Plan		- Instructions for the storage on vessels for the storage of rec. oil, and for the handling of oily waste on shore clean-up sites (reducing, sorting, temporary storage, accounting, transfer etc.). - Identification of intermediate storage sites and instructions for transport, +(pre-)treatment and final disposal.	Technical Specialist
Demobilization/ Deactivation Plan		- Instructions for the demobilisation & return of personnel, and for the demobilisation of equipment, check, inventory etc. and specific assessment for equipment to be returned to assistance providers.	Demobilization Unit
Site Security Plan		Depending on the area of operations.	Law Enforcement, Specialist, or Security Manager
Meeting Schedule	230	None oil spill specific.	Situation Unit

2.3 Example of GIS structure for a "Common Operating Picture"

Table below outlines the possible layers – to be adapted by TEP Liban – to set-up to build a GIS to manage all geographic information related to the incident and a selection of pre-incident information.

BASE MAPS	
BASELINE TERRESTRIAL INFORMATION	
	Capital
	City (Governorates & districts, coastal cities & villages)
	Main infrastructure
	River
	Lakes
	Coastline
	Railway
	Road
	Municipality (admin. bound.)
	District (admin. bound.)
	Region (admin. bound.)
	Countries boundaries
	Offshore boundaries
	Army camps/ base
	Restricted areas (no access/ no over flight)
	Place names
	Topography
BASELINE MARITIME INFORMATION	
	Port and maritime infrastructure (lock, dams, boat launch etc.)
	Navigable waterways
	Bathymetry
	Special areas (anchorage, precautionary, restricted, dredging etc.)
	Maritime traffic separation lines
	Aids to navigation
	Marine juridiction (national, EEZ, territorial)
	Nautical charts ("e" or raster)
BACKGROUND	
	"Public" satellite imagery (Google Earth, ESRI, others)
	"Public" street maps (Google, Bing, OpenStreetMap)
	Topographic maps ("e" or raster)
	Other satellite/aerial imagery (specific acquisition)
LIVE FEEDS	
NON INCIDENT SPECIFIC	
	Wind observations (FPSO, buoys)
	Current observations (buoys)
	Wind forecast (Link to Web Service?)
	Current forecast (Link to SPILWATCH/ SATOCEAN?)
	Waves/ swell forecast offshore (Link to Web Service?)
	Waves forecast onshore (Link to Web Service?)
	Tides predictions: height, time & currents (?) (Link to Web Service?)
	HF coastal RADAR imagery
NON INCIDENT SPECIFIC	
	Vessel Tracking system (AIS)
	Aircraft tracking system (SkyTrack)
	Vehicle tracking system (GPS)

NON INCIDENT SPECIFIC INFORMATION	
ENVIRONMENTAL SENSITIVITY	
	Priority Protection Sites (+ links to Protection Plan)
	Shoreline sensitivity to oil spill (ESI) per segment of coast
	Segment boundaries & labels (pre-SCAT) per segment of coast
	Shoreline type per segment of coast
	Coastal Character (type of backshore) per segment of coast
	Sensitive fauna (family) marine, coastal & terrestrial
	Season of fauna
	Fauna (class - area)
	National protected sites
	National protected areas
	International protected areas
	Vegetation classification
SOCIO-ECONOMIC SENSITIVITY	
	Priority Protection Sites (+ links to Protection Plan)
	Fishing village
	Fishing areas
	Harbour (commercial/ fishing/ marina)
	Tourism activities (beach/ aquatic sport/ hotel)
	Salt pans
	Water supply
	Water intake
	Archaeological sites
	Refugee camp
OIL SPILL LOGISTICS AND RESPONSE	
	Priority Protection Sites (+ links to Protection Plan)
	Hazard area, landmines (rough guide)
	Access to the coast/ sea (pedestrian, quad, 4x4, truck, boat)
	Boom deployment area
	Potential waste storage sites
	Shipwrecks
	Environmental, operational & logistical information on each segment of coast
	Pre-approved areas (dispersant, ISB)
EMERGENCY MANAGEMENT	
	Onshore facilities (accommodation, yard, medic, office)
	Shore emergency facilities (airport, police, embassy, FiFi, hotel, hospital)
	Shore critical facilities (power plants & lines)
	Radio coverage
	Resources available in the area for emergency
TEPC OIL E&P INFORMATION	
OFFSHORE INFRASTRUCTURES	
	Surface facilities (Rig, etc.)
	Subsea System (well etc.)
ONSHORE INFRASTRUCTURES	
	Facilities, terminal, storage
	Pipelines
	Refinery, production
GENERAL E&P INFRASTRUCTURES	
	Platforms (IHS)
	Wells (IHS)
	Fields IHS

