

**KILLO
SPILL**



Kill•Spill

Integrated Biotechnological
Solutions for Combating
Marine Oil Spills

Deliverable D8.10

Protocol for mobilization /
involvement in case of an
“oil spill” phenomena in
natural marine environments



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Table of Content

1	Introduction.....	1
2	Preparation phase	1
3	Alert phase	2
3.1	Suitability assessment flow chart.....	2
3.2	Notification Flow chart.....	4
3.3	Notification form	4
4	Mobilization phase.....	4
5	Additional Information.....	5
5.1	Persistence of Oil.....	5
5.2	NOAA's Oil weathering Model	6
6	References.....	6
7	Annex.....	7

List of Figures

Figure 1	Incident suitability assessment flow chart.....	3
Figure 2	Notification Flow chart	4
Figure 3	Volume of oil and water-in-oil emulsion remaining on the sea surface, as a percentage of the original volume spilled (100%).....	6
Figure 4	Example for a Notification Form.....	7



1 Introduction

This report provides information in relation to the protocol and appropriate procedures to be followed in case of an oil spill incident in the natural environment during the Kill•Spill project or beyond. The parties included in a Kill•Spill product application in a real oil spill are:

- Response Coordinator: partner EPE or MMB
- Kill•Spill Project Leader: partner TUC as project coordinator
- Scientific representative of a partner: staff delegated by any partner who developed the product to be applied

Due to the complexity and dissimilarity of oil spill incidents, partners to be involved in the emergency response have to adhere to the protocol which defines the responsibility of the response agency (partner MMB and EPE) and each (project)partner separately. In this way, potential accidents or undesirable impacts will be avoided. The abovementioned procedure is classified in three phases:

- Preparation phase
- Alert phase
- Mobilization phase

2 Preparation phase

The first objective is to prepare in detail the necessary equipment and consumables and their installation at the response contractor's warehouse and vessel.

The warehouses are in close proximity to the location of the response vessel. This allows fast loading of equipment and agents in case of an incident. Storage specifications of storable agents (e.g. Temperature range, Moisture, Humidity, Air exchange, Flooring material etc.) have to be communicated, in order to prepare the storage area (if needed), since temperature changes considerably between summer and winter.

Part of the equipment will be stored on the response vessels, and if possible also preinstalled for direct use. Agents will be stored on the vessels, if storage conditions can be preserved. Vessels storage area will be prepared for the suitable storage of agents, if this is needed and possible. In the case that storage conditions cannot be secured for a long period of time (e.g. due to high humidity or temperature) on the vessels, then the agents will be stored in the warehouse and in case of an incident will be transported to the vessel. During an incident, agents will be stored in a suitable place that will sustain the needed storage conditions (e.g. cooling container or other applicable solution).

Additional specifications of non-storable agents have to be communicated in order to prepare a temporary storage area on vessel (if needed). For non-storable agents it is highly possible, that due to the fast departure of the vessel in case of an incident, they will not arrive prior to vessel's departure. Therefore an open communication channel to EPE/MBB has to be arranged, in order to support the quick delivery of non-storable agents to the incident's location via the Scientific coordinator.

Regarding the permits for application of non-storable material (microorganisms, biosurfactants, bioemulsifiers and dispersants), EPE have repeatedly discussed the issue with the Ministry of Marine in order to get a fast approval for the application, when an incident occurs.



3 **Alert phase**

In case of an alert EPE or MMB have to inform partners about the outbreak of an oil spill to which they have access according to a notification mechanism. The following procedures will be followed in case of an incident that seems suitable:

- Response Coordinator (EPE/MBB) establishes agreement of Coast Guard and Polluter (Mandatory precondition)
- Response Coordinator (EPE/MBB) informs the Kill•Spill Project Leader about possible suitable incident by the Oil Spill Notification form
- If an incident is suitable, the Kill•Spill Project Leader informs Partners about it and the potential testing tasks of a Partner. Partners that want to participate at the testing for observing and advising reasons have to arrange the relevant transportation of a scientific representatives.
- Continuous information flow between Response Coordinator and Kill•Spill Project Leader about incident situation and assessment of it
- Arrival of Partners' scientific representatives and start of field tests
- Continuous adaptation to actual incident situation and information flow to Partners about field test results and adjustments made

The notification mechanism has been designed according to actual incident experience (Grounding of M/V YUSUF CEPNIOGLU at Mykonos Isl.), in order to decide about the mobilization of parties.

