

EMSA's Pollution Response Tools: Dispersants & Application Systems

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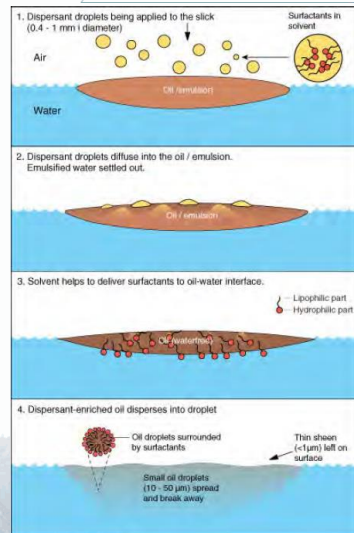
EMSA's Pollution Response Toolbox

- **Current capabilities developed following the implementation of the Action Plan for Oil Pollution Preparedness and Response (2004) and the Action Plan for HNS Pollution Preparedness and Response (2007):**
 - ❖ Mechanical recovery
 - ❖ Satellite monitoring (CleanSeaNet)
 - ❖ Experts: On-site/Office-based
 - ❖ HNS Operational Support: MAR-ICE Network
- **Additional capabilities in line with the Action Plan for Response to Marine Pollution from Oil & Gas Installations (2013):**
 - ❖ Dispersants and application systems

Dispersant Use

Dispersants:

- Are liquid blends of surfactants and solvents sprayed onto spilled oil in order for the oil to be dispersed into the water column;
- Replicate/Speed-up a natural occurring phenomenon (natural dispersion of oil) by transferring chemically dispersed oil from the sea surface into the water column in the form of small oil droplets.



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Dispersant Types

Description and Generation	UK Type	Sprayed from	Recommended treatment rate	Comments	Current Availability
First generation dispersants		Ships, boats, onshore	High treatment rate 30 - 50% dispersant as volume of spilled oil or 1 part dispersant to 2 to 3 parts oil	High toxicity Industrial detergents with solvents that are too toxic to be used as dispersants	No longer used as oil spill dispersants
'Second generation dispersants'	UK Type 1 'Conventional' or 'Hydrocarbon-based' dispersant	Ships, boats, onshore	High treatment rate 30 - 50% dispersant as volume of spilled oil or 1 part dispersant to 2 to 3 parts oil	Low toxicity	Available
'Third generation dispersants'	UK Type 2 'Water-dilutable' dispersant	Ships and boats	High treatment rate 10% solution of dispersant in seawater to 2 to 3 parts oil Equivalent to 1 part dispersant to 20 to 30 parts oil	Low toxicity	Available
'Third generation dispersants'	UK Type 3 'Concentrate' dispersant	Aircraft, ships and boats	Low treatment rate 3 to 5% dispersant as volume of spilled oil or 1 part dispersant to 20 to 30 parts oil	Low toxicity	Available

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Dispersant Use

Overall potential benefit and risk of dispersant use:

- The potential benefit: oil is removed from the sea surface and will not drift into shallow water or ashore. The effect of dispersing spilled oil is beneficial to those habitats and organisms that will not be contaminated by the spilled oil.
- The potential risk: marine organisms might be exposed to higher levels of dispersed oil (and soluble components from the dispersed oil) than with natural occurring dispersion. The degree of harm is a dependent on exposure conditions (dispersed oil concentration, duration of exposure and the rate of dispersion and dilution), plus the inherent sensitivity of the particular organism to dispersed oil.

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Dispersant Use

Criteria for the appropriateness and effectiveness of dispersant application:

- Weather condition: may be the only effective response option in adverse weather conditions;
- Type of oil: efficient to treat low to medium viscosity oil ($\leq 10,000$ mPa.s), but not oil with high viscosity and wax content;
- Geography/morphology of the area: not recommended in shallow waters and areas with slow water replenishment rates;
- Water salinity: efficient in open sea conditions with salinities of 30 psu (practical salinity units) or more;
- Nature of spill: extended window of opportunity for continuous release of fresh oil;
- Extent of spill: efficient in large spills which may require multiple means to cover the full scope of the spill.

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Dispersant Effectiveness (type of oil)

Spilled Oil	Dispersant use effective or appropriate?
Marine Diesel/Gas Oil	No
Medium Fuel Oil	Yes
Medium / Heavy Fuel Oil	Yes
Gasoline cargo	No
Jet fuel cargo	No
Diesel cargo	No
Vegetable oil	No
Heavy Fuel Oil	Possibly
HFO for power use	No
Condensate	Probably No
Light crude oil	Yes (for some time)
Medium crude oil	Yes (for some time)
Heavy crude oil	No

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Dispersant Effectiveness (viscosity of oil)

Dispersant			Viscosity of spilled oil (mPa.s) and dispersion potential			
Generation	Description	UK Type	<500 (generally easy)	500 - 5,000 (generally possible)	5,000 - 10,000 (sometimes possible)	>10,000 (generally impossible)
Second	'Conventional' or 'Hydrocarbon-based'	UK Type 1	Dispersant effective at 30% volume treatment rate	Dispersant effective at 30% - 50% volume treatment rate	Dispersant possibly effective at 100% volume treatment rate	Ineffective
Third	'Water-dilutable'	UK Type 2	Dispersant effective at 50 - 100% volume treatment rate	Ineffective	Ineffective	Ineffective
Third	'Concentrate'	UK Type 3	Dispersant effective at 5% volume treatment rate	Dispersant effective at 5% - 10% volume treatment rate	Dispersant effective at 10% - 15% volume treatment rate	Ineffective

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Dispersant Effectiveness (oil thickness)

The thickness of the oil layer in an oil slick will vary from less than 1 micron (one thousandth of a millimetre) in the areas of sheen, to several millimetres or – in the case of higher viscosity oils – several centimetres or more. The great variation in spilled oil layer thickness has implications for dispersant use.

Bonn Agreement Oil Appearance Code (BAOAC)

Code	Description	Layer thickness (µm)	Recommended dispersant use
1	Sheen (silvery/grey)	0.04 - 0.30	No
2	Rainbow	0.30 – 5.0	No
3	Metallic	5.0 - 50	No
4	Discontinuous true oil colour	50 – 200	Yes
5	Continuous true oil colour	More than 200	Yes

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Dispersant Deposition Rate

Oil slicks of variable thickness and the localized oil layer thickness may vary over short distances. A commonly used approach is that the average oil layer thickness in an oil slick is 0.1 mm. Given this average (of a very wide range) value the recommended deposition rate is determined based on the dispersant flow rate and the speed of spraying.

Dispersant generation	UK Type	Sprayed from	Recommended deposition rate
'Second generation dispersants'	UK Type 1 'Conventional' or 'Hydrocarbon-based' dispersant	Ships, boats, onshore	20 to 30 m ³ /km ²
'Third generation dispersants'	UK Type 2 'Water-dilutable' dispersant	Ships and boats	20 to 30 m ³ /km ² of a 10% solution of dispersant in seawater
'Third generation dispersants'	UK Type 3 'Concentrate' dispersant	Aircraft, ships and boats	2 to 3 m ³ /km ²

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Dispersant Use

Dispersant should be used:

- when the safety of the pollution response and salvage operations crew is at stake;
- if the product is oil with low to medium viscosity;
- If the thickness of the oil layer is over 50µm;
- when there is a risk of the oil drifting ashore, contaminating near-shore or coastal sensitive habitats;
- in rough weather conditions;
- in open sea, areas with relatively fast water replenishment rates and/or areas with no sensitive environmental factors;
- in a large and/or continuous release of fresh oil.

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Dispersant Use

Dispersant should not be used:

- in very calm waters;
- if the product is oil with a high viscosity and wax content;
- If the thickness of the oil is below 50µm;
- in very shallow water, less than 5 to 10 metres deep;
- on spilled oil that is directly over environmentally sensitive areas (e.g. corals, sea grass, fish spawning areas and shellfish beds);
- in the vicinity of fish/shellfish cages and/or shallow water fisheries;
- close to desalination and/or other water treatment installations;
- close to industrial water intakes which are normally protected by fixed booms;
- In a controlled and non-continuous release of oil.

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Dispersant Use

Dispersant application systems:

➤ Seaborne application systems used on-board vessels:

- ❖ Fixed spray booms;
- ❖ Portable single spray nozzles;
- ❖ Spray hoses with floating buoys.



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Dispersant Use

Dispersant application systems:

➤ Airborne application systems used on-board aircrafts:

- ❖ Fixed spray arms;
- ❖ Fixed single spray nozzles;
- ❖ Helicopter buckets.



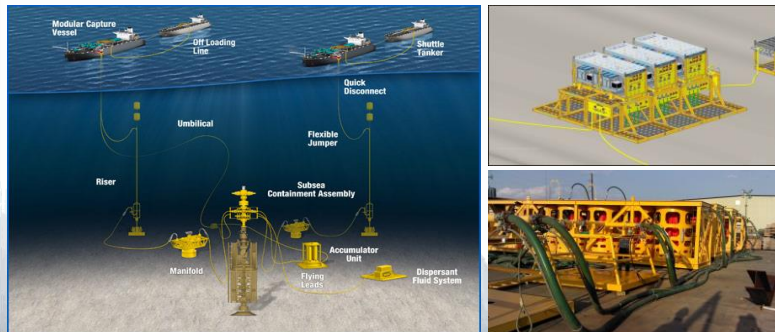
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Dispersant Use

Dispersant application systems:

➤ Sub-sea application systems:

- ❖ Specialised sub-sea dispersant injection tools.