	Pipelines IHS
	Blocks & operators
GALLERY	
	Photos
	Videos
INCIDENT LOCATION	
	Location of incident (LAT/LON, depth or altitude)
INCIDENT SPECIFIC OFFSHORE	
MONITORING	
	Aerial surveillance results (flight path)
	Aerial surveillance results (slick "envelope")
	Aerial surveillance results (remarkable way-points)
	Aerial surveillance picture
	ARGOS buoys
	Satellite imagery (slick "envelope")
	Satellite imagery
	Satellite imagery footprint
	Air quality monitoring (explo. & VOC) locations & results
	Dissolved oxygen (in water column - mg/L)
	Oil plume subsea observations (blow-out)
	Oil in water concentration (Fluorometer)
	Oil in water (Snare/ Sorbent/ VIPERS etc.) missions
	Oil in water (Snare/ Sorbent/ VIPERS etc.) results
MODELING	
	Slick drift prediction short-term (OSRA tool) - LINE
	Slick drift prediction short-term (OSRA tool) - PT
	Slick drift + extent prediction mid-term (SPILLWATCH)
	Oil plume subsea prediction for blow-out (SPILLWATCH)
	Dissolved dispersion modelling
	Atmospheric dispersion modelling
NATURAL RESOURCE DAMAGE ASSESSMENT/ SAMPLING	
	Oil at surface - sampling
	Water at surface - sampling
	Water deepsea - sampling
	Subsea sediment - sampling
	Benthic resources (seafood/ fish) - area of study/ abundance/ biodiversity
	Benthic resources (seafood/ fish) - sampling
	Water column species (fish) - area of study
	Water column species (fish) - sampling
	Marine mammals - area of study
	Marine mammals - sampling/ corpse collection
	Marine mammals or reptils - geo-tracking
OPERATIONS	
	Exclusion zone / restricted areas
	Zoning of marine operations planned (next day)
	Zoning of aerial operations planned (next day)/ done/ in progress
	ZONING OF MARINE OPERATIONS CARRIED OUT (KML/POINT) - OFF_OPERATIONS_MARINE_PT
	ZONING OF MARINE OPERATIONS CARRIED OUT (KML/LINE) - OFF_OPERATIONS_MARINE_LIN
	Key OSR resources tracking (skimmer, boom)
	Facilities OSR (ACP, staging areas, helideck, tanker, vessel, others)
INCIDENT SPECIFIC ONSHORE (SHORELINE, RIVER, LAKES, TERRESTRIAL)	