Following documents are part of the notification mechanism:

1. Decision tree for the suitability of incidents
2. Notification flow chart
3. Notification form

3.1 **Suitability assessment flow chart**

The Kill•Spill Scientific Administrator/Project Coordinator has to evaluate the suitability of the incident according to the given information by using the **following Incident suitability assessment flow chart** (Figure 1).

EPE/MBB have to be the Emergency Response contractor of an oil spill incident in order to start the notification mechanism. However not all incidents are suitable for the Kill•Spill testing. For example oil spills of light and very light oil are not suitable due to the quick evaporation. Small incidents are also not suitable since the response time at these incidents is less than a day.

Therefore every incident has to pass the "**Incident suitability assessment**", in order to start the notification of the project partners. The procedure assesses the type of oil, the spill size and type. However shoreline incidents, even if they small incidents have to assessed case by case, since the shoreline cleaning may last some days



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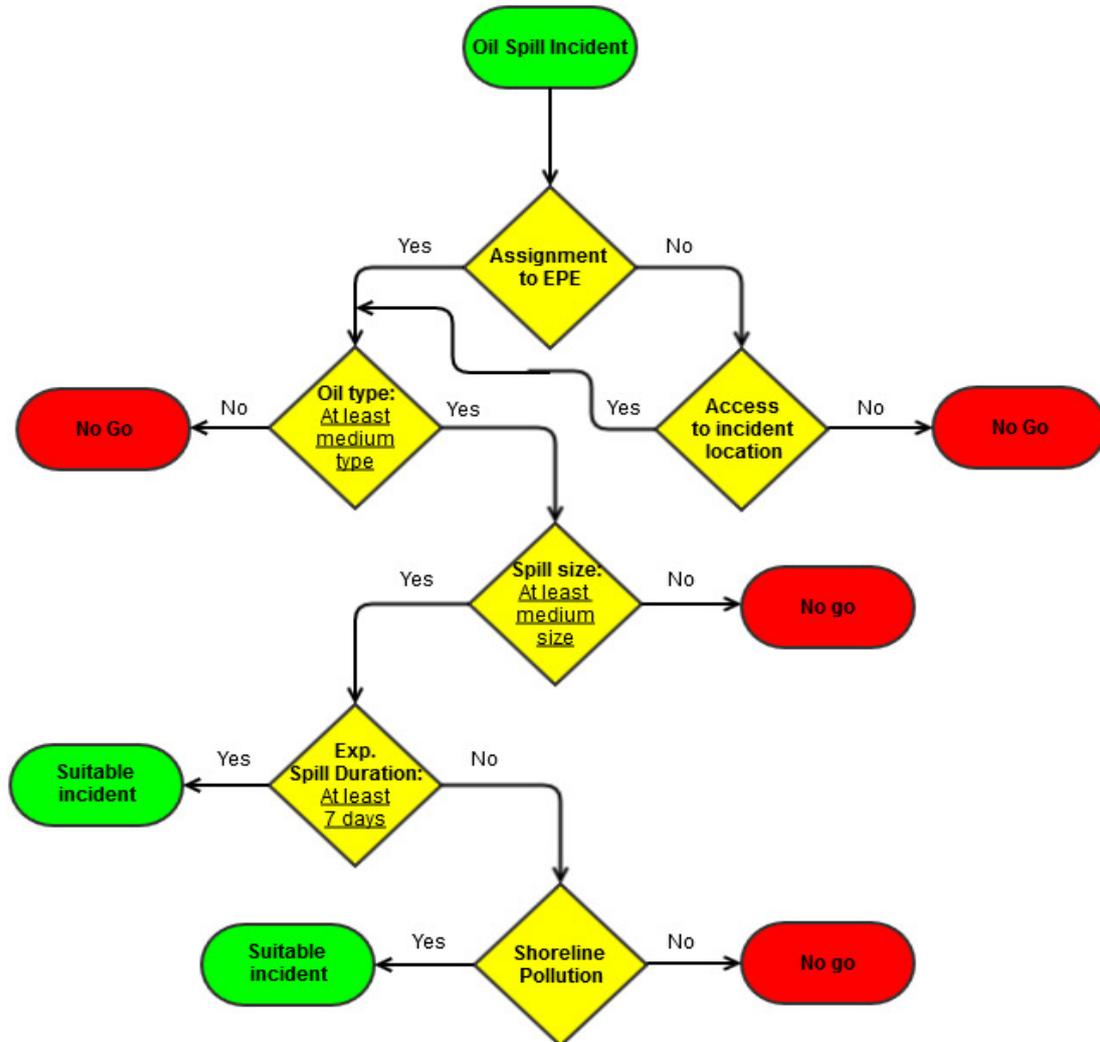


Figure 1 Incident suitability assessment flow chart



3.2 Notification Flow chart

The Notification Flow chart (Figure 2) describes the information flow chart in case of a suitable incident:

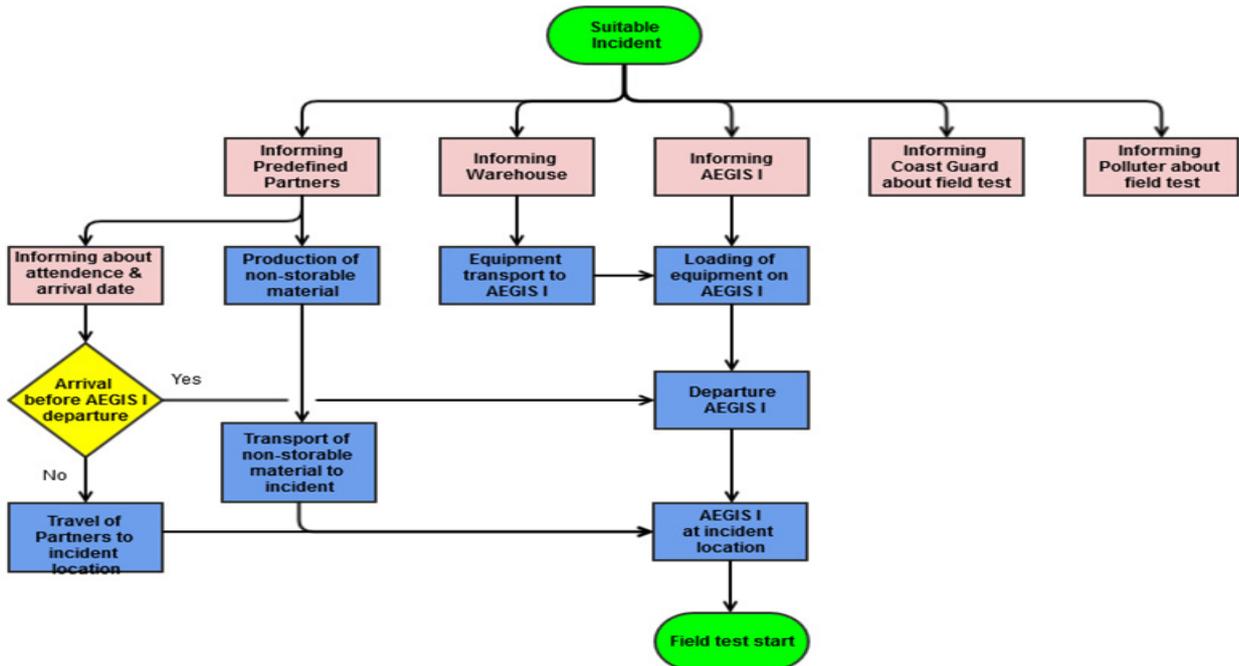


Figure 2 Notification Flow chart

3.3 Notification form

In the notification form, further information will be given over to the Scientific Coordinator:

- Vessel's Particulars (Name, IMO, Type, Owner, Manager, LOA, Gross Tonnage, DWT)
- Incident's Details (Date, Location, Incident type, Weather conditions, Visibility, Estimated Oil Quantity, Spill size, Spill area, Estimated leakage, Oil type, Possible field tests)

The notification form Figure 4 in the Annex) gives the Scientific coordinator all data needed to decide whether the incident is suitable. The example form is filled with data from the YUSUF CEPNIOGLU incident.

4 Mobilization phase

During this phase, EPE or MMB will proceed to the preparation and loading of the equipment from the dedicated warehouse to the response vessel prior departure. EPE or MBB will make the logistics arrangements for transportation of the necessary personnel from other partners or their replacements to the incident site and will support the partners in the sending of non-storable agents sent. EPE and MMB will facilitate the access for all necessary personnel and equipment to the site.

At the final phase of mobilization, apart from Partners Scientific representatives and non-storable agents, partners who are responsible for monitoring and biosensors (for the on-site bioremediation verification), is necessary to be presents as well. EPE/MBB has to monitor the tests till the response process is finished and revisit the area after two and four weeks later for monitoring purposes.



5 **Additional Information**

5.1 **Persistence of Oil**

When considering the fate of oil spilt at sea, a distinction is frequently made between persistent and non-persistent oil, as this allows a quick assessment of the most appropriate response options. For more accurate predictions of persistence, oils are classified into the following four main groups (according to their "API" or specific gravity):

Type 1: Very Light Oils (Jet Fuels, Gasoline)

Density less than 0.8 kg/m³

- Highly volatile (should evaporate within 1-2 days)
- High concentrations of toxic (soluble) compounds
- Localized, severe impacts to water column and intertidal resources
- No cleanup possible

Type 2: Light Oils (Diesel, No. 2 Fuel Oil, Light Crudes)

Density between 0.8 and 0.95 kg/m³

- Moderately volatile; will leave residue (up to one-third of spill amount) after a few days
- Moderate concentrations of toxic (soluble) compounds
- Will "oil" intertidal resources with long-term contamination potential
- Cleanup can be very effective

Type 3: Medium Oils (Most Crude Oils)

Density between 0.85 and 0.95 kg/m³

- About one-third will evaporate within 24 hours
- Oil contamination of intertidal areas can be severe and long-term
- Oil impacts to waterfowl and fur-bearing mammals can be severe
- Cleanup most effective if conducted quickly

Type 4: Heavy Oils (Heavy Crude Oils, No. 6 Fuel Oil, Bunker C)

Density greater than 0.95 kg/m³

- Little or no evaporation or dissolution
- Heavy contamination of intertidal areas likely
- Severe impacts to waterfowl and fur-bearing mammals (coating and ingestion)
- Long-term contamination of sediments possible
- Weathers very slowly
- Shoreline cleanup difficult under all conditions

As shown in Figure 3, due to the immediacy of evaporation, precipitation or disperse of light and very light oils, Kill•Spill is only interested to medium and heavy oils.

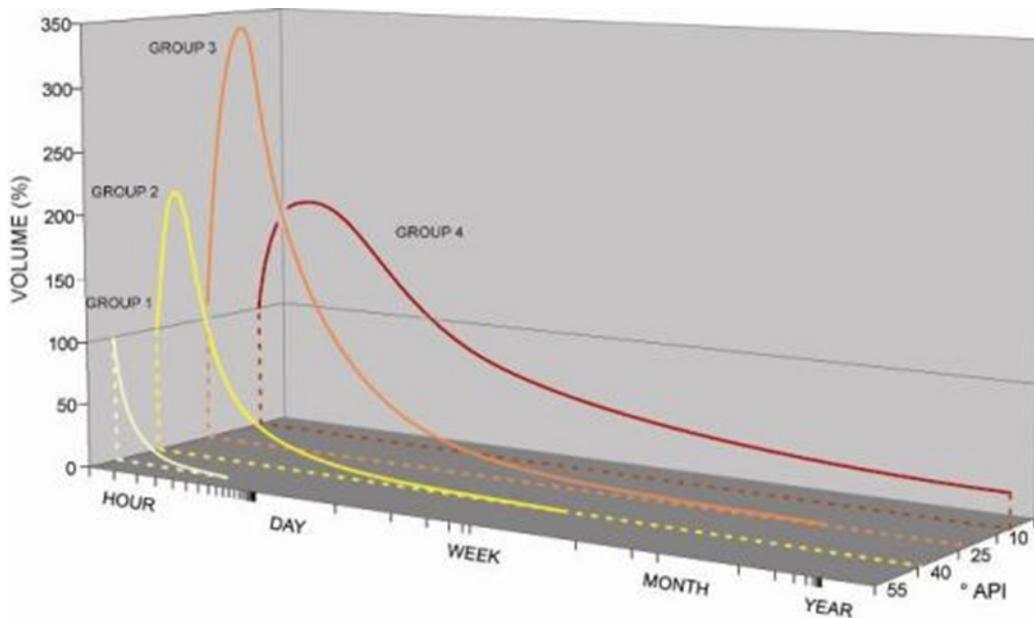


Figure 3 Volume of oil and water-in-oil emulsion remaining on the sea surface, as a percentage of the original volume spilled (100%).
The curve represents an estimated average behavior for each group (ITOPF)

5.2 NOAA's Oil weathering Model

The Scientific coordinator can find on the following link the free software ADIOS (Automated Data Inquiry for Oil Spills). The program is NOAA's (U.S. National and Atmospheric Administration Service) oil weathering model and can be freely downloaded.

ADIOS is an oil spill response tool that models how different types of oil weather (undergo physical and chemical changes) in the marine environment. Working from a database of more than a thousand different crude oils and refined products, ADIOS quickly estimates the expected characteristics and behavior of the spilled oil.

<http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/downloading-installing-and-running-adios.html>

6 References

The International Tanker Owners Pollution Federation Ltd (ITOPF), Response to Marine Oil Spills (2nd Edition), 2012, p 9-18.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Oceanic Service, Office of Response and Restoration, Oil weathering model, <http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/downloading-installing-and-running-adios.html>



7 Annex

Figure 4 Example for a Notification Form

Kill•Spill - OIL SPILL NOTIFICATION FORM (EXAMPLE)				
Agreement:	Coast Guard	Click here to enter text.	Ship's Owner/Manager	Click here to enter text.
Vessel's Particulars				
Name:	YUSUF CEPNIOGLOU			
IMO number:	9119646			
Vessel Type:	CONTAINER VESSEL			
Ship Owner:	FURKAN DENIZCILIK SANAYI -TURKEY			
Ship Manager:	FURKAN DENIZCILIK SANAYI -TURKEY			
Flag:	TURKEY			
LOA:	116,40 m			
Gross Tonnage:	4984			
DWT:	6928			
Incident's Details				
Date/Time:	08/03/2014	04:00		
Location:	Mykonos Isl. - Greece	WGS 84	E 37°29'54" N 25°20'11"	
Incident type:	<input checked="" type="checkbox"/> Grounding	<input type="checkbox"/> Fire	<input type="checkbox"/> Collision	<input type="checkbox"/> Sinking
	<input type="checkbox"/> Flooding	<input type="checkbox"/> Other		
Act. Weather conditions: Wind:	7 Beaufort Scale			
	Wave Height:	4-5 m		
	Temperature:	8° Celsius		
	Precipitation:	0 mm		
	Humidity:	80-90 %		
Visibility:	<input checked="" type="checkbox"/> Clear	<input type="checkbox"/> Foggy		
Est. ship's total oil quantity:	207 Tons IFO 180 - 36,6 Tons Diesel			
Spill size:	<input type="checkbox"/> Tier 1 (Spill size < 7 tons / Small local spill)			
	<input checked="" type="checkbox"/> Tier 2 (7 tons < Spill size < 700 tons / Medium spill)			
	<input type="checkbox"/> Tier 3 (Spill size > 700 tons / Large spill)			
Estimated spill size:	~20-30 tons			
Spill area:	<input checked="" type="checkbox"/> Rocky shoreline	<input checked="" type="checkbox"/> Sandy shoreline		
	<input type="checkbox"/> Sea	<input type="checkbox"/> Deep Sea		
Est. leakage rate (est.):	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High	
Oil type:	<input type="checkbox"/> Very Light Oils (Jet Fuels, Gasoline) <small>Group 1: Density < 0.8 kg/m³</small>			
	<input type="checkbox"/> Light Oils (Diesel, No. 2 Fuel Oil, Light Crudes) <small>Group 2: 0.8 < Density < 0.85 kg/m³</small>			
	<input checked="" type="checkbox"/> Medium Oils (Most Crude Oils) <small>Group 3: 0.85 < Density < 0.95 kg/m³</small>			
	<input type="checkbox"/> Heavy Oils (Heavy Crude Oils, No. 6 Fuel Oil, Bunker C) <small>Group 4: Density > 0.95 kg/m³</small>			
Possible Field Tests:	- Spill involving leakage from a vessel			
	- Clean-up of rocky shoreline			
	- Clean-up of sandy shoreline and sediments			