EMSA

European Maritime Safety Agency

Network of Stand-by Oil Spill Response Vessels and Equipment

Handbook

2012

EUROPEAN MARITIME SAFETY AGENCY

Table of Contents

Pollution Response Equipment Information Sheets

Sweeping Arms

Booms

Skimmers

Slick Detection Systems

General Information

EMSA'S ROLE AND SERVICE

The requirement

In May 2004, with the entering into force of Regulation 724/2004/EC, EMSA was given the task of providing support to Member States in their efforts to respond to ship-sourced pollution in EU waters. In order to define the framework for the associated support activities, the Agency developed the Action Plan for Oil Pollution Preparedness and Response (2004). The plan is updated regularly as part of the Agency's annual Work Programme.

EMSA 'top-up' pollution response resources

The primary responsibility to react to, and to co-ordinate the response to, an oil pollution incident rests with the affected Member State(s). As major spills frequently concern more than one country, various regional arrangements have been set in place to facilitate co-operation and assistance in such cases. EMSA provides an additional 'top-up' tier to these arrangements and to the Member States.

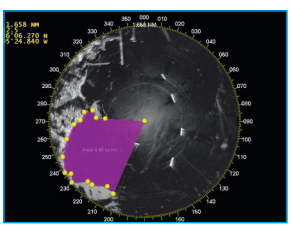
A cost efficient 'top-up' service is provided by ships contracted from the private sector

Big scale pollution disasters, like the most recent cases of the Erika (1999) and the Prestige (2002), illustrate that individual coastal states can not reasonably be expected to have sufficient resources to mount an appropriate response by themselves. European co-operation is required, and it is within this framework that EMSA provides its assistance. For major spills, generally the most appropriate response is to recover the oil at sea before it reaches the coastline, as this significantly reduces the environmental damage and waste disposal challenges.

At the practical level, an EU level mechanism has been set up to enable coastal states to request additional response equipment and resources from other EU/EFTA countries or from EMSA. This mechanism is operated by the Monitoring and Information Centre (MIC) based in Brussels, Belgium, which is managed by the European Commission (DG ECHO).

Following a request via the MIC from an EU Member State, an EU Candidate Country, an EFTA country or the European Commission, EMSA provides assistance on the following basis:

- The Agency resources are a 'reserve for disasters' to assist Member States in responding to an incident which is beyond national capabilities.
- The Agency resources are put under the operational command of the affected Member State for the duration of the emergency.
- The Agency resources have been established in a cost efficient manner.



The Stand-by Oil Spill Response Vessels are equipped with state-of-the-art pollution response equipment

EMSA's pollution response vessels

Experience acquired during previous major oil spills has shown clearly that mechanical at-sea oil 'containment and recovery' is the most appropriate technique for removing spilled oil from the marine environment. To provide support for this type of activity, EMSA has established, following public procurement procedures, contracts for at-sea oil recovery services around the European coastline with commercial vessel operators. Given that the EMSA service is to 'top-up' available resources for major spills and for cost efficiency reasons, it was not seen as appropriate to build or buy dedicated vessels to be on permanent stand-by.

The contracted vessels will, under normal circumstances, carry out their usual commercial activities. However, in the event of an oil spill, and following a request for assistance from a Member State, the nominated vessel will cease its normal activities and, at short notice, be transformed into and operate as a certified oil recovery vessel.

Appropriate modification/pre-fitting to the vessels has been carried out in order to ensure that the specialised oil spill response equipment can be installed rapidly onboard and be operated safely by the crew.

ADDITIONAL RESPONSE CAPACITY

EMSA's pollution response vessels (continued)

Each of the EMSA contracted vessels is equipped with oil pollution response equipment. The Agency resources are primarily tailored for spills of heavy grades of oil.

EMSA vessels deploying sweepimg arms (left) and offshore boom (right)

Each arrangement has the following common characteristics:

- The vessel will operate as an oil recovery vessel on the basis of a pre-agreed model contract with fixed fees and conditions as developed by the Agency in consultation with Member States for this purpose.
- Each vessel has large ecovered oil storage capacity.
- The primary oil recovery system is based around the 'sweeping arm' concept with an alternate 'ocean-going boom and skimmer' system also available. The requesting Member State can select the equipment in accordance with the incident characteristics.
- Each vessel has a speed over 12 knots for prompt arrival on site.
- Each vessel is equipped with a local radar based oil slick detection system to facilitate the positioning of the vessel in the thicker oil slicks, and to enable operations at night.
- Each vessel has the manoeuvrability required to carry out oil recovery operations.
- Each vessel is able to decant excess water thus maximising the utilisation of the onboard storage capacity.
- Each vessel has the ability to heat the recovered cargo and utilise high capacity pumps in order to facilitate the discharging of heavy viscous oil mixtures to shoreside facilities as designated by the Member State concerned.

Oil recovery operations on board an EMSA vessel during the Fedra incident

It is important to note that, independent of their area of commercial operations, all vessels are available to respond to a spill anywhere in European waters.

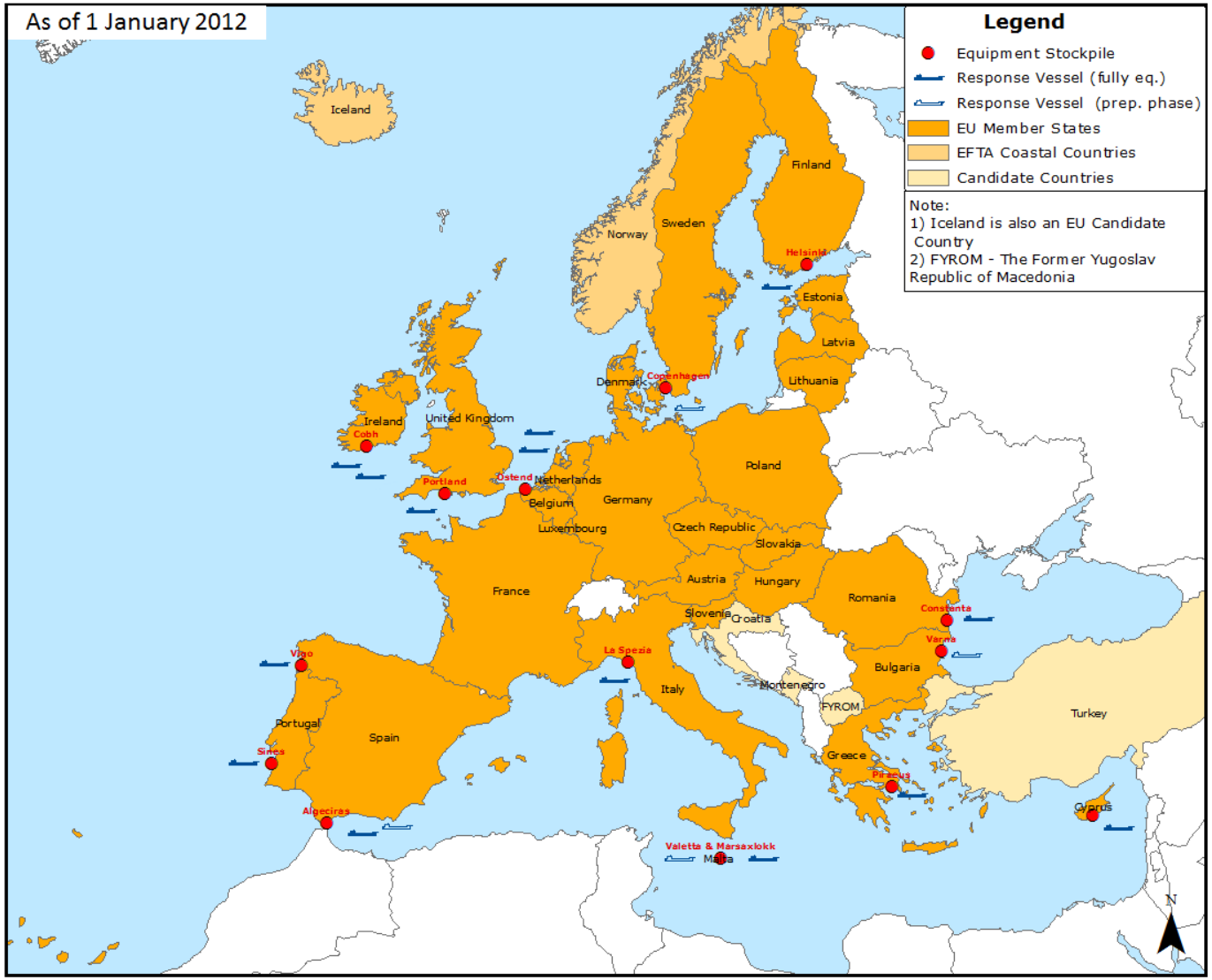
The average individual oil storage capacity of the EMSA contracted vessels is in the region of 3,800 m^3 and they provide a total storage capacity of more than 52,000 m^3. During an incident, the vessel and her crew will be under the operational command of the affected Member State.

To maintain the quality of the at-sea oil recovery service, all vessels and crews undergo regular equipment drills under the supervision of the Agency. In order to work under an international command and control structure, which is the most likely scenario during a major spill, each vessel is available to participate in regular at-sea spill response exercises.

EMSA vessels during international exercises

Following a period of phasing-in, the service network now has resources in place along the European coastline: from the Baltic Sea to the Black Sea, and covering the Atlantic coastline and the Mediterranean Sea. The service network will be maintained and improved in order to continue to provide an effective 'European tier' of pollution response vessels for the protection of the European coastline.

Network Map



Note: Iceland is also an EU Candidate Country since 17 June 2010.

Summary Table of the Network

SUMMARY TABLE OF EMSA STAND-BY OIL SPILL RESPONSE VESSELS								
Name	Type	Area of Operations & Equipment Depot	Tank capacity [m^3]	Length [m]	Breadth [m]	Draft [m]	Flash point	Oil Spill Response Equipment
Kontio	Icebreaker	Baltic Sea North Helsinki & Oulu/Finland	2003	98.60	24.20	8.00	> 60°C	Two Rigid Sweeping Arms, 12m Heavy Duty Boom 2x250m Brush Skimmer Arctic skimmer** Oil Slick Detection System
OW Copenhagen*	Bunker Vessel	Baltic Sea South	4487	90.50	14.60	5.30	< 60°C	Two Rigid Sweeping Arms 15.6m Single Point Inflation Boom, 2x250m Brush Skimmer Arctic Skimmer Oil Slick Detection System
DC Vlaanderen 3000	Hopper Dredger	North Sea Ostend/Belgium	2744	89.20	14.00	6.30	> 60°C	Two Rigid Sweeping Arms, 12m Heavy Duty Single Point Inflation Boom, 2x250m Weir Skimmer Oil Slick Detection System
Interballast III	Hopper Dredger		1886	70.00	13.20	5.40	> 60°C	Two Rigid Sweeping Arms, 12m Heavy Duty Single Point Inflation Boom, 2x250m Weir Skimmer Oil Slick Detection System
Forth Fisher	Product Tanker	Atlantic Cobh/Ireland	4754	91.00	15.58	6.20	< 60°C	Two Rigid Sweeping Arms, 15m Two Rigid Sweeping Arms, 15m** Heavy Duty Single Point Inflation Boom, 4x250m Two Weir Skimmers Two Oil Slick Detection Systems
Galway Fisher	Product Tanker		4754	91.00	15.58	6.20	< 60°C	
Mersey Fisher	Product Tanker		5028	91.40	15.50	6.02	< 60°C	
Sara	Bunker Vessel	Atlantic/Channel Portland/UK	6658	111.30	16.50	7.00	< 60°C	Two Rigid Sweeping Arms, 15m Heavy Duty Single Point Inflation Boom, 2x250m Weir/Brush/Disc Skimmer Oil Slick Detection System
Ria de Vigo	Offshore Supply Vessel	Atlantic Vigo/Spain	1522	69.00	13.50	6.80	> 60°C	Two Rigid Sweeping Arms, 13m Heavy Duty Boom, 2x250m Weir/Shovel Drum High-capacity Multiskimmer Weir Skimmer Oil Slick Detection System
Bahia Tres	Bunker Vessel	Atlantic Sines/Portugal	7413	99.80	18.00	7.00	> 60°C	Two Rigid Sweeping Arms, 12m Single Point Inflation Boom, 2x250m Brush Skimmer Oil Slick Detection System
Bahia Uno	Bunker Vessel	Mediterranean West Algeciras/Spain	3800	71.01	15.60	5.80	> 60°C	Two Rigid Sweeping Arms, 12m Single Point Inflation Boom, 2x250m Brush Skimmer Oil Slick Detection System
Monte Anaga*	Bunker Vessel	Mediterranean West Algeciras/Spain	4069	87.16	15.3	5.30	> 60°C	Two Rigid Sweeping Arms, 12m Single Point Inflation Boom, 2x250m Brush Skimmer Oil Slick Detection System
Salina Bay	Bunker Vessel	Mediterranean West La Spezia/Italy	2800	74.70	13.10	5.53	> 60°C	Two Rigid Sweeping Arms, 12m Single Point Inflation Boom, 2x250m Weir/Brush/Disc SKimmer Oil Slick Detection System
Balluta Bay*	Bunker Vessel	Mediterranean Central La Valletta/Malta	2912	74.12	13.10	5.52	> 60°C	Two Rigid Sweeping Arms, 12m Single Point Inflation Boom, 1x300m Weir Skimmer Oil Slick Detection System
Santa Maria	Bunker Vessel	Mediterranean Central Marsaxlokk/Malta	2421	93.10	14.05	6.82	< 60°C	Two Rigid Sweeping Arms, 15m Heavy Duty Boom, 2x250m Weir/Brush Multiskimmer Weir Skimmer Oil Slick Detection System
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus/Greece	3000	78.50	12.60	4.87	< 60°C	Two Rigid Sweeping Arms, 15m Single Point Inflation Boom, 2x250m Weir Skimmer Weir/Brush High-capacity Multiskimmer** Oil Slick Detection System
Aegis I	Offshore Supply Vessel		950	65.00	14	5.90	> 60°C	Heavy Duty Boom, 2x250m Weir/Brush Skimmer
Alexandria	Oil Tanker	Mediterranean East Limassol/Cyprus	7458	94.00	18.50	9.60	< 60°C	Two Rigid Sweeping Arms, 15m Heavy Duty Single Point Inflation Boom, 2x250m Weir/Brush Skimmer Oil Slick Detection System
Enterprise*	Offshore Supply Vessel	Black Sea Varna, Bulgaria	1374	64.4	13.80	5.70	> 60°C	Two Rigid Sweeping Arms, 15m Heavy Duty Boom, 2x250m Brush Skimmer Oil Slick Detection System
GSP Orion	Offshore Supply Vessel	Black Sea Constanta/Romania	1334	60.00	16.80	6.20	> 60°C	Two Rigid Sweeping Arms, 12m Heavy Duty Boom, 2x250m Weir/Shovel Drum High-capacity Multiskimmer Brush Skimmer Oil Slick Detection System

* The vessel is in Preparation Phase and is expected to enter into Stand-by service by mid-2012

** This equipment will be supplied under an Improvement Project by mid-2012

EMSA Contractors Information Sheets

Baltic Sea

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Arctia Icebreaking Oy, subsidiary of Arctia Shipping Oy Ltd.