MONITORING	
	Aerial coastal surveillance (flight path)
	Aerial coastal surveillance (oiled coastline / river bank)
	Aerial coastal surveillance (oiled area)
	Imagery - interpretation of coastline or area impacted
	Imagery
	imagery footprint
	SCAT mission planned/ IP/ done per segment of coast
	SCAT results : daily oiling (heavy, mod, light, trace, 0) per segment of coast
	Oil sampling locations & results
MODELING	
	Coastal area and sensitive sites at risk
CLEAN-UP OPERATIONS	
	Shoreline Treatment recommendations per segment of coast
	Zoning of coast (divisions boundaries on the coast) per segment of coast
	Working areas planned/ done/ in progress per segment of coast
	Working sites planned/ done/ in progress (link to STR + SIS) per segment of coast
	Facilities (ACP, base camp, staging areas, large decon., heliport etc.)
	Waste storage sites (planned/ opened/ closed + Volume per type of waste) - for mapping
	Waste storage sites (planned/ opened/ closed + Volume per type of waste) - for statistic and archive
	Waste storage sites description
	Key resources tracking (skimmer, boom...)
	Main roads & tracks (to sites)
OILED WILDLIFE	
	Oiled wildlife areas at risk (nesting, breeding, spawning)
	Oiled wildlife observations (birds, reptiles, mammals)
	Oiled wildlife operations planned/ done/ in progress
	Oiled wildlife location & facilities
	Mammals / reptiles / Birds - geo-tracking
NATURAL RESOURCE DAMAGE ASSESSMENT/ SAMPLING	
	Water quality (sea, fresh/ground water) - sampling
	Sediment - sampling
	Nearshore submerged habitat (e.g. sea grass) - survey
	Nearshore submerged habitat (e.g. sea grass) - sampling
	Intertidal/shore habitat (e.g. beaches) - survey
	Intertidal/shore habitat (e.g. beaches) - sampling
	Coastal/ intertidal/ shore species (e.g. fish/ seafood/ marine mammals) - survey (abundance/diversity)
	Coastal/ intertidal/ shore species (e.g. fish/ seafood/ marine mammals) - sampling (tissue)
	Birds impacts – summary
	Birds - Survey (location/ abundance/ diversity)
	Human-use (fishery, subsistence, recreational, cultural, other) - survey
	Human-use (fishery, subsistence, recreational, cultural, other) - hot spots
RESTORATION	
	Restoration projects planned/ done/ in progress
	Past polluted areas
	Past restored areas
COMMUNITY OUTREACH	
	Information centre
	Claims for compensation office

	Fishing bans/ closures
	Shore/Beach closure

2.4 Stakeholder mapping in CMC - Example

Figure below is an example of stakeholder mapping for the CMC (Source: OTRA for Total E&P Bulgaria).

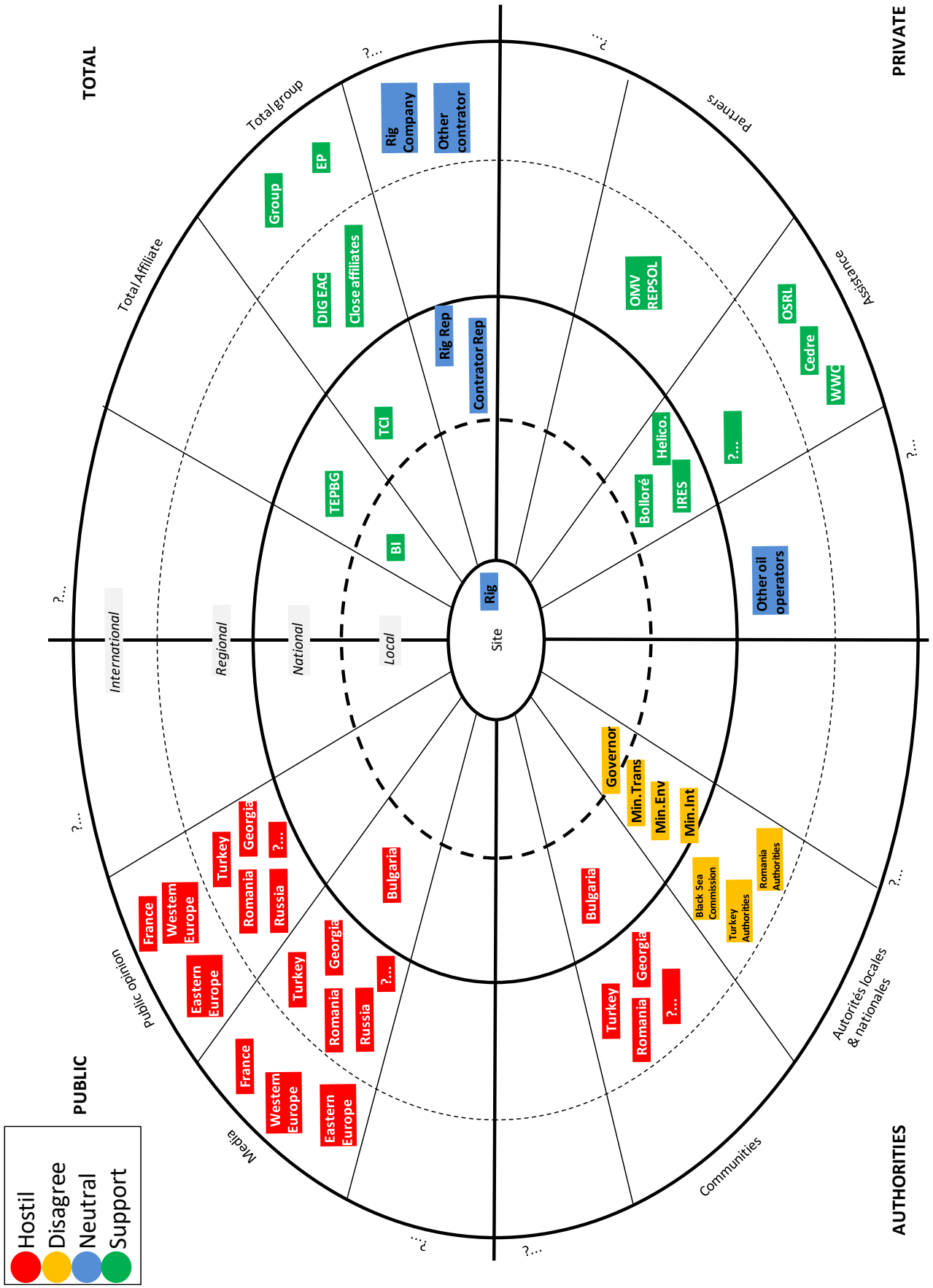


Figure 1 : Example of stakeholder mapping in CMC (TEP Bulgaria)

2.5 Press release

Press releases are the responsibility of the External Communication Officer, who prepares the following elements, to be validated by the GM:

- location of the spill on/around the facilities,
- date and time of the spill,
- type of incident,
- volume spilled,
- casualties,
- other risks/escalations: possible pollution drifting, fire / explosion, etc.
- mitigation measures taken for safety, pollution control, environmental protection, etc.
- pollution control resources deployed: internal, external companies, etc.
- anticipated measures planned and / or implemented.

Example of press release (Source: Total GM EP HSE 092) – to adapt:

TOTAL		Date : Page : /
From: Name: Address: Phone: Fax: E-mail:		**To:** Name: Address: Phone: Fax: E-mail:
Subject:		
Press release number :		
TOTAL E&P Liban indicates an oil spill on its facility ... .XXXXX. The leak was detected on the ... (specify the sector / exact site) ..... to ..... (Time) that day (specify date). This incident caused XXXX .... wounded and generated. ... .. (Fire risk and explosion / a site pollution / contamination of the water). All safety measures have been implemented soon .... (specify date and time). The causes of this incident are already the subject of internal investigations. Total EP Liban has expanded its capacity to fight against pollution. Dispersant spraying / cleaning operations began. More than ... XXXX ... outside companies have been mandated to assist the site in this cleaning. Additional resources from ..... XXXX ... .have been mobilized and will arrive on site ..... XXXX		
Mr. General Manager		

2.6 Media communication

Examples of questions likely to be asked by journalists are listed in the Emergency Response Plan.

Some specific and frequent questions in case of major oil spill are proposed below:

- In terms of safety: what are the risks and the measures taken to limit these last?
- Can you confirm the circumstances and causes of the incident?
- How was the leak / spill / detected?
- Who relayed the internal alert? externally? to the authorities and populations?
- What product and how much was spilled? on earth? on the water?
- Will the activities of the site be disturbed?
- If so, how long will it last?
- Which sites, facilities, are impacted?
- Are any ecological zones, socio-economic areas, housing, tourist sites, neighbouring industrial sites threatened?
- What are the potential impacts of this spill on the surrounding environment?
- What resources have you deployed on site? technical? human?
- What measures do you take to reduce the risk of recurrence of such incidents?
- Are you accountable for the response actions to the port authorities? To other local authorities?
- How long do you estimate the duration of the clean-up?
- Have you ever experienced such an event in your affiliate? In the TOTAL group?
- Who is the owner of the facility? the ship? the spill?
- Who is responsible for this spill?
- What entity is responsible for defining response strategies? of the coordination of resources?
- Have you made use of external human and material resources?
- What is your policy in terms of waste management? storage? treatment?
- Have you made use of external experts in the evaluation of potential damage? In order to define the means to be implemented?