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Dispersant Use

National policies regarding the use of dispersant:

Member State*	Dispersant Use					
	First response option	Secondary response option	Last response option	Not allowed	Included in NCP**	Not included in NCP**
Croatia		•			•	
Cyprus		•			•	
France	•				•	
Greece		•			•	
Italy			•		•	
Malta		•			•	
Slovenia				•		•
Spain			•			•

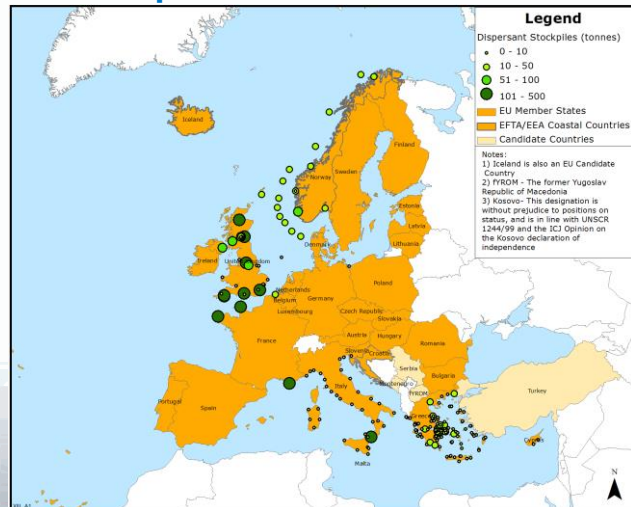
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National dispersant stockpiles:

Member State*	Dispersant supplies (tonnes)
France	1,118
Greece	645
Italy	127
Malta	25
Cyprus	13

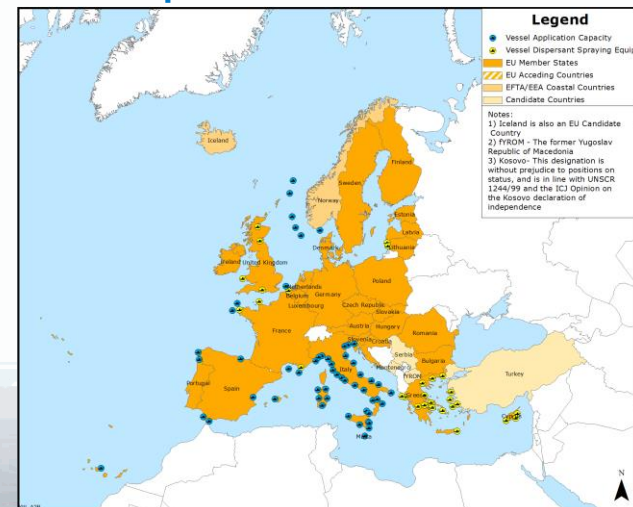
*Coastal EU Member States in the Mediterranean Sea **NCP - National Contingency Plan

Dispersant Capacities



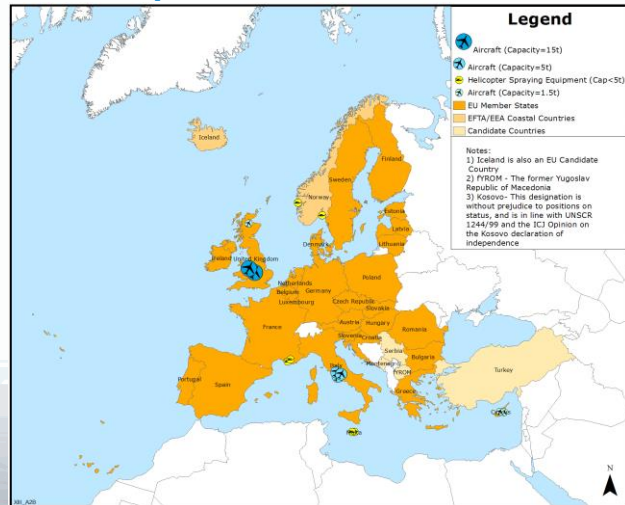
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Dispersant Capacities



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Dispersant Capacities



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EMSA's Action Plan for Response to Marine Pollution From Oil & Gas Installations

Provision of dispersants and application systems:

- Limited quantities of dispersants stored in selected EMSA depots;
- 2 seaborne dispersant spraying arrangements, to be located in interested Member States as part of the oil recovery vessel set-up;
- 1-2 airborne dispersant spraying arrangements, to be located in a selected location in Europe, in conjunction with chartered airplane(s).

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Principles

- Confirmation of 'top-up philosophy': 'additional means' under command and control of Affected State;
- EMSA offers the tool box, the Affected State/Commission decide if and what kind of support they want to receive;
- The proposed activities are based on Commission proposal for multi annual financial framework for APM measures (160,5 MEURO): as such they do not represent a claim for additional budget;
- The proposed activities are part of the Action Plan, which is only the framework for implementing the new task of EMSA: decisive is the annual budget and the work programme.

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Conclusions

- The dispersant application services will complement EMSA's currently existing pollution response tools, by addressing those spills where mechanical recovery of oil is not sufficient or possible;
- The Agency will be able to provide a more complete toolbox of pollution response measures;
- The provision of dispersant application services is designed to fit within available budget: phasing-in of new tasks;
- '*Modus operandus*' does not change: Support is on request by Affected States/Commission and assistance is under command and control of Affected State(s).

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Detailed information on dispersants and their application systems and strategies are provided on the following documents:

[Manual on the Applicability of Oil Spill Dispersants](#)

[Action Plan for Response to Marine Pollution from Oil and Gas Installations](#)

These documents are available for download on EMSA's website:

www.emsa.europa.eu

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THANK YOU FOR YOUR ATTENTION !