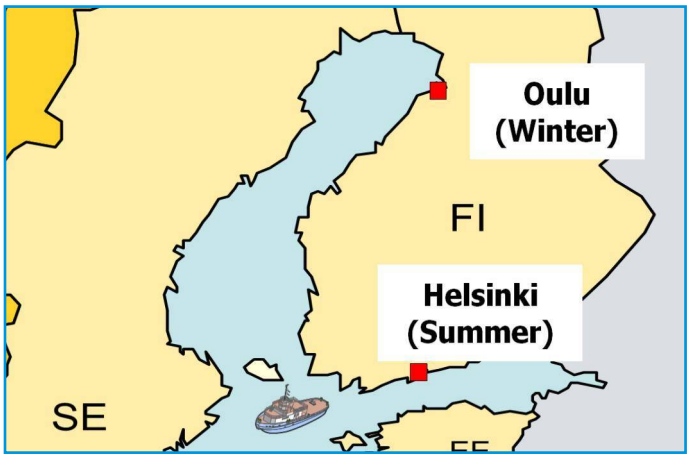
CONTRACTED VESSEL(S)
Kontio

AREA OF ECONOMIC OPERATION
The Northern Baltic Sea
limited to the south by the line from Klaipeda (LT) to Kalmar (SE)

STOCKPILE LOCATION
Helsinki, Finland (summer); Oulu, Finland (icebreaking season)

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 24 hours



ABOUT THE SERVICE

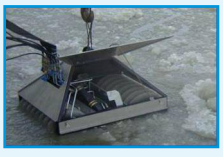
Arctia Icebreaking Oy offers icebreaking services and owns 29 vessels, including the Kontio, 4 other conventional icebreakers, 3 multipurpose icebreakers and eleven ferries. The company has 100 years' experience of icebreaking in the Baltic.

During the summer the oil pollution equipment is kept onboard the vessel in Helsinki. During the icebreaking period (130 - 140 days, beginning of December) the equipment is be stored at Oulu in northern Finland.

EQUIPMENT STOCKPILE

Sweeping arms
Two Lamor rigid sweeping arms (12 m) with weir/brush skimmer module (LSS 12)
Boom
Lamor heavy duty boom, 2x250 m (HDB 2000)
Skimmer
Lamor free floating brush skimmer (LFF 100 2C)
Lamor brush arctic skimmer (LAS 125)
Slick detection
Consilium slick detection system (Selesmar Selux ST 340)
Additional equipment
Gas detector, Mini Lab, Flashpoint tester


Sweeping arm


Arctic skimmer


Brush skimmer


Heavy duty boom

ABOUT THE VESSEL - Kontio

The Kontio's commercial activity is as an icebreaker.



IMO Number: 8518120
Flag State: Finland
Port of Registry: Helsinki
Type: Icebreaker (Swedish-Finnish Ice Class 1A Super)
Built: 1986
Length: 98.60 m
Breadth: 24.20 m
Max. Draft: 8.0 m
DWT: 2000 Ton
Gross Tonnage: 7066 Ton
Net Tonnage: 2120 Ton
Storage capacity: 2033 m³
Heating capacity: 2 x 1.54 MW
Pumping capacity: 700 m³/h
Flash Point: > 60°
Propeller: 2 x Fixed Pitch Propeller
Bow Thruster: Yes
Max. speed: 18.5 knots
Classification Society: Germanischer Lloyd

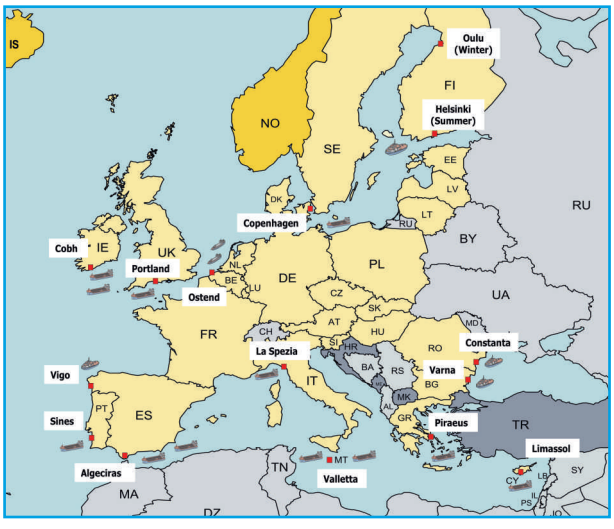
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

BALTIC SEA — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
OW Bunkers

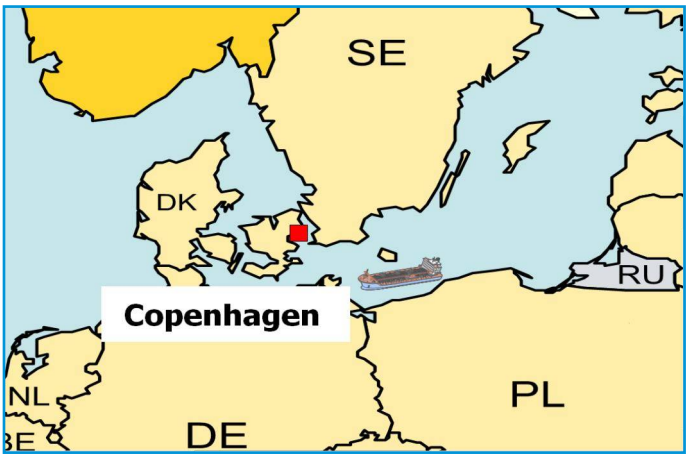
CONTRACTED VESSEL(S)
OW Copenhagen

AREA OF ECONOMIC OPERATION
Baltic Sea

STOCKPILE LOCATION
Copenhagen, Denmark

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 18 hours



ABOUT THE SERVICE

The arrangement comprises a bunker tanker operating in Danish Baltic ports and equipment stockpile based in Copenhagen.

The contractor OW Bunkers is a shipowner specialised in bunker services. It is part of the Wrist Group A/S, which includes a wide range of companies servicing the shipping industry worldwide.

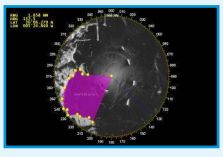
EQUIPMENT STOCKPILE

Sweeping arms
Two Lamor rigid sweeping arms (15 m) with weir/brush module (LSS 15)
Boom
Norlense single point inflation boom, 1x400 m (NO-450-S)
Skimmer
Lamor brush skimmer (LFF 400 W)
Lamor brush arctic skimmer (LAS 125)
Slick detection
Seadarq oil slick detection system
Additional equipment
Gas detector, Mini Lab, Flashpoint tester

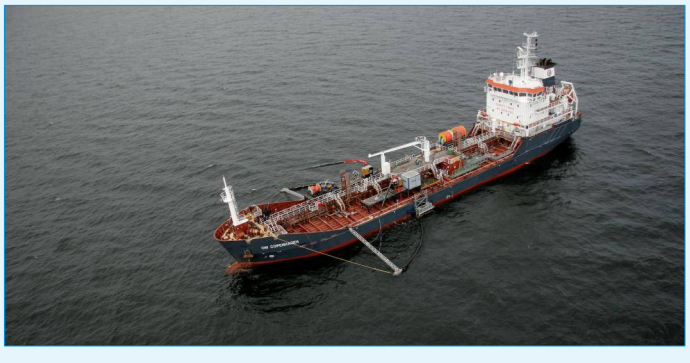

Sweeping arm


Brush skimmer

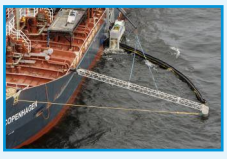

Boom and skimmer


Slick Detection

ABOUT THE VESSEL - OW Copenhagen



The OW Copenhagen's commercial activity is as a bunker vessel.



IMO Number: 9327487
Flag State: Denmark
Port of Registry: Aalborg
Type: Chemical Product Tanker
Built: 2006
Length: 90.50 m
Breadth: 14.60 m
Max. Draft: 5.30 m
DWT: 3548 Ton
Gross Tonnage: 3021 Ton
Storage capacity: 4487 m³
Heating capacity: 2 x 1800 kW
Pumping capacity: 1500 m³/h
Flash Point: < 60°C
Propeller: 2 x Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12 knots
Classification Society: Germanischer Lloyd

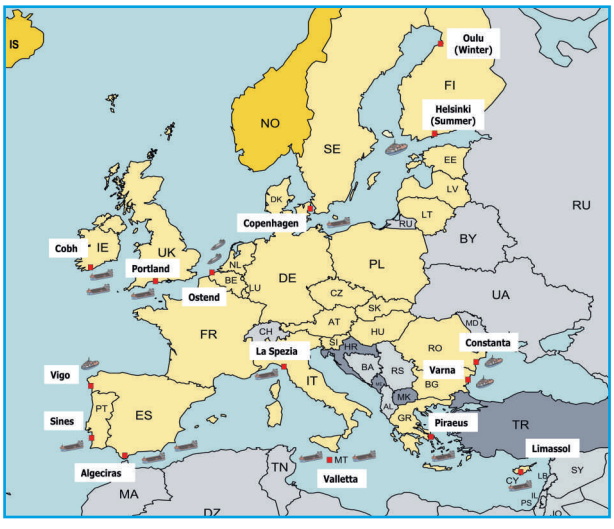
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

North Sea

NORTH SEA — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
DC Industrial

CONTRACTED VESSEL(S)
DC Vlaanderen 3000, Interballast III

AREA OF ECONOMIC OPERATION
Coasts of Belgium and the Netherlands

STOCKPILE LOCATION
Ostend, Belgium

NUMBER OF VESSELS TO BE MOBILISED
2

MOBILISATION TIME
Within 20 hours

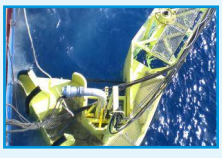
ABOUT THE SERVICE

The arrangement comprises two hopper dredgers, DC Vlaanderen 3000 and Interballast III, operating in the North Sea area, and two stockpiles based in Ostend. Both dredgers can be mobilised simultaneously.

The contractor, DC Industrial, is part of the Belgian group De Cloedt, an independent industrial group active in different domains such as granulates, concrete, environmental contracting and dredging. The contractor operates a fleet of four hopper dredgers and has experience operating dredgers with pollution response capabilities.

EQUIPMENT STOCKPILE

Sweeping arms
Four Koseq rigid sweeping arms (12 m) with weir skimmer
Boom
Vikoma heavy duty single point inflation boom, 4x250 m (Hi-Sprint 2000)
Skimmer
Two Markleen weir skimmer (WMS 280)
Slick detection
Two Miros oil slick detection system
Additional equipment
Gas detector, Mini Lab


Sweeping arm


Vikoma boom


Weir skimmer


Slick detection

ABOUT THE VESSEL - DC Vlaanderen 3000

The DC Vlaanderen's commercial activity is as a hopper dredger.



IMO Number: 9250373
Flag State: The Netherlands
Port of registry: Breskens
Type: Suction Hopper Dredger
Built: 2002
Length: 89.20 m
Breadth: 14.00 m
Max. Draft: 6.60 m
DWT: 4207 Ton
Gross tonnage: 2744 Ton
Net Tonnage: 823 Ton
Storage capacity: 2744 m³
Heating capacity: 1226 kW
Pumping capacity: 1460 m³/h
Flash Point: >60°C
Propeller: 2 x Fixed Pitch Propeller
Bow Thruster: Yes
Max. speed: 13 knots
Classification Society: Bureau Veritas

EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

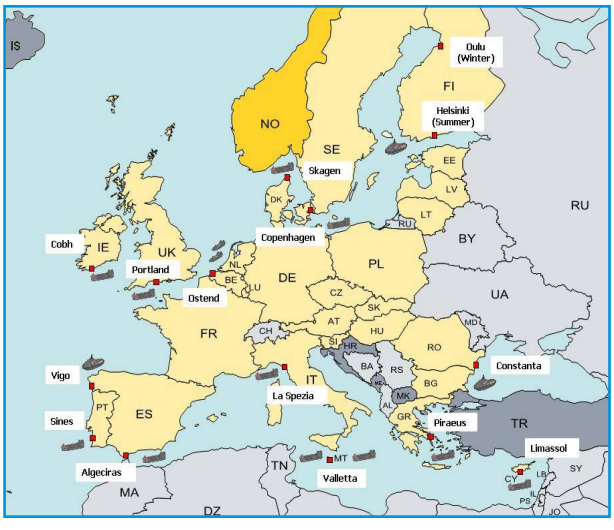
ABOUT THE VESSEL - Interballast III

The Interballast III's commercial activity is as a hopper dredger.

IMO Number: 8113463
Flag State: The Netherlands
Port of registry: Sas Van Gent
Built: 1980 (refurbished in 2003)
Type: Suction Hopper Dredger
Length: 65.40 m
Breadth: 13.20 m
Max. Draft: 6.40 m
DWT: 2937 Tons
Gross Tonnage: 1670 Tons
Net Tonnage: 503 Tons
Storage capacity: 1886 m³
Heating capacity: 785 kW
Pumping capacity: 1460 m³/h
Flash Point: >60°C
Propeller: Fixed Pitch Propeller
Bow Thruster: Yes
Max. speed: 12 knots
Classification Society: Bureau Veritas

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m³)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

Atlantic Coastline

ATLANTIC — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
James Fisher Everard

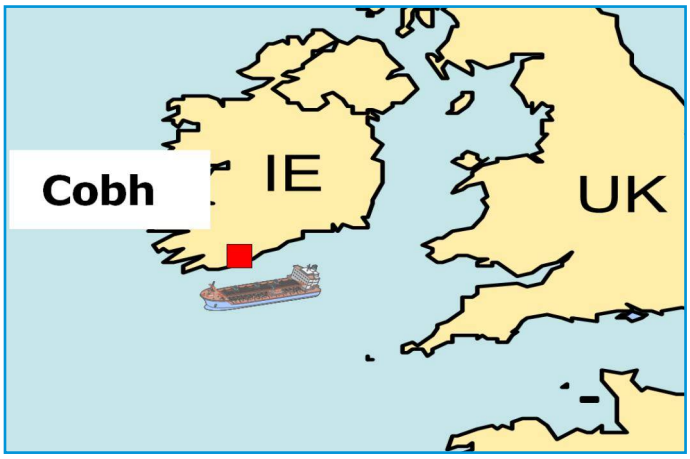
CONTRACTED VESSEL(S)
Forth Fisher, Galway Fisher, Mersey Fisher

AREA OF ECONOMIC OPERATION
Atlantic Coast

STOCKPILE LOCATION
Cobh, Ireland

NUMBER OF VESSELS TO BE MOBILISED
2

MOBILISATION TIME
Within 24 hours



ABOUT THE SERVICE

The James Fisher Group of companies provides a range of marine services from bases around the UK and in Scandinavia. The services include defence, marine oil, offshore oil, shipping and specialist technical services.

The arrangement includes three tankers from which two vessels can be mobilised. The tankers usually trade from the South of the UK to Ireland. The equipment stockpile is located in Cobh, Ireland.

EQUIPMENT STOCKPILE

Sweeping arms
Four Koseq rigid sweeping arms (15 m) with weir skimmer
Boom
Vikoma heavy duty single point inflation boom, 4x250 m (Hi-Sprint 2000)
Skimmer
Two Desmi weir skimmer (Tarantula)
Slick detection
Two Miros oil slick detection system


Sweeping arm


Tarantula skimmer


Boom and skimmer


Slick detection

ABOUT THE VESSEL - Forth Fisher

The Forth Fisher's commercial activity is as a product tanker.



IMO Number: 9118159
Flag State: United Kingdom
Port of Registry: Barrow
Type: Product Tanker
Built: 1997
Length: 91.00 m
Breadth: 15.58 m
Max. Draft: 6.20 m
DWT: 4973 Ton
Gross Tonnage: 3368 Ton
Net Tonnage: 1367 Ton
Storage capacity: 4756 m³
Heating capacity: 3488 kW
Pumping capacity: 3400 m³/h
Flash Point: < 60°C
Propeller: Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12 knots
Classification Society: Lloyd's Register

EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ABOUT THE VESSEL - Galway Fisher

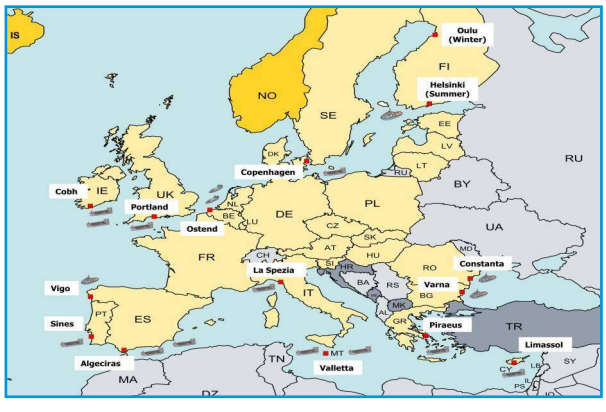
The Galway Fisher's commercial activity is as an oil tanker.

IMO Number: 9118161
Flag State: United Kingdom
Port of Registry: Barrow
Type: Oil Tanker
Built: 1997
Length: 91.00 m
Breadth: 15.58 m
Max. Draft: 5.10 m
DWT: 4968 Ton
Gross Tonnage: 3368 Ton
Net Tonnage: 1010 Ton
Storage capacity: 4754 m³
Heating capacity: 3883 kW
Pumping capacity: 3400 m³/h
Flash Point: < 60°C
Propeller: Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 13 knots
Classification Society: Lloyd's Register

ABOUT THE VESSEL - Mersey Fisher

The Mersey Fisher's commercial activity is as an oil tanker.

IMO Number: 9170420
Flag State: Gibraltar
Port of Registry: Gibraltar
Type: Product Tanker
Built: 1998
Length: 91.40 m
Breadth: 15.50 m
Max. Draft: 6.02 m
DWT: 4765 Ton
Gross Tonnage: 2760 Ton
Net Tonnage: 1454 Ton
Storage capacity: 5028 m³
Heating capacity: 2907 kW
Pumping capacity: 3400 m³/h
Flash Point: < 60°C
Propeller: Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12 knots
Classification Society: Lloyd's Register



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'.

ATLANTIC & CHANNEL — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Aegean Bunkers at Sea

CONTRACTED VESSEL(S)
Sara

AREA OF ECONOMIC OPERATION
Atlantic and the Channel

STOCKPILE LOCATION
Portland, United Kingdom

NUMBER OF VESSELS TO BE MOBILISED
1 vessel

MOBILISATION TIME
Within 24 hours

ABOUT THE SERVICE

Aegean Bunkers at Sea NV provides in-port and offshore bunkering services for the international shipping industry.

The company is a subdivision of Aegean Marine Petroleum Network Inc., a marine fuel logistics company that physically supplies and markets refined marine fuel and lubricants to ships. The company operates three vessels: m/t Syros, m/t Sara and m/t Aegean Princess. The offshore bunkering locations of the company are the English Channel, North Sea and St. George Channel. The equipment will be stored in Portland.

EQUIPMENT STOCKPILE

Sweeping arms
Two Koseq rigid sweeping arms (15 m) with weir/brush skimmer module

Boom
Desmi heavy duty single point inflation boom, 2x250 m (Ro-Boom 2000 SPI)

Skimmer
Desmi skimmer with weir/brush/disc module (Tarantula)

Slick detection
Miros oil slick detection system

Additional equipment
Gas detector, Mini Lab, Flashpoint tester, Oleometer


Sweeping arm


Boom


Tarantula skimmer


Slick detection system

ABOUT THE VESSEL - Sara


The Sara's commercial activity is bunkering services.



IMO Number: 8814861
Flag State: Malta
Port of Registry: Valletta
Type: Oil Tanker
Built: 1990 (double hull conversion in 2003)
Length: 111.30 m
Breadth: 16.50 m
Max. Draft: 7.0 m
DWT: 7389 Ton
Gross Tonnage: 4156 Ton
Net Tonnage: 1947 Ton
Storage capacity: 6658 m³
Heating capacity: 2394 kW
Pumping capacity: 2550 m³/h
Flash Point: < 60°
Propeller: Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 14 knots
Classification Society: Bureau Veritas

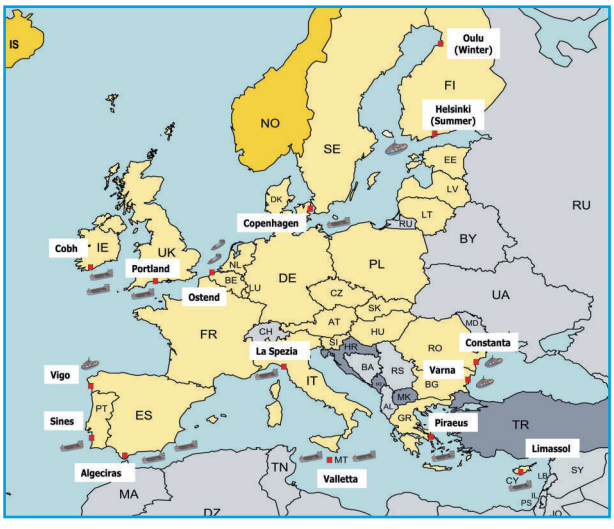
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

ATLANTIC — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Remolcanosa S.A.

CONTRACTED VESSEL(S)
Ria de Vigo

AREA OF ECONOMIC OPERATION
Spain, North-western Coast (Galicia)

STOCKPILE LOCATION
Vigo, Spain

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 24 hours

ABOUT THE SERVICE

The Contractor, Remolcanosa, is a marine services company based in Vigo and has a worldwide operational capacity. The main activities include harbour towage, salvage, offshore and coastal towage, crew and vessels management and ISM and ISPS Codes Consulting.

The arrangement includes the supply vessel Ria de Vigo, which is based in Vigo providing Fisheries Monitoring Services. The equipment is permanently installed onboard.

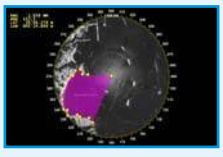
EQUIPMENT STOCKPILE

Sweeping arms
Two Sofreba rigid sweeping arms (13 m) with weir skimmer
Boom
Desmi heavy duty boom, 2x250 m (Ro-Boom 2000)
Skimmer
Framo weir/shovel drum high-capacity multiskimmer (Transrec 150)
Desmi weir skimmer (Terminator)
Slick detection
Seadarq oil slick detection system
Additional equipment
Gas detector, Mini Lab, Flashpoint tester, Cleaning mach.


Sweeping arms


Transrec multiskimmer


Heavy duty boom


Slick detection

ABOUT THE VESSEL - Ria de Vigo


The Rio de Vigo's commercial activity is fisheries control.



IMO number: 8311417
Flag state: Spain
Port of registry: Santa Cruz de Tenerife
Type: Supply Vessel
Built: 1985
Length: 69.00 m
Breadth: 13.50 m
Max draft: 6.80 m
Gross Tonnage: 1585 Ton
Storage capacity: 1522 m³
Heating capacity: 750 kW
Pumping capacity: 625 m³/h
Flash Point: >60°
Propeller: 2 x Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 14.25 knots
Classification Society: Germanischer Lloyd

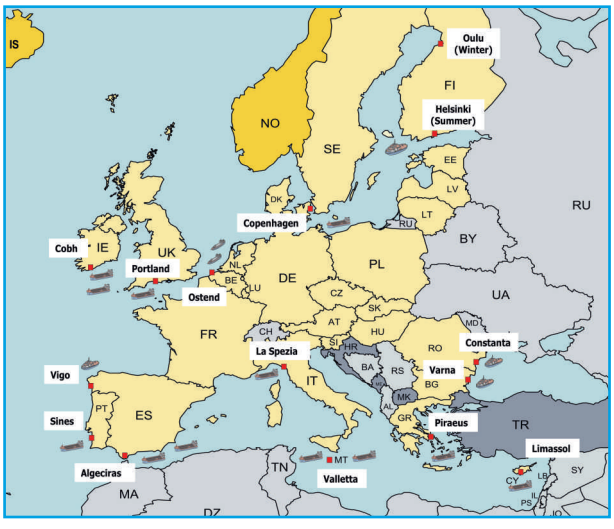
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

ATLANTIC — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Lamor Corporation/Mureloil

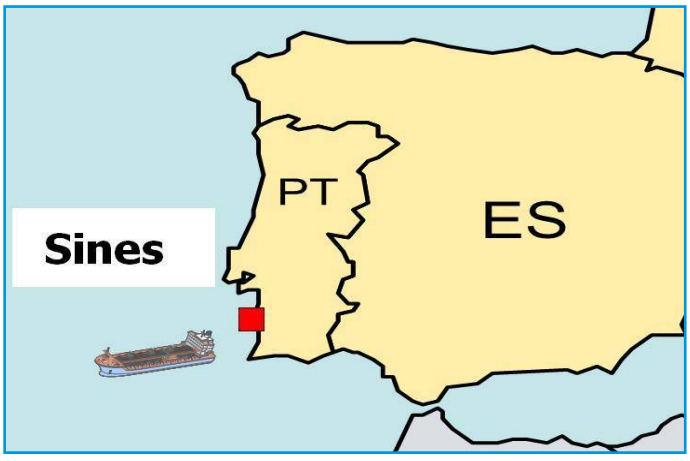
CONTRACTED VESSEL(S)
Bahia Tres

AREA OF ECONOMIC OPERATION
Western coast of Portugal, mainly between Sines and Lisbon

STOCKPILE LOCATION
Sines, Portugal

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 15 hours



ABOUT THE SERVICE

The main Contractor of this arrangement is Lamor, Finland based company, supplying oil spill recovery equipment and services globally. The sub-contractor providing the ship is Mureloil, result of a Joint Venture between Naviera Murueta and Naviera Elcano, both of them Spanish shipowners.

The vessel in this arrangement, Bahia Tres, provides bunkering services along the Portuguese coast. The equipment stockpile is located in Sines.

EQUIPMENT STOCKPILE

Sweeping arms
Two Lamor rigid sweeping arms (12 m) with weir/brush skimmer module (LJS 12)
Boom
Norlense single point inflation boom, 2x250 m (NO-800-R)
Skimmer
Lamor offshore brush skimmer (LFF 100 2C)
Slick detection
Seadarq oil slick detection system
Additional equipment
Oil water separator, Gas detector, Mini Lab, Flashpoint tester, Portable cleaning machine


Sweeping arm


Boom and brush skimmer


Norlense boom


Sweeping arm skimmer

ABOUT THE VESSEL - Bahia Tres


The Bahia Tres' commercial activity is bunkering services.



IMO Number: 9428671
Flag State: Spain
Port of Registry: Santa Cruz de Tenerife
Type: Product Tanker
Built: 2007
Length: 99.80 m
Breadth: 18.00 m
Max. Draft: 7.00 m
DWT: 6920 Ton
Gross Tonnage: 4969 Ton
Net Tonnage: 1859 Ton
Storage capacity: 7413 m³
Heating capacity: 2300 kW
Pumping capacity: 2050 m³
Flash Point: >60°C
Propeller: Fixed Pitch Propeller
Bow Thruster: Yes
Max. speed: 12.7 knots
Classification Society: ABS and Bureau Veritas

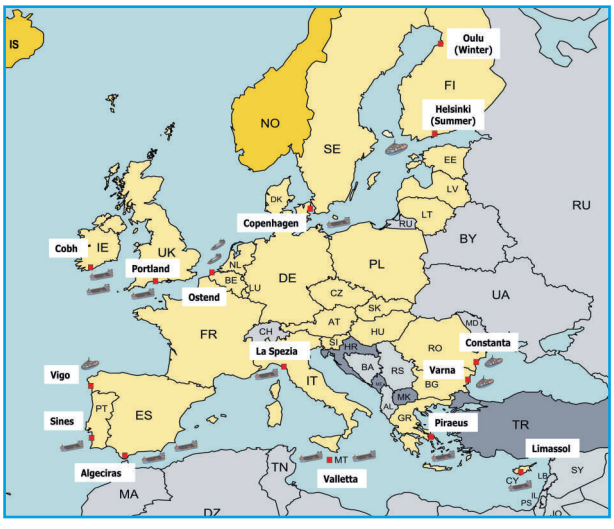
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

Mediterranean Sea

MEDITERRANEAN NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Mureloil

CONTRACTED VESSEL(S)
Bahia Uno

AREA OF ECONOMIC OPERATION
Vicinity of Algeciras (southern Spain)

STOCKPILE LOCATION
Algeciras, Spain

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 12 hours

ABOUT THE SERVICE

The Contractor, Mureloil, is the result of a Joint Venture between Naviera Murueta and Naviera Elcano, both of them Spanish shipowners. The company was created to provide bunkering services. The vessel is chartered to Repsol, a Spanish oil company, which has agreed to provide pollution response services with this ship.

The arrangement comprises Bahia Uno which provides bunkering services in the Algeciras Bay and neighbouring ports. The equipment stockpile is located in Algeciras.

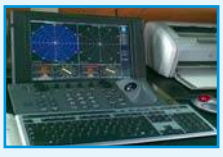
EQUIPMENT STOCKPILE

Sweeping arms
Two Lamor rigid sweeping arms (12 m) with weir/brush skimmer module (LJS 12)
Boom
Markleen single point inflation boom, 2x250 m (Uniboom X-1900)
Skimmer
Lamor offshore brush skimmer (LFF 100 2C)
Slick detection
Miros oil slick detection system
Additional equipment
Gas Detector, Mini Lab, Flashpoint tester, Cleaning mach.

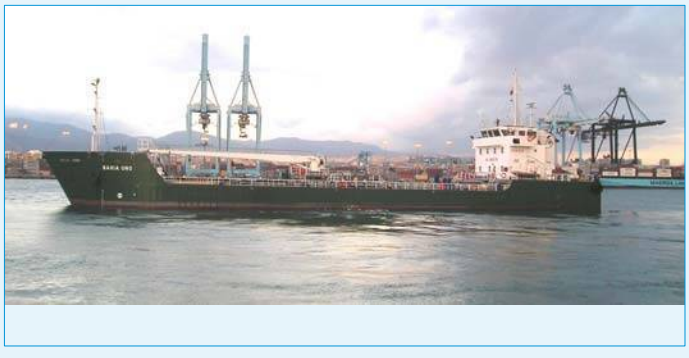

Sweeping arm skimmer


Offshore skimmer


Boom


Slick detection

ABOUT THE VESSEL - Bahia Uno


The Bahia Uno is a bunkering vessel



IMO Number: 9312274
Flag State: Spain
Port of Registry: Santa Cruz de Tenerife
Type: Product Tanker
Built: 2004
Length: 71.01 m
Breadth: 15.60 m
Max. Draft: 5.80 m
DWT: 3808 Ton
Gross Tonnage: 2200 Ton
Net Tonnage: 1110 Ton
Storage capacity: 3800 m³
Heating capacity: 1490 kW
Pumping capacity: 1400 m³/h
Flash Point: >60°
Propeller: Fixed Pitch Propeller
Bow Thruster: Yes
Max. speed: 12 knots
Classification Society: Bureau Veritas

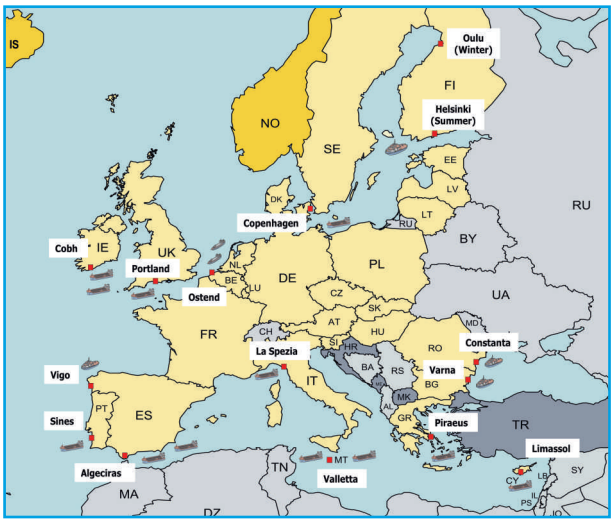
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

MEDITERRANEAN NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Naviera Altube

CONTRACTED VESSEL(S)
Monte Anaga

AREA OF ECONOMIC OPERATION
Vicinity of Algeciras (southern Spain)

STOCKPILE LOCATION
Algeciras, Spain

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 24 hours

ABOUT THE SERVICE

The arrangement comprises the tanker Monte Anaga which provides bunkering services in Algeciras for oil company CEPSA. The pollution response equipment is located on board the vessel.

The Contractor, Naviera Altube, is part of Ibaizabal Group of Companies which is a provider of integrated ship management services to the international shipping and offshore industries.

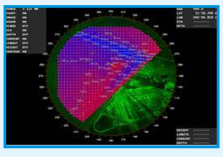
EQUIPMENT STOCKPILE

Sweeping arms
Two Lamor rigid sweeping arms (12 m) with weir/brush skimmer module (LJS 12)
Boom
Norlense single point inflation boom, 2x250 m (NO 800R)
Skimmer
Lamor offshore brush skimmer (LFF 400 W)
Slick detection
Seadarq oil slick detection system
Additional equipment
Gas Detector, Cleaning machines


Sweeping arm


Offshore skimmer


Boom


Slick detection

ABOUT THE VESSEL - Monte Anaga


The Monte Anaga is a bunkering vessel



IMO Number: 9551399
Flag State: Spain
Port of Registry: Santa Cruz de Tenerife
Type: Oil Tanker
Built: 2010
Length: 87.16 m
Breadth: 15.30 m
Draft: 5.30 m
DWT: 4335 Ton
Gross Tonnage: 2651 Ton
Storage capacity: 4069 m³
Heating capacity: 2000 kW
Pumping capacity: 1000 m³/h
Flash Point: >60°
Propeller: 2 x Controlable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12.5 knots
Classification Society: Bureau Veritas

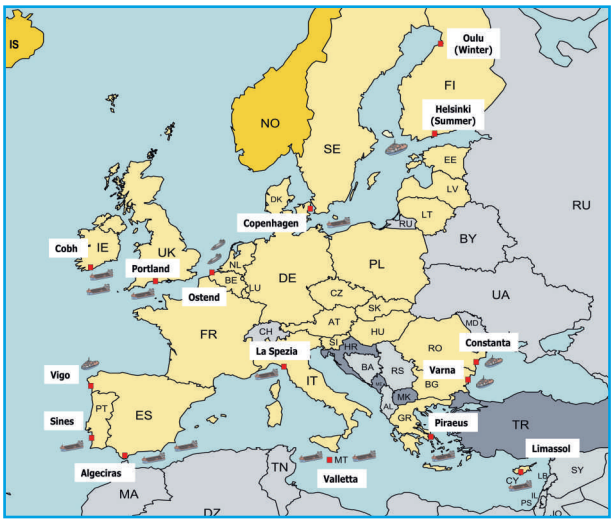
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

MEDITERRANEAN NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Tankship Management

CONTRACTED VESSEL(S)
Salina Bay

AREA OF ECONOMIC OPERATION
Central Mediterranean Sea

STOCKPILE LOCATION
La Spezia, Italy

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 24 hours

ABOUT THE SERVICE

Tankship Management was set up in 1985 to manage and operate tanker vessels, and is a subsidiary of Malta-based Virtu Holding Ltd., which operates passenger transport, bunkering, ship repairing, fendering and shipping services. Virtu Holding's facilities include an oil storage facility and floating dry dock.

The arrangement is based on the oil tanker Salina Bay. The tanker carries out most of its bunkering operations close to the port and can be mobilised at short notice.

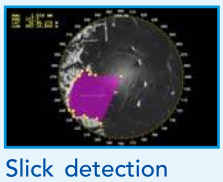
EQUIPMENT STOCKPILE

Sweeping arms
Koseq rigid sweeping arms (12 m) with weir skimmer
Boom
Markleen single point inflation boom, 2x250 m (Uniboom X-1900)
Skimmer
Desmi weir/brush/disc skimmer (Tarantula)
Slick detection
Seadarq oil slick detection system
Additional equipment
Gas detector, Mini Lab, Flashpoint tester, Portable cleaning machine


Sweeping arm


Offshore skimmer


Boom


Slick detection

ABOUT THE VESSEL - Salina Bay


The Salina Bay's commercial activity is bunker operations.

IMO Number: 8013118
Flag State: Malta
Port of Registry: Valletta
Type: Oil Tanker
Built: 1981
Length: 74.70 m
Breadth: 13.10 m
Max. Draft: 5.53 m
DWT: 3027 Ton
Gross Tonnage: 1676 Ton
Storage capacity: 2800 m^3
Heating capacity: 2800 kW
Pumping capacity: 1975 m^3/h
Flash Point: >60°
Propeller: Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12 knots
Classification Society: Lloyds Register

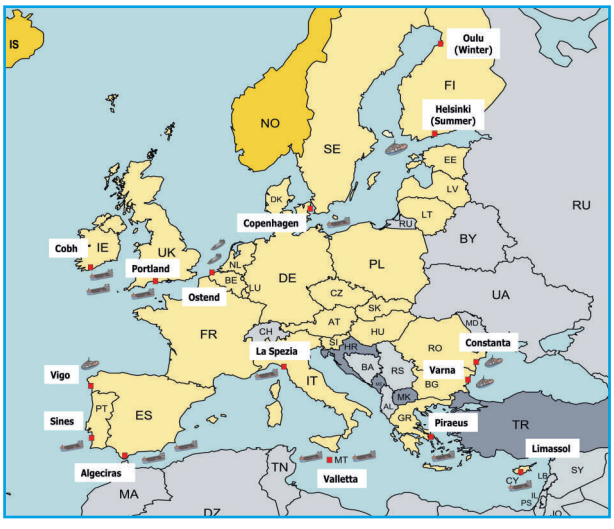
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

MEDITERRANEAN NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Tankship Management

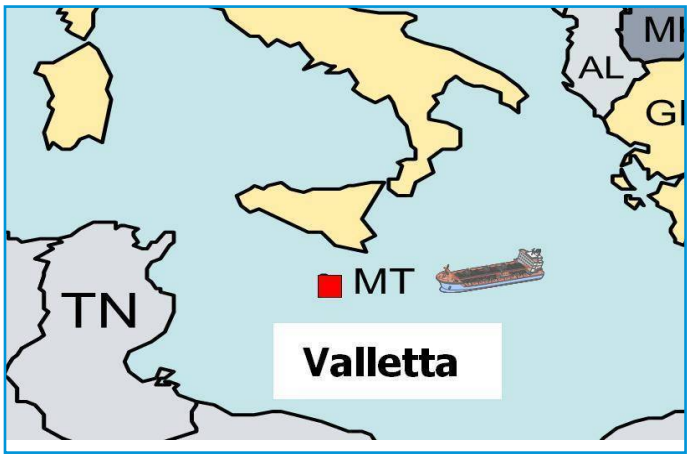
CONTRACTED VESSEL(S)
Balluta Bay

AREA OF ECONOMIC OPERATION
Valletta port and neighbouring area, Malta

STOCKPILE LOCATION
Valletta, Malta

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 49 hours



ABOUT THE SERVICE

Tankship Management was originally set up in 1985 to manage and operate tanker vessels. The company is a subsidiary of Virtu Holding Ltd., a group which operates passenger transport, bunkering, ship repairing, fendering and shipping in general. The consortium has facilities in Malta for a 25,000 tonne land-based oil storage facility and a 130 m floating dry dock with ancillary workshops for steel and machinery works.

The arrangement is based on the oil tanker Balluta Bay operating in Valletta port and the neighbouring area.

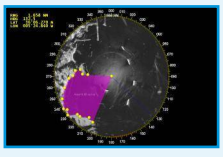
EQUIPMENT STOCKPILE

Sweeping arms
Two Koseq rigid sweeping arms (12 m) with weir skimmer
Boom
Markleen single point inflation boom, 1x300 m (Uniboom X-1900)
Skimmer
Desmi weir skimmer (Tarantula)
Slick detection
Seadarq oil slick detection system
Additional equipment
Oil water separator, Oil-in-water monitor, Gas detector, Mini Lab, Flashpoint tester, Portable cleaning machine


Sweeping arm


Skimmer


Boom


Slick detection

ABOUT THE VESSEL - Balluta Bay

The Balluta Bay's commercial activity is bunkering services.

IMO Number: 8013091
Flag State: Malta
Port of Registry: Valletta
Type: Oil Tanker
Built: 1981
Length: 74.12 m
Breadth: 13.10 m
Max. Draft: 5.52 m
DWT: 3027 Ton
Gross Tonnage: 1676 Ton
Storage capacity: 2192 m^3
Heating capacity: 2209 kW
Pumping capacity: 1260 m^3/h
Flash Point: >60°C
Propeller: Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12 knots
Classification Society: Lloyds Register

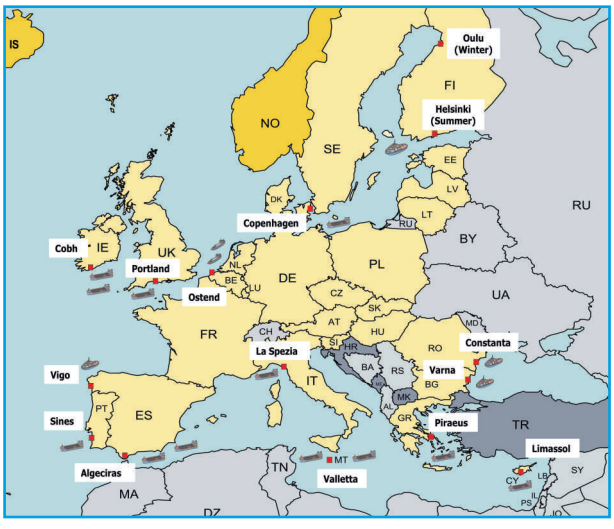
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

MEDITERRANEAN NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Falzon Group Holdings

CONTRACTED VESSEL(S)
Santa Maria

AREA OF ECONOMIC OPERATION
Valletta and Marsaxlokk, Malta

STOCKPILE LOCATION
Marsaxlokk, Malta

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 24 hours

ABOUT THE SERVICE

Falzon Group was the first entity in Malta to be given a bunker operator's licence by the Maltese authorities. The company is today a reputable bunker trader and supplier on the Maltese Islands. The marine industry serviced by the Falzon Group comprises not only locally-owned and operated vessels, but also vessels and seacraft visiting the islands for commercial and leisure purposes.

The vessel Santa Maria provides bunkering services, with an equipment stockpile located in Valletta.

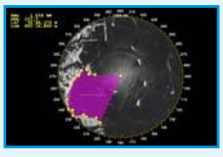
EQUIPMENT STOCKPILE

Sweeping arms
Two Koseq rigid sweeping arms (15 m) with weir skimmer
Boom
Desmi heavy duty boom, 2x250 m (Ro-Boom 2000)
Skimmer
Noren weir/brush high-capacity multiskimmer (Normar 200TI)
Slick detection
Seadarq oil slick detection system
Additional equipment
Oil water separator, Oil-in-water monitor, Gas detector, Mini Lab, Flashpoint tester, Portable cleaning machine


Sweeping arm


Normar multiskimmer


Heavy duty boom


Slick detection

ABOUT THE VESSEL - Santa Maria

The Santa Maria's commercial activity is bunkering services.



IMO Number: 7423732
Flag State: Malta
Port of Registry: Valletta
Type: Oil Tanker
Built: 1977
Length: 93.10 m
Breadth: 14.05 m
Draft: 6.82 m
Gross Tonnage: 2813 Ton
Storage capacity: 2421 m³
Heating capacity: 3630 kW
Pumping capacity: 1780 m³/h
Flash Point: <60°
Propeller: Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 14 knots
Classification Society: Lloyds Register

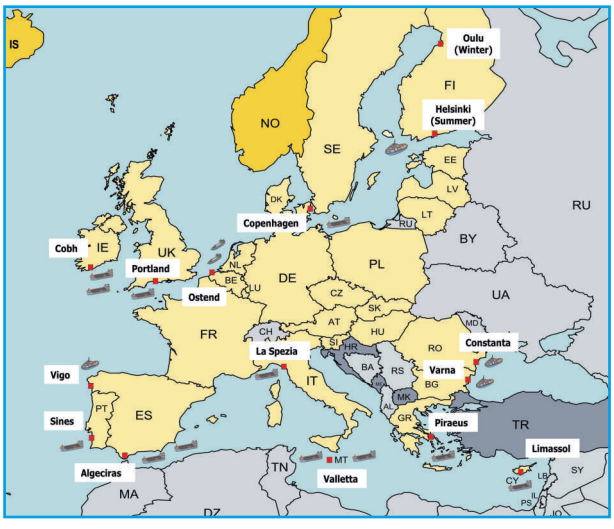
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

AEGEAN SEA — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Environmental Protection Engineering (EPE)

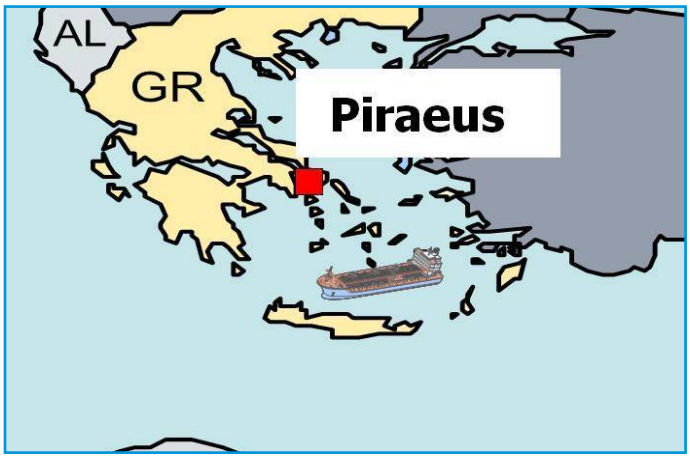
CONTRACTED VESSEL(S)
Aktea OSRV, Aegis I

AREA OF ECONOMIC OPERATION
Aegean sea/Greek islands

STOCKPILE LOCATION
Piraeus, Greece

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 20 hours



ABOUT THE SERVICE

The arrangement includes a tanker, Aktea OSRV, trading in Greek waters and a stockpile permanently installed onboard. The second vessel, Aegis I, is a back-up vessel equipped with a boom and a skimmer.

Environmental Protection Engineering is one of the major companies in the field of environmental protection in Greece and the wider area of the Eastern Mediterranean, with a variety of activities: marine pollution response, wreck removal, waste management, remediation and handling of polluted or destroyed cargoes.

EQUIPMENT STOCKPILE

Sweeping arms
Two Koseq rigid sweeping arms (15 m) with weir skimmer
Boom
Markleen single point inflation, 2x250 m (Uniboom X-1900)
Desmi heavy duty boom, 2x250 m (Ro-Boom 2000)
Skimmer
Foilex weir skimmer (TDS 250)
High-capacity Offshore Multiskimmer (Normar 250 TI)
Desmi weir/brush/disc skimmer (Tarantula)
Slick detection
Seadarq oil slick detection system
Additional equipment: Gas detector, Mini Lab, etc.


Sweeping arm


Foilex skimmer


Markleen boom


Normar Multiskimmer

ABOUT THE VESSEL - Aktea OSRV


The Aktea OSRV's commercial activity is oil trading.



IMO Number: 8801321
Flag State: Greece
Port of Registry: Piraeus
Type: Oil Tanker
Built: 1989
Length: 78.50 m
Breadth: 12.60 m
Max Draft: 6.20 m
DWT: 2500 Ton
Gross Tonnage: 1646 Ton
Storage capacity: 3000 m³
Heating capacity: 3000 kW
Pumping capacity: 1000 m³
Flash Point: < 60°C
Propeller: Contrllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12.6 knots
Classification Society: Lloyds Register

EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RECOVERY VESSELS - INFO SHEET

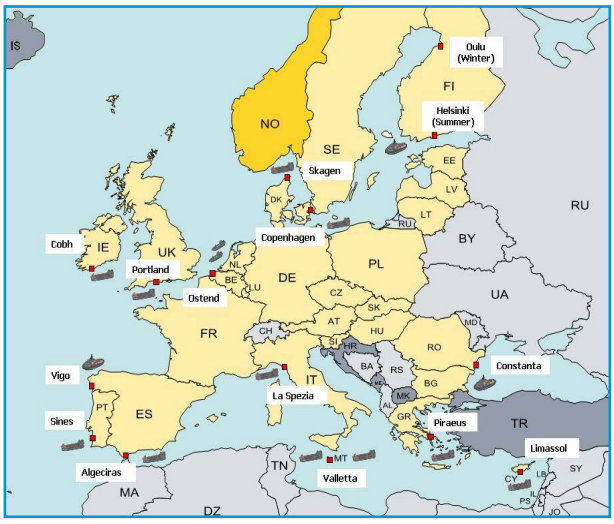
ABOUT THE VESSEL - Aegis I

The Aegis I is an ofshore supply vessel

IMO Number: 7392957
Flag State: Greece
Built: 1985
Type: Supply Vessel
Length: 61.50 m
Breadth: 11.50 m
Max. Draft: 3.50 m
DWT: 1023 Tons
Gross Tonnage: 1274 Tons
Storage capacity: 997 m³
Flash Point: > 60°C
Propeller: 2 x Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12.7 knots
Classification Society: DNV

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m³)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

Eastern Mediterranean

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Petronav Ship Management

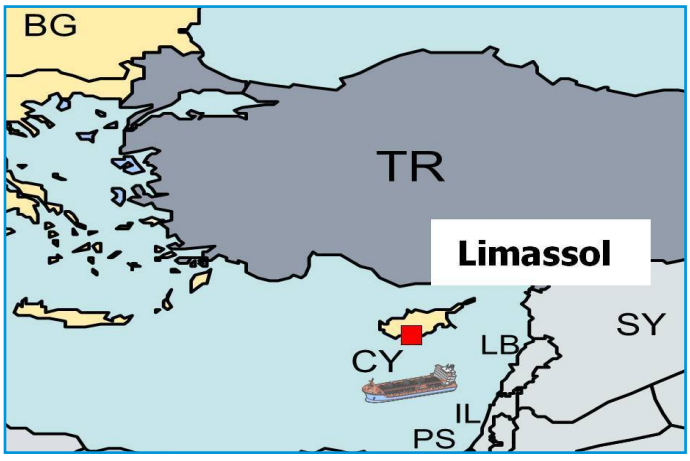
CONTRACTED VESSEL(S)
Alexandria

AREA OF ECONOMIC OPERATION
Eastern Mediterranean Sea

STOCKPILE LOCATION
Limassol, Cyprus

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 24 hours



ABOUT THE SERVICE

Petronav Ship Management Limited was established in 1998 and offers comprehensive shipmanagement services. The company is located in Limassol, Cyprus, and aims to provide high quality services with a long-term perspective. Currently, Petronav Ship Management operates five oil tankers.

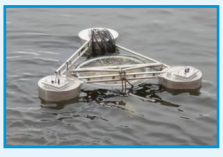
The arrangement comprises the oil tanker Alexandria which transports oil between Haifa (Israel) and Cyprus mainly for its own bunkering vessels. The pollution response equipment will be permanently stored onboard the Alexandria.

EQUIPMENT STOCKPILE

Sweeping arms
Two Lamor rigid sweeping arms (15 m) with weir/brush skimmer module (LSS 15)
Boom
Lamor heavy duty single point inflation boom, 2x250 m (LAN 2200)
Skimmer
Lamor free floating weir/brush skimmer (LWS 1300)
Detection
Miros oil slick detection system
Additional equipment
Gas detector, Mini Lab, Flashpoint tester, Cleaning mach.


Sweeping arm


Oil transfer pump


Skimmer


Boom deployed

ABOUT THE VESSEL - Alexandria


The Alexandria's commercial activity is as an oil tanker.

IMO Number: 9448889
Flag State: Cyprus
Port of Registry: Limassol
Type: Oil Tanker
Length: 94.00 m
Breadth: 18.50 m
Max. Draft: 9.60 m
DWT: 6379 Ton
Gross Tonnage: 5034 Ton
Net Tonnage: 1686 Ton
Storage capacity: 7458 m³
Heating capacity: 5742 kW
Pumping capacity: 1850 m³/h
Flash Point: <60°C
Propeller: Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12.6 knots
Classification Society: ABS

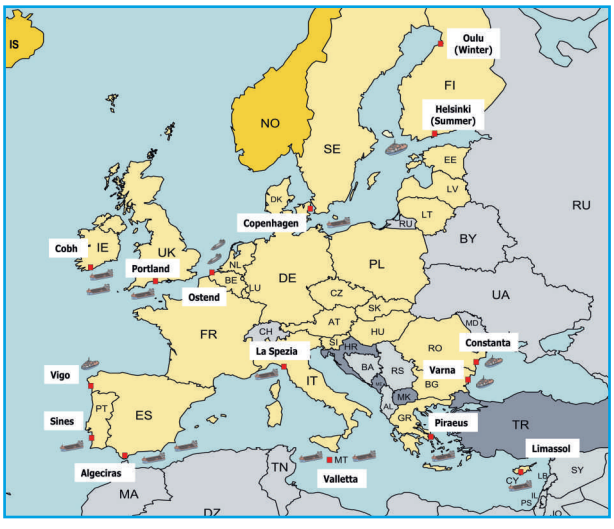
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

Black Sea

BLACK SEA — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
BM Gust

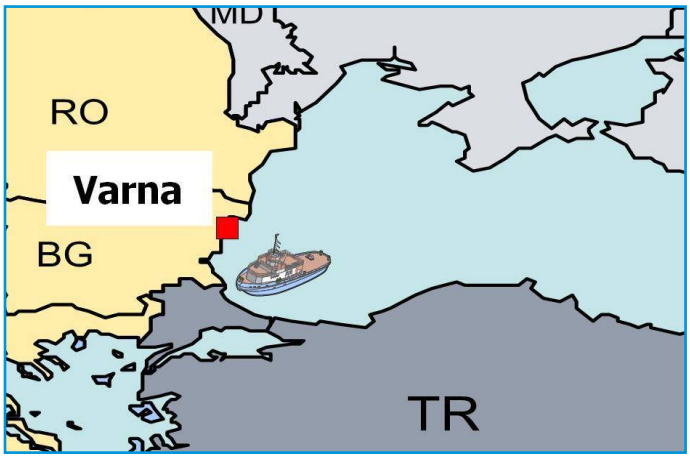
CONTRACTED VESSEL(S)
Enterprise

AREA OF ECONOMIC OPERATION
Vicinity of Varna

STOCKPILE LOCATION
Varna, Bulgaria

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 14 hours



ABOUT THE SERVICE

The arrangement comprises an offshore supply vessel operating in the vicinity of Varna, Bulgaria, providing supply service to the offshore installations.

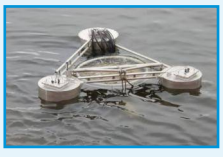
The main activity of the contractor BM Gust is marine transportation and ship brokerage. The company owns two vessels, actively involved in offshore drilling operations.

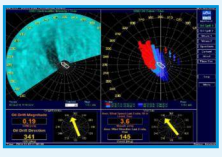
EQUIPMENT STOCKPILE

Two Lamor rigid sweeping arms (15 m) with weir/brush skimmer module (LSS 15)
Boom
Lamor heavy duty boom, 2x250 m (HDB 2000)
Skimmer
Lamor free floating brush skimmer (LWS 1300)
Slick detection
Miros oil slick detection system
Additional equipment
Gas detector, Mini Lab, Flashpoint tester, Cleaning machines


Sweeping arm


Heavy duty boom


Skimmer


Slick Detection

ABOUT THE VESSEL - Enterprise


The Enterprise's commercial activity is as a supply vessel.



IMO Number: 7424774
Flag State: Bulgaria
Port of Registry: Varna
Type: Supply Vessel
Built: 1975
Length: 64.40 m
Breadth: 13.80 m
Max. Draft: 5.70 m
DWT: 2366 Ton
Gross Tonnage: 1313 Ton
Storage capacity: 1374 m³
Heating capacity: 1000 kW
Pumping capacity: 700 m³/h
Flash Point: > 60°C
Propeller: 2 x Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12.7 knots
Classification Society: RINA

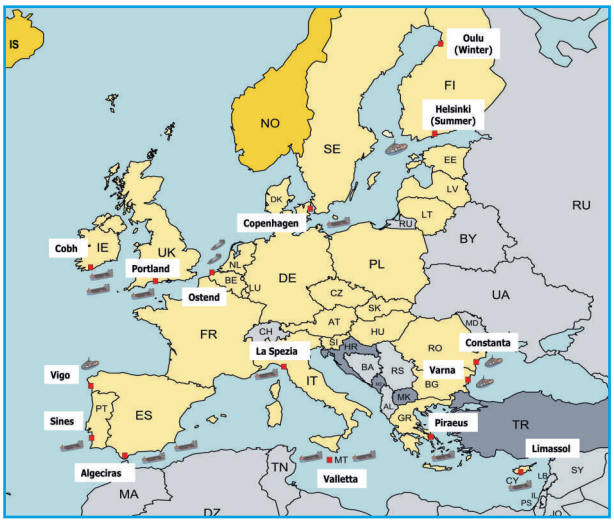
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

BLACK SEA — NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

CONTRACTOR
Grup Servicii Petroliere (GSP)

CONTRACTED VESSEL(S)
GSP Orion

AREA OF ECONOMIC OPERATION
Constanta Oilfield, 30 nm off Constanta

STOCKPILE LOCATION
Constanta, Romania

NUMBER OF VESSELS TO BE MOBILISED
1

MOBILISATION TIME
Within 24 hours

ABOUT THE SERVICE

GSP is a member of Upetrom Group and is headquartered in Constanta Harbour, Romania. GSP is a regional leader in offshore drilling, providing a wide range of offshore drilling and connected services, engineering solutions and technical consultancy.

The arrangement consists of one vessel (the GSP Orion, 1334 m³ recovered oil storage capacity) with one equipment stockpile in Constanta, Romania. For oil recovery operations rigid sweeping arms, boom and two skimmer systems are available.

EQUIPMENT STOCKPILE

Sweeping arms
Two Lamor rigid sweeping arms (12 m) with weir/brush skimmer module (LSS 12)
Boom
Lamor heavy duty boom, 2x250 m (HDB 2000)
Skimmer
Framo weir/shovel drum high-capacity multiskimmer (Transrec 150)
Lamor free floating brush skimmer (LFF 100 2C)
Slick detection
Miros oil slick detection system
Additional equipment
Gas detector, Mini Lab, Flashpoint tester, Cleaning mach.


Sweeping arms


Brush skimmer


Heavy duty boom


Transrec multiskimmer

ABOUT THE VESSEL - GSP ORION

The GSP Orion's commercial activity is supplying oil rigs.



IMO number: 8102517
Flag state: Isle of Man
Port of registry: Douglas
Type: Supply Vessel
Built: 1983
Length: 60.00 m
Breadth: 16.80 m
Max draft: 6.20 m
DWT: 3003 Ton
Gross Tonnage: 1599 Ton
Storage capacity: 1334 m³
Heating capacity: 1700 kW
Pumping capacity: 830 m³/h
Flash Point: > 60°
Propeller: 2 x Controllable Pitch Propeller
Bow Thruster: Yes
Max. speed: 12 knots
Classification Society: DNV

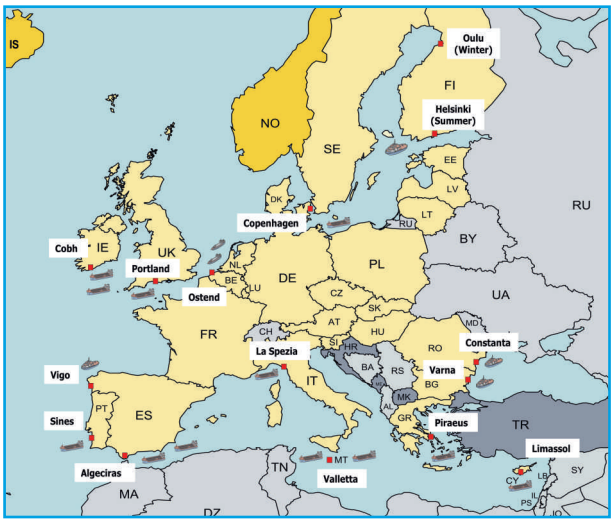
EUROPEAN MARITIME SAFETY AGENCY

QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

NETWORK OF STAND-BY OIL SPILL RESPONSE VESSELS - INFO SHEET

ADVANTAGES OF RESPONSE SYSTEMS

- State of the art equipment which provides good effectiveness for pollution response
- Flexibility of the response systems allows different operational configurations
- Sweeping arms tailored for recovery of heavy viscous oil



EMSA's vessel network provides a service across the European coastline. For more information, visit the EMSA web site and consult the related brochure: 'Supporting Coastal States: Service Network of Stand-by Oil Spill Response Vessels', or watch the video 'Oil Spill Response Services, Video 2009'

Name	Type	Area of Economic Operation and Equipment Depot	Tank Capacity (m^3)
Kontio	Icebreaker	Baltic Sea North Oulu and Helsinki, Finland	2033
OW Copenhagen	Chemical Product Tanker	Baltic Sea South Copenhagen, Denmark	4487
DC Vlaanderen 3000	Suction Hopper Dredger	North Sea Ostend, Belgium	2744
Interballast III	Suction Hopper Dredger		1886
Forth Fisher*	Product Tanker	Atlantic Cobh, Ireland	4754
Galway Fisher*	Oil Tanker		4754
Mersey Fisher*	Product Tanker		5028
Sara	Oil Tanker	Atlantic/Channel Portland, the UK	6658
Ria de Vigo	Supply Vessel	Atlantic Vigo, Spain	1522
Bahia Tres	Product Tanker	Atlantic Sines, Portugal	7413
Bahia Uno	Product Tanker	Mediterranean West Algeciras, Spain	3800
Monte Anaga	Oil Tanker	Mediterranean West Algeciras, Spain	4069
Salina Bay	Oil Tanker	Mediterranean West La Spezia, Italy	2800
Balluta Bay	Oil Tanker	Mediterranean Central Valletta, Malta	2192
Santa Maria	Oil Tanker	Mediterranean Central Valletta, Malta	2421
Aktea OSRV	Oil Tanker	Mediterranean East Piraeus, Greece	3000
Aegis I**	Supply Vessel		997
Alexandria	Oil Tanker	Mediterranean East Limassol, Cyprus	7458
Enterprise	Supply Vessel	Black Sea Varna, Bulgaria	1374
GSP Orion	Supply Vessel	Black Sea Constanta, Romania	1334

Note:
* This is a pool of three similar sized tankers from which two can be mobilised simultaneously.
** Aegis I is a back-up vessel equipped with boom and skimmer systems.

FOR MORE INFORMATION: www.emsa.europa.eu

Pollution Response Equipment Information Sheets

Sweeping Arms

KOSEQ SWEEPING ARM SYSTEM

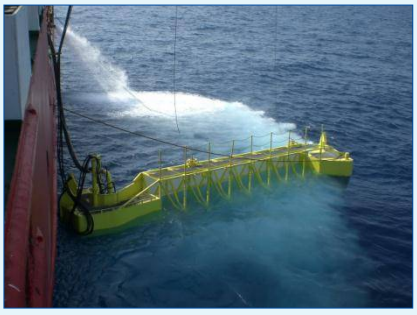
Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Koseq rigid sweeping arm system consists of a sweeping arm structure with foldable ends, oil transfer pumps, ancillaries, control panel, oil and hydraulic hoses, crane and hydraulic power pack.

The sweeping arm system is supplied with an integrated weir skimmer and centrifugal pump with screw impeller, Marflex MSP150-63, pre-installed with a hot water current radial system to facilitate pumping of high viscosity oil. A brush cassette with a movable debris screen can also be used for the recovery of high viscosity oil. The system is equipped with a remotely controlled self-cleaning grating to prevent debris to obstruct the skimmer and the pump.

The oil collecting system consists of two sweeping arms, with a total length of either 12 or 15 meters. The sweeping arm is launched by means of a crane or davit on the vessel. Two Lagendijk cranes specially designed for this purpose, are most commonly used to operate the sweeping arms.



The oil/water mixture is guided along the bulkheads of the sweeping arm and the side of the vessel via an adjustable debris screen to the oil collecting chamber of the inner pontoon, from which it is removed by a hydraulically driven portable submersible cargo oil pump and discharged into the oil collecting tanks via a flexible hose.

The vessel equipped with the sweeping arms is capable to remove oil from the sea up to Beaufort 5. The current between vessel and oil slick must be up to 2 knots and the forward speed of the vessel should be maximum 4 knots.

KEY CHARACTERISTICS:

- Rigid sweeping arm with length of 12/15 m with a foldable end
- Lifting crane/davit
- Weir skimmer module with a centrifugal pump using a hot water radial system
- Brush skimmer module with a PDAS pump
- Remotely controlled debris screen

TECHNICAL SPECIFICATIONS – 12 /15 METER SWEEPING ARM			
Overall Length	12074/15115 mm	Operational temperature	-20°C to 60°C
Overall Width	3412/3330 mm	Operational window	up to Beaufort 5
Overall Height	1900/3335 mm	Recovery speed	up to 4 knots
Weight	4300/4800 kg	Deployment time	approx. 10 min. each arm

KOSEQ SWEEPING ARM SYSTEM

Remark: The information is based on the manufacturer's documentation

WEIR SKIMMER MODULE

The weir module consist of an oil collection chamber fitted with a pump. The height of the oil collecting chamber can be adjusted in order to optimise the flow to the pump. The optimal height depends on oil viscosity, thickness of the layer etc.

For the operation with the weir skimmer module each sweeping arm is fit with a centrifugal screw impeller pump MSP 150/63 which has a discharging capacity of 300 m^3 per hour.

BRUSH SKIMMER MODULE

This skimmer consists of an aluminium oil collection chamber, brush belt and a pump. The height of the collection chamber can be adjusted.

For the operation with the brush skimmer module, each sweeping arm is fit with a Desmi DOP 250 pump which has a discharging capacity of 125 m^3 per hour.

POWER PACK

The Marflex type DHP-120 Explosion proof Zone 2 power pack is a compact diesel engine driven hydraulic unit.

TECHNICAL SPECIFICATIONS:

Length:	2200 mm
Width:	1200 mm
Height:	2025 mm
Weight:	2200 kg
Rated power:	76.5 kW at 2400 rpm
Max. pressure:	320 bar
Hydraulic oil flow :	120 l/min
Fuel tank:	400 l
Fuel consumption :	0.26 l/kW/h

This system is available on board the EMSA Contracted Vessels in following variations:

Name	Length	Skimmer	Crane (2x)	Power pack (2x)	Flash point* Ex Class
Forth Fisher Galway Fisher Mersey Fisher	15 m	Weir/brush	Lagendijk	Marflex DHP-120	Zone 2
	15 m	Weir		Marflex DHP-120	Zone 2
Sara	15 m	Weir/brush	Lagendijk	Hydraulic power provided by the vessel	N.A.
DC Vlaanderen	12 m	Weir	Veegarmen	Hydraulic power provided by the vessel	N.A.
Interballast III	12 m	Weir	Veegarmen	Hydraulic power provided by the vessel	N.A.
Salina Bay	12 m	Weir	Lagendijk	Marflex DHP-120	Zone 2
Balluta Bay	12 m	Weir	Lagendijk	Marflex DHP-120	Zone 2
Santa Maria	15 m	Weir	Lagendijk	Marflex DHP-120	Zone 2
Aktea OSRV	15 m	Weir	Lagendijk	Marflex DHP-120	Zone 2

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

LAMOR STIFF SWEEPING RECOVERY SYSTEM

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The sweeping arm system includes two arms with a length of either 12 or 15 meters. Each sweeping arm consists of an outer pontoon, a bridge and an inner pontoon welded together. In this inner pontoon either a weir or brush skimmer module is fitted. The inner pontoon contains the collection chamber in which the pump (centrifugal or PDAS) is fitted.

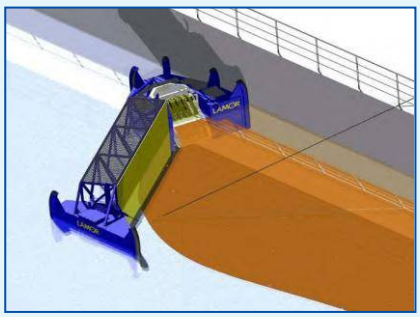
The free floating arm is stored and locked with twist locks on the deck. When in recovery position, the inner float leans against the ship side. The float is protected with round fenders allowing the arm to move with the ship's rolling movement and waves.

The construction is made of aluminium and steel. The oil guiding plate is made of polyethylene, an easy to clean surface, where the oil does not stick.

The sweeping arms are launched via a set of cranes. Two Hidroacar cranes specially designed for this purpose, are most commonly used to operate the sweeping arms.

The Lamor oil recovery system uses the forward motion of the vessel to deflect surface water and oil towards the collection area formed by the apex of the stiff sweeping arm. The oil is collected by the skimmer and pumped on board into the storage tanks.

The vessel equipped with the sweeping arms is capable to remove oil from the sea up to Beaufort 5. The Lamor stiff sweeping recovery system collects oil at speeds of up to 3 knots, depending on the wave height and other operating conditions.



KEY CHARACTERISTICS:

- Stiff sweeping arm with length of 12 or15 m
- Lifting crane/davit
- Weir skimmer module with a centrifugal pump
- Brush skimmer module with a PDAS pump with hot water injection

TECHNICAL SPECIFICATIONS – 12 /15 METER SWEEPING ARM			
Length	1200/15000 mm	Operational temperature	-20°C to 60°C
Width	3300/3300 mm	Operational window	up to Beaufort 5
Height	1900/2130 mm	Recovery speed	up to 3 knots
Weight	4000/4100 mm	Deployment time	approx. 10 min. each arm

LAMOR STIFF SWEEPING RECOVERY SYSTEM

Remark: The information is based on the manufacturer's documentation

WEIR SKIMMER MODULE

The weir module consists of a stainless steel hopper fitted with the oil pump. A plate that hinges up and down, depending on the oil-water inflow rate, is assembled in the fore part of the hopper.

For the operation with the weir skimmer the sweeping arm is fitted with a centrifugal screw impeller pump MSP 150/63 which has a discharging capacity of 300 m^3 per hour.

BRUSH SKIMMER MODULE

The brush module consists of 5 parallel brush chains. It is suitable for collecting oils with high viscosity up to 3,000,000 cSt. The conveyor belt is mounted in the apex of the stiff arm and is removable. The brush cleaning mechanism is a comb-like device mounted at the upper end of the brush conveyor.

For the operation with the brush skimmer module, the sweeping arm is equipped with Lamor GT A 115 or 140 PDAS pump as it is capable to handle high viscous oils and the pumping rate meets the feeding capacity of the brush chains.

POWER PACK

The diesel hydraulic power pack LPP 109 D explosion proof Zone 2 is containerised within a steel frame.

TECHNICAL SPECIFICATIONS:

Length:	2000 mm
Width:	1300 mm
Height:	1900 mm
Weight:	2500 kg
Max. pressure:	280 bar
Max. oil flow:	330 l/min
Fuel tank capacity:	200 l
Hydraulic oil tank :	400 l

This system is available on board the EMSA Contracted Vessels in following variations:

Name	Length	Skimmer	Crane (2x)	Power pack (2x)	Flash point* Ex Class
OW Copenhagen	12 m	Weir/brush	Hidroacar cranes	Lamor LPP 90 Cu, 90 kW	Zone 2
Bahia Uno	12 m	Weir/brush	Hydra Pro cranes	Lamor LPP 109 D, 109 kW	N.A.
Alexandria	15 m	Weir/brush	Hidroacar cranes	Lamor LPP 109 D, 109 kW	N.A.
Bahia Tres	12 m	Weir/brush	Heila cranes	Lamor LPP 120 E, 120 kW	Zone 2
GSP Orion	12 m	Weir/brush	Hidroacar cranes	Lamor LPP 109 D, 109 kW	N.A.
Enterprise	15 m	Weir/brush	Hidroacar cranes	Lamor LPP 90 Cu, 90 kW	N.A.
Kontio	12 m	Weir/brush	Hidroacar cranes	Lamor LPP 109 D, 109 kW	N.A.
Monte Anaga	12 m	Weir/brush	Hidroacar cranes	One Lamor electric-hydraulic LPP 2 x 90 E, 180 kW, fixed in the engine room	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

SOFREBA SWEEPING ARMS

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Sofreba sweeping arm system consists of a sweeping arm structure, skimmer pump, ancillaries, oil and hydraulic hoses and a crane.

The oil collecting system consists of two sweeping arms, with a total length of 13.2 meters. The sweeping arms are deployed by means of the vessel's cranes .

The sweeping arm system includes an integrated weir skimmer and two interchangeable pumps - Desmi DOP Dual PDAS 125m³/h or Framo TK 150 300m³/h.

A Heila crane with a capacity of 5 tons at 12 meters is used to launch the sweeping arms.

The oil/water mixture is guided along the bulkheads of the sweeping arm and the side of the vessel via an adjustable oil collecting chamber of the inner pontoon, from which it is removed by the pump and discharged into the oil collecting tanks via a flexible hose.

The vessel on which the sweeping arms are mounted must be equipped with the following features:

- Sufficient room on the deck for storing 2 sweeping arms (Starboard and Portside arms), space required for one sweeping arm – approximately 13.2 m x 4.2 m.

- Hydraulic power supply to the oil pumps (hydraulic oil flow - 217 l/min, hydraulic oil pressure 210 bar).

KEY CHARACTERISTICS:

- Stiff sweeping arm with length of 13.2 m
- Lifting crane/davit
- Weir skimmer module with two interchangeable pumps

TECHNICAL SPECIFICATIONS – 13.2 METER SWEEPING ARM			
Overall Length	13200 mm	Operational Temperature	-20°C to 60°C
Overall Width	4027 mm	Operational window	up to Beaufort 4
Overall Height	2830 mm	Recovery speed	up to 3 knots
Weight	4600 kg	Deployment time	approx. 10 min. each arm

SOFREBA SWEEPING ARMS

Remark: The information is based on the manufacturer's documentation

WEIR SKIMMER MODULE

The weir module consists of an oil collection chamber fitted with a pump. The height of the oil collecting chamber can be adjusted in order to optimise the flow to the pump. The optimal height depends on oil viscosity, thickness of the layer etc.

For the operation with the weir skimmer the sweeping arms are fit with two interchangeable pumps - Desmi DOP Dual PDAS 125m3/h or Framo TK 150 300m^3/h.

Remarks:

- The Sofreba system does not include a brush skimmer module.
- Under the present Contract hydraulic power is supplied by the vessel.

This system is available on board the following EMSA Contracted Vessel:					
Name	Length	Skimmer	Crane	Power pack	Flash point* Ex Class
Ria de Vigo	13.2 m	Weir	Heila	Hydraulic power provided by the vessel	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

Booms

DESMI RO-BOOM 2000 SPI

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Ro-boom single point inflation (SPI) models are made in the neoprene construction with hypalon rubber skin chosen due to UV resistance combined with oil resistance.

The inflation is made at the outer end of the boom. The Ro-boom lies completely flat when it is deflated allowing for easy cleaning and storage. The SPI systems in combination with individual air chambers provide high integrity.

The Ro-boom is fitted with stainless steel fittings and a hot galvanized ballast/tension chain. Internal fiberglass rods secured with stainless steel brackets. Stainless steel hinge connectors or ASTM connectors are standard

The SPI system used still keeps the major advantages of having individual air chambers in case of puncture. Due to the rigidity and total buoyancy of the boom, puncture of one chamber will not affect the function of the boom.

The boom set consists of two booms (250 meters each), two storage reels mounted on two 10' ISO flat rack containers, a towing set, a repair kit with tools, a power pack with an air blower and storage containers.

BOOM WINDER AND AIR BLOWER

The Ro-boom is delivered on a winder. The winder frame is used for storage, transportation and handling of the Ro-boom.

Two frames with bearing housings for a shaft are mounted on the bottom frame. On the shaft a drum with end flanges is mounted. On one end of the shaft a sprocket wheel is mounted between the drum and the bearing housing.

An air blower is used for the inflation and deflation of the boom.

TECHNICAL SPECIFICATIONS

Freeboard	600 mm	Operational temperature	-30°C to 60°C
Draught	1100 mm	Efficient in waves	up to 4 m
Length (chamber)	4.5 m	Stable in current	up to 3 knots
Weight	20 kg/m	Deployment time	250 m – approx. 15 minutes

This system is available on board the following EMSA Contracted Vessel:

Name	Winder	Air blower	Power pack	Flash point* Ex Class
Sara	Ro-Boom winder	Air compressor	Hydraulic power provided by the vessel	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

DESMI RO-BOOM 2000

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Ro-boom 2000 is a segmented heavy duty boom. It is moulded in a composite of Du Pont hypalon and neoprene rubber and reinforced with two plies of polyester fabric.

The Ro-boom is rapidly filled using a high capacity air blower, and once deployed the boom will remain inflated. The boom withstands the effects of the sun, sea and oil, while attachments, such as eyelets and brackets, are made from stainless steel.

The Ro-boom is supplied with a variety of section connectors and it lies completely flat when deflated, allowing for easy cleaning and storage.

The boom is equipped with inflatable buoyancy chambers with separate air valves, which means that in case of puncture only one chamber will lose air. Due to the rigidity and total buoyancy of the boom, puncture of one chamber will not affect the function of the boom.

The boom set consists of two booms (250 meters each), two storage reels mounted on two 10' ISO flat rack containers, a towing set, a repair kit with tools, a power pack with an air blower and storage containers.

KEY CHARACTERISTICS:

- Segmented heavy duty boom, 250 meters each
- Inflatable buoyancy chambers with separate air valves
- High-capacity air blower
- Storage reels mounted on 10' flat rack containers

TECHNICAL SPECIFICATIONS			
Freeboard	600 mm	Operational temperature	-40°C to 60°C
Draught	1100 mm	Efficient in waves	up to 4m
Length (chamber)	4.9 m	Stable in current	up to 3 knots
Length (section)	50 m	Deployment time	250 m – approx. 45 minutes
Weight per meter	13.5 kg	Buoyancy /weight ratio	7:1

DESMI RO-BOOM 2000

Remark: The information is based on the manufacturer's documentation

BOOM WINDER

The Ro-boom is delivered on a 10 ft flat rack winder. The winder frame is used for storage, transportation and handling of the Ro-boom.

The winder frame is manufactured from specially designed steel and standard profiles.

Two frames with bearing housings for a shaft are mounted on the bottom frame. On the shaft a drum with end flanges is mounted. On one end of the shaft a sprocket wheel is mounted between the drum and the bearing housing. To rotate the drum a gearbox, with hydraulic motor, is mounted on a bracket plate on the bottom frame. the side of the bearing frame.

AIR BLOWER

The remote control stand with built-in air-blower is a movable unit designed for inflation/deflation of oil booms and operation of boom winders in areas where hazardous atmospheres may occasionally occur.

The remote control stand is connected to the power supply by means of a 10 meters hose set. It should be placed in such a way that the best possible control of the operation is obtained.

POWER PACK

The Ro-clean Desmi power pack, type DSPP 58 kW is a power unit, designed to operate in areas where hazardous atmospheres may occasionally occur. It is fitted with the necessary safety equipment to meet the safety standard Lloyd's Open Deck explosion proof Zone 2 areas and it is designed with ease of operation and maintenance in mind.

TECHNICAL SPECIFICATIONS :

Length:	2015 mm
Width:	1115 mm
Height:	1800 mm
Weight:	1500 kg
Max. pressure:	210 bar
Flow range:	0-200 l/min

This system is available on board the EMSA Contracted Vessels in following variations:

Name	Winder	Air Blower	Power pack	Flash point* Ex Class
Santa Maria(2x250 m)	Ro-boom winder	HRD2	Desmi DSPP 58, 58 kW	Zone 2
Aegis I (2x250 m)	Ro-boom winder	HRD2 (integrated in the power pack)	Desmi DSPP 58, 58 kW	Zone 2
Ria de Vigo (2x250 m)	Ro-boom winder	HRD2	Hydraulic power provided by the vessel	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

LAMOR HDB 2000 HEAVY DUTY BOOM

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Lamor heavy duty boom is a segmented boom constructed in such a way that two layers of synthetic fabric are vulcanized together with synthetic oil-resistant rubber outer layers. The boom is equipped with a ballast chain that guarantees correct deployment in sweeping operations.

The boom has ASTM connectors and towing lines. On deployment the boom sits symmetrically in the water, allowing for easy maneuver and for facing the oil slick from either side. Inflation of the boom is quick and efficient thanks to the air valve and the use of an air blower.

The boom is equipped with inflatable buoyancy chambers with separate air valves, which means that in case of puncture only one chamber will lose air. It is manufactured from heavy-duty neoprene rubber with a hypalon external skin.

This one-piece moulded composite construction has complete cross vulcanization of rubber and reinforcing plastics. The construction is seamless, it has high abrasion resistance, peel resistance and tensile strength.

The boom is also fitted with stainless steel fittings, galvanised ballast/tension chains and internal stainless steel rods. These rods ensure optimum skirt profile under tow.

KEY CHARACTERISTICS:

- Segmented heavy duty boom, 250 meters each
- Inflatable buoyancy chambers
- ASTM connectors
- Belt-driven air blower
- Storage reels mounted on 10' flat rack containers

TECHNICAL SPECIFICATIONS			
Freeboard	600 mm	Operational temperature	-40°C to 60°C
Draught	1100 mm	Efficient in waves	up to 4 m
Length (chamber)	3 m	Stable in current	up to 3 knots
Length (section)	50 m	Deployment time	250 m – approx. 45 minutes
Weight per meter	19.6 kg	Buoyancy /weight ratio	12.5:1

LAMOR HDB 2000 HEAVY DUTY BOOM

Remark: The information is based on the manufacturer's documentation

BOOM WINDER

The boom winder is a hydraulically motorised storage reel (HSR H1822) and winder, driven by a power pack. Two hydraulic motors transmit smooth and even motive power to the reel.

TECHNICAL SPECIFICATIONS :

Length:	2740 mm
Width:	1800 mm
Height:	2113 mm
Drum diameter:	1800 mm
Weight:	605 kg
Power requirement:	25 kW
Hydraulic flow:	60 l/min
Hydraulic pressure:	160 bar

AIR BLOWER

The air blower is a belt-driven radial fan. It has casing of cast aluminium and impeller of sheet steel with backward curved blades.

TECHNICAL SPECIFICATIONS :

Length:	550 mm
Width:	410 mm
Height:	600 mm
Weight:	40 kg
Capacity:	400 m^3/h

POWER PACK

The Lamor multipurpose power pack (type LPP7HA B8 7.3 kW) is designed for flexible operation of many types of hydraulically operated oil spill clean-up equipment. This unit is equipped with an air-cooled diesel engine. The frame of the unit is manufactured in steel. The engine is equipped with both an electric start and a hand start operation.

TECHNICAL SPECIFICATIONS :

Length:	945 mm
Width:	850 mm
Height:	785 mm
Weight:	170 kg
Max. pressure:	170 bar
Flow range:	0-28 l/min

This system is available on board the EMSA Contracted Vessels in following variations:

Name	Winder	Air Blower	Power pack	Flash point* Ex Class
GSP Orion (2x250 m)	HSR 2228	HAB 200	Lamor LPP 7HA B8, 7 kW	N.A.
Enterprise (2x250m)	HSR H1822	HAB 200	Lamor LPP 90 CU, 90 kW, shared with the skimmer	N.A.
Kontio (2x250m)	HSR H1822	HAB 200	Lamor LPP 109 D, 109 kW, shared with the sweeping arms	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

LAMOR LAN 2200 NEOPRENE AUTO BOOM

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Lamor neoprene auto boom 2200 has been developed to provide a safe, quick and efficient means of oil recovery equipment. It is manufactured from high tensile fabrics that guarantee durability and stability.

The Lamor boom can operate in rough seas and strong currents and has good wave performance. It can be deployed at a rate of up to 15 meters per minute. All buoyancy chambers are inflated from a single air source without the need to stop to open or shut valves to inflate each chamber individually, which contributes to the rapid deployment of the boom. The boom can be easily deflated and retrieved onto a storage reel.

As the boom is deployed from the storage reel it is automatically inflated from a single low pressure air source attached to the end of the boom. The inflation is made at the outer end of the boom. Upon inflation the internal design automatically separates the floatation chambers and each individual buoyancy chamber is isolated.

In the event that one air chamber becomes damaged or deflated, adjacent chambers will not be affected and will remain inflated. A layer of closed cell foam provides additional floatation for positive reserve buoyancy on each chamber.

The deployment of the boom requires only one operator at the reel.

KEY CHARACTERISTICS:

- Neoprene auto boom, 250 meters each
- Inflatable buoyancy chambers
- Automatic inflation from one single air source
- Belt-driven air blower
- Motorised storage reel

TECHNICAL SPECIFICATIONS

Freeboard	715 mm	Operational temperature	-40°C to 60°C
Draught	1070 mm	Efficient in waves	up to 4 m
Length (chamber)	4.7 m	Stable in current	up to 3 knots
Length (section)	30 m	Deployment time	250 m – approx. 20 minutes
Weight per meter	13 kg	Buoyancy /weight ratio	22:1

LAMOR LAN 2200 NEOPRENE AUTO BOOM

Remark: The information is based on the manufacturer's documentation

BOOM WINDER

The boom winder is a hydraulically motorised storage reel and winder, driven by a power pack. Two hydraulic motors transmit power to the reel.

TECHNICAL SPECIFICATIONS :

Length:	3254 mm
Width:	1800 mm
Height:	2122.5 mm
Drum diameter:	1800 mm
Weight:	700 kg
Power requirement:	25 kW
Hydraulic flow:	60 l/min
Hydraulic pressure:	160 bar

AIR BLOWER

The air blower is a belt-driven radial fan. It has a casing of cast aluminium and an impeller of sheet steel with backward curved blades.

TECHNICAL SPECIFICATIONS :

Length:	550 mm
Width:	410 mm
Height:	600 mm
Weight:	40 kg
Capacity:	400 m^3/h

POWER PACK

The Lamor power pack provides the necessary power (LPP 14LS11, 14 kW) for the inflation of the Lamor neoprene auto boom. This unit is equipped with an air-cooled diesel engine.

TECHNICAL SPECIFICATIONS :

Length:	930 mm
Width:	770 mm
Height:	800 mm
Weight:	230 kg
Max. pressure:	180 bar
Flow range:	0-39 l/min

This system is available on board the following EMSA Contracted Vessel:

Name	Winder	Air Blower	Power pack	Flash point* Ex Class
Alexandria (2x250m)	HSR H1826	HAB 200	Lamor LPP 14LS11, 14 kW	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

MARKLEEN UNIBOOM X-1900 SPI

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Uniboom X-1900 is a single point inflation (SPI) oil boom designed for open waters and offshore application. The boom is designed for wave heights up to 5 m. The Uniboom X-1900 barrier is self-inflating from one single base position. By using a special compressed air inflation system, the work and time necessary for deployment and subsequent collection are greatly reduced.

The inflation of the Uniboom X-1900 is automatic and is carried out by a hydraulic air compressor or the ship's compressed air supply line. The boom has three separate air filling systems to inflate the freeboard which make the air filling fail-proof. The two primary systems are in the form of spiral that are pressurised with air while the barrier is still on the reel. During deployment, the spiral expands the freeboard as soon as the barrier leaves the hydraulic reel. This sudden expansion produces the entry of air from the atmosphere into the barrier chambers and, when the barrier reaches the water, these chambers are sealed.

The X-1900 is equipped with two independent spirals and with a secondary inflation system that can be used to inflate the barrier's air chambers if necessary, thus enabling deployment of the barrier during long periods in rough seas.

Various transversal partitions divide each barrier into 5 meter chambers and the spiral is inflated from several points. This creates sections that are independent of each other to ensure speed during deployment and safety during operation.

KEY CHARACTERISTICS:

- Single point inflation boom
- Three separate air filling systems
- Automatic inflation from one single air source
- Hydraulic air blower
- Storage reel mounted on 20' flat rack with standard container twist locks

TECHNICAL SPECIFICATIONS

Freeboard	800 mm	Operational temperature	-5°C to 40°C
Draught	1160 mm	Efficient in waves	up to 5 m
Length (chamber)	5 m	Stable in current	up to 4 knots
Weight per meter	18.8 kg	Deployment time	250 m – approx. 15 minutes
Max. pressure	Ring– 8 bar	Buoyancy /weight ratio	28:1

MARKLEEN UNIBOOM X-1900 SPI

Remark: The information is based on the manufacturer's documentation

BOOM WINDER

The Markleen hydraulic turntable boom reel (Unireel 12) makes boom deployment quick and easy. The reel is mounted on a 20 ft container base with standard container twist locks.

TECHNICAL SPECIFICATIONS :

Length:	3312 mm
Width:	2438 mm
Height:	2985 mm
Drum diameter:	508 mm
Weight:	4990 kg
Hydraulic flow:	10 l/min
Hydraulic pressure:	200 bar

AIR BLOWER

The Markleen Uniair air compressor supplies a high rate of compressed air flow to operate the Markleen Uniboom X single-point inflatable boom. The hydraulic power should be supplied from a separate power source (power pack or hydraulic power provided by the vessel). Due to the fact that the Markleen Uniair air compressor is operated hydraulically and contains no electrical components, it is suitable for use in explosive or flammable environments.

TECHNICAL SPECIFICATIONS :

Length:	1200 mm
Width:	650 mm
Height:	950 mm
Weight:	210 kg
Capacity:	5000 l/min
Air pressure:	8 bar

POWER PACK

The Markleen power pack (type DHPP 60 kW) is equipped with a diesel engine that operates below 200° C. This lower operating temperature, combined with additional shut down features, means that the power pack is designed to be used in areas where there is a strong potential explosion hazard. The flame protected engine is designed specifically to meet the European ATEX Directive Zone 2.

TECHNICAL SPECIFICATIONS :

Length:	2010 mm
Width:	1160 mm
Height:	1673 mm
Weight:	1810 kg
Max. pressure:	225 bar
Flow range:	0-150 l/min

This system is available on board the EMSA Contracted Vessels in following variations:

Name	Winder	Air Blower	Power pack	Flash point* Ex Class
Bahia Uno (2x250 m)	Unireel 14 m³	Air provided by the vessel	Hydraulic power provided by the vessel	N.A.
Balluta Bay (1x300 m)	Unireel 16 m³	Uniair 5000/8	Markleen DHPP, 60 kW	Zone 2
Salina Bay (2x250 m)	Unireel 12 m³	Uniair 5000/8	Markleen DHPP, 60 kW	Zone 2
Aktea OSRV (2x250 m)	Unireel 16 m³	Uniair 5000/8	Markleen DHPP, 60 kW	Zone 2

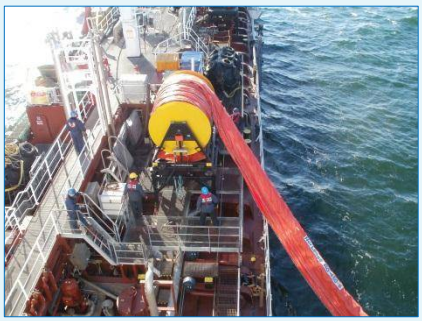
* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

NORLENSE NO-450-S BOOM SPI

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The NorLense NO-450-S oil containment boom is a single point inflation boom. Due to the automatic inflation of the boom, no crew members are required to stand by the winder during deployment and recovery, which increases safety of operations. In addition, since the boom is self-inflated no air valves are used, thus eliminating the risk of bursting flotation elements due to the temperature rise.



The NorLense boom is manufactured as a continuous tube, 400 meters long, and has been designed for quick response with the minimum of manpower requirements. The boom inflates automatically and up to 400 meters can be deployed in 10 to 20 minutes, while the retrieval of the boom can take approximately 40 minutes. In case the boom is deployed from the main vessel, only one operator is required. Rapid mobilisation is thus possible even when the vessel is carrying cargo on deck.

Due to its size and crew requirements during deployment, operation and hauling, the boom can be stored permanently and used on board most types of vessels. The space required on board is at a minimum as the boom is deployed directly from the reel over the side of the ship.

The NorLense offshore boom is made to meet rough weather conditions on open sea. The construction of the boom with no longitudinal stiff elements gives very good wave conformity.

The boom systems are provided with ASTM adapters so that the booms can be, if required, easily connected to standard booms used in all the coastal states.

KEY CHARACTERISTICS:

- Single point inflation boom
- Continuous tube structure
- Automatic inflation from one single air source, no air valves
- Low deck space and crew requirements
- 20 degrees rotating winder

TECHNICAL SPECIFICATIONS

Freeboard	450 mm	Operational temperature	-30°C to 80°C
Draught	680 mm	Efficient in waves	up to 2 m
Length (chamber)	50 m	Inflation pressure	6 bar
Length (section)	400 m	Deployment time	400 m – approx. 20 minutes
Weight per meter	7.1 kg	Buoyancy /weight ratio	23:1

NORLENSE NO-450-S BOOM SPI

Remark: The information is based on the manufacturer's documentation

BOOM WINDER

The base and drum are built-up of steel profiles/plates. The drum has a spherical roller-bearing at one end. At this end, a rotating union that supplies air to the boom is mounted while the winch is running. The winch can be turned 20 degrees to each side through a vertical axis.

TECHNICAL SPECIFICATIONS :

Length:	3150 mm
Width:	2400 mm
Height:	3060 mm
Drum diameter:	508 mm
Weight:	2600 kg
Oil flow:	62 l/min
Oil pressure:	210 bar
Power requirement:	22 kW

AIR BLOWER

The hydraulic compressor (HKL 4100/8-113) transforms the hydraulic power into air pressure. This hydraulic compressor comprises a frame integrated pressure reservoir, relief and safety valves, pressure gauge as well as automatic rotation speed control valve.

This unit is also provided with a cooled lubrication system, an oil separator and a relief valve on the air intake.

TECHNICAL SPECIFICATIONS :

Length:	870 mm
Width:	495 mm
Height:	770 mm
Weight:	185 kg
Capacity:	4100 l/min
Air pressure:	8 bar

POWER PACK

The Lamor LPP 30 D explosion proof Zone 2 power pack is powered by a Deutz 35 kW diesel engine and serves as a multipurpose power pack designed for the flexible operation of many types of hydraulically operated oil spill clean-up equipment. Equipped with 3 hydraulic circuits, the Lamor power pack can be used to power multiple users such as a skimmer and boom winder consecutively.

TECHNICAL SPECIFICATIONS :

Length:	1345 mm
Width:	810 mm
Height:	1100 mm
Weight:	700 kg
Max. pressure:	180 bar
Max. flow:	106 l/min

This system is available on board the following EMSA Contracted Vessel:

Name	Winder	Air Blower	Power pack	Flash point* Ex Class
OW Copenhagen (1x400 m)	LW 10.14	HKL 4100/8-113	Lamor LPP 30 D, 35 kW	Zone 2

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

NORLENSE NO-800-R BOOM SPI

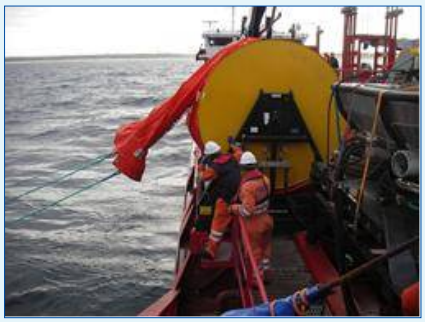
Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The NorLense oil containment boom is a single point inflation boom (SPI). Due to the automatic inflation of the boom, no crew members are required to stand by the winder during deployment and recovery, which increases safety of operations. In addition, since the boom is self-inflated no air valves are used, thus eliminating the risk of bursting flotation elements due to the temperature rise.

Due to its size and crew requirements during deployment, operation and hauling, the boom can be stored permanently and used on board most types of vessels.

The NorLense offshore boom is made to meet rough weather conditions on open sea. The construction of the boom with no longitudinal stiff elements gives very good wave conformity. Inside the freeboard there are round, heavy duty hoses in the form of rings or a spiral. The purpose of these spirals is to form the freeboard fabric into a round configuration during the deployment of the boom and to retain the shape of the freeboard.



The system includes two units of 250 meters of boom on storage reels with all necessary deployment equipment including an air inflation system. The system can be stored in and deployed from a dedicated ISO container. The space required on board is at a minimum as the boom is deployed directly from the reel over the side of the ship.

The boom systems are provided with ASTM adapters so that the booms can be, if required, easily connected to standard booms used in all the coastal states.

KEY CHARACTERISTICS:

- Single point inflation boom, 250 meters each
- Heavy duty spirals inside the freeboard
- Automatic inflation from one single air source, no air valves
- Low deck space and crew requirements
- 20 degrees rotating winder

TECHNICAL SPECIFICATIONS

Freeboard	740 mm	Operational temperature	-30°C to 80°C
Draught	1020 mm	Efficient in waves	up to 5 m
Length (chamber)	10 m	Max. wind force	22 m/s
Length (section)	250 m	Deployment time	250 m – approx. 15 minutes
Weight per meter	17 kg	Buoyancy /weight ratio	28:1

NORLENSE NO-800-R BOOM SPI

Remark: The information is based on the manufacturer's documentation

BOOM WINDER

The base and drum are built-up of steel profiles/plates. The drum has a spherical roller-bearing at one end. At this end, a rotating union that supplies air to the boom is mounted while the winch is running. The winch can be turned 20 degrees to each side through a vertical axis.

TECHNICAL SPECIFICATIONS :

Length:	3150 mm
Width:	2400 mm
Height:	3060 mm
Drum diameter:	508 mm
Weight:	2600 kg
Oil flow:	62 l/min
Oil pressure:	210 bar

AIR BLOWER

The hydraulic compressor (HKL 4100/8-113) transforms the hydraulic power into air pressure. This hydraulic compressor comprises a frame integrated pressure reservoir, relief and safety valves, pressure gauge as well as automatic rotation speed control valve.

TECHNICAL SPECIFICATIONS :

Length:	870 mm
Width:	495 mm
Height:	770 mm
Weight:	185 kg
Capacity:	4100 l/min
Air pressure:	8 bar

POWER PACK

The Lamor LPP 50 D power pack is powered by a Deutz 50 kW diesel engine and serves as a multipurpose power pack designed for the flexible operation of many types of hydraulically operated oil spill clean-up equipment. Equipped with 3 hydraulic circuits, the Lamor power pack can be used to power multiple users such as a skimmer and boom winder consecutively.

TECHNICAL SPECIFICATIONS :

Length:	1345 mm
Width:	810 mm
Height:	1100 mm
Weight:	700 kg
Max. pressure:	180 bar
Max. flow:	106 l/min

This system is available on board the EMSA Contracted Vessels in following variations:

Name	Winder	Air Blower	Power pack	Flash point* Ex Class
Bahia Tres (2x250 m)	LW 10.14	HKL 5000/8-135	Lamor LPP 120 E, 120kW shared with the sweeping arms	Zone 2
Monte Anaga (2x250 m)	LW 10.14	HKL 4100/8-113	Lamor LPP 50 D, 50 kW	Zone 2
OW Copenhagen (2x250 m)	LW 10.14	HKL 4100/8-113	Lamor LPP 50 D, 50 kW	Zone 2

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

VIKOMA HI-SPRINT 2000 BOOM

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Vikoma Hi-sprint 2000 is a single point inflation (SPI) heavy duty boom. The boom is made from vulcanised, reinforced, double-faced neoprene, thus ensuring an all-weather, flexible, high integrity boom.

The boom is inflated from a single point at one end of the cuff tube. This tube is vulcanised along the top of the full length of the boom, and inflates each bulkhead through a non-return valve. This allows for the rapid deployment and requires a small footprint on board or dockside. The inflation is made at the outer end of the boom.

The boom is designed as a single outer tube with internal equally spaced bulkheads every 3-5 meters to form independent chambers. These are completely sealed and in the event of damage to any one chamber, the boom's integrity and ability to contain oil are retained. The boom's continuous cylindrical shape coupled with low air inflation pressure enhances flexibility and inhibits the formation of vortices, thereby discouraging oil loss under the boom. After recovery, the boom can be easily cleaned with normal detergents and pressure washers.

The interface between the boom material and the marine grade aluminium connecting plate is achieved without puncturing the material, which ensures boom integrity. The Vikoma Hi-sprint boom is manufactured in heavy duty fabric impregnated with special neoprene rubber with hypalon external skin, giving good puncture, oil, chemical abrasion and ultraviolet (sunlight) resistance.

KEY CHARACTERISTICS:

- Single point inflation boom, 250 meters each
- Single outer tube with internal bulkheads
- Inflation from one single air source at the outer end of the boom
- Heavy duty fabrics
- Storage reel with standard container twist locks

TECHNICAL SPECIFICATIONS			
Freeboard	750 mm	Operational temperature	-40°C to 90°C
Draught	1250 mm	Efficient in waves	up to 4 m
Length (chamber)	3-5 m	Stable in current	up to 3 knots
Length (section)	50 m	Deployment time	250 m – approx. 15 minutes
Weight per meter	12.68 kg	Buoyancy /weight ratio	34.1:1

VIKOMA HI-SPRINT 2000 BOOM

Remark: The information is based on the manufacturer's documentation

BOOM WINDER

The Vikoma reel (type 600P) is intended for the storage, deployment and recovery of the Hi-sprint 2000 boom. The reel is supplied with ISO block corners, fork lifting pockets and four lifting eyes. The reel is powered by an integrated hydraulic power unit.

TECHNICAL SPECIFICATIONS :

Length:	1950 mm
Width:	3640 mm
Height:	2325 mm
Weight:	1530 kg
Hydraulic flow:	53 l/min
Hydraulic pressure:	140 bar

AIR BLOWER

The Vikoma Airpack inflator is used to supply the necessary air inflation during the deployment of the Vikoma Hi-sprint 2000 boom. The inflator is supplied with a hose kit.

TECHNICAL SPECIFICATIONS :

Length:	840 mm
Width:	450 mm
Height:	590 mm
Weight:	75 kg
Capacity:	max. 16 m^3/min at 8000 rpm
Air pressure:	69 mbar

POWER PACK

The power pack (type GP 10-2E) provides the necessary pressure and flow to operate the Vikoma reel through a diesel, single cylinder engine. The power pack is mounted on the reel base unit.

TECHNICAL SPECIFICATIONS :

Max. pressure:	140 bar
Flow range:	0-53 l/min
Max. power:	7.4 kW at 3600 rpm

This system is available on board the EMSA Contracted Vessels in following variations:

Name	Winder	Air Blower	Power pack	Flash point* Ex Class
Forth Fisher/Galway Fisher/Mersey Fisher (in total 4x250 m)	Vikoma type 600P	Vikoma AP/0080	Desmi DSPP 110, 110 KW, shared with the skimmer	Zone 2
DC Vlaanderen 3000 (2x250 m)	Vikoma type 600P (powered) and type 600 (not powered)	Airpack inflator	Vikoma GP 10-2E	N.A.
Interballast III (2x250 m)	Vikoma type 600P (powered) and type 600 (not powered)	Airpack inflator	Vikoma GP 10-2E	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

Skimmers

DESMI TARANTULA SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Desmi Tarantula skimmer system is a high capacity offshore skimmer with thrusters. The skimmer is fitted with two Desmi positive displacement Archimedes screw (PDAS) pumps DOP-250 DUAL. It works efficiently in waves up to 3 meters.

The skimmer also has a disc/brush skimmer head.

The Tarantula skimmer has two thrusters to secure the best recovery position in the floating containment boom. The thrusters are hydraulically driven and controlled from the remote control box.

The skimmer is fitted with a flotation system to provide the necessary buoyancy. A discharge hose connects the skimmer to the storage tank. The hoses will not affect the buoyancy of the skimmer as they are equipped with their own floats.

PUMPS

Using two Desmi positive displacement Archimedes screw (PDAS) pumps in vertical design, type DOP-250 DUAL and with total pumping capacity of 250 m^3/h, the skimmer is able to efficiently recover light as well as heavy oil, also when mixed with debris normally found in connection with oil spills. The hydraulic power to the skimmer pumps is supplied through hydraulic hoses connected to the power supply or remote control box.

KEY CHARACTERISTICS:

- High capacity offshore skimmer
- Two PDAS pumps, total capacity 250 m^3/h
- Weir skimmer module with self-adjusting weir lip
- Brush skimmer module from marine grade aluminium
- Integrated power pack and crane
- Two thrusters, remote control

TECHNICAL SPECIFICATIONS

Length	2450 mm	Power requirements	119 kW
Width	2450 mm	Hydraulic flow	320 l/min
Height	1550 mm	Hydraulic pressure	210 bar
Weight	520 kg incl. thrusters	Pumping capacity	2 x 125 m^3/h
Deployment time	approx. 5 min.	Draught	950 mm

DESMI TARANTULA SKIMMER

Remark: The information is based on the manufacturer's documentation

WEIR SKIMMER

The self-adjusting weir lip is capable of recovering a wide range of oils even with high viscosities. The level of the weir is controlled by the pumping rate.

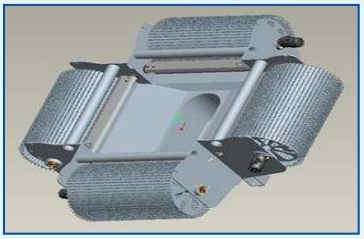
As the weir floats on the internal contents of the hopper it lowers itself when the hopper is emptied by the pumps, thus increasing the skimming depth. The weir is free to follow the wave movements independent of the position of the skimmer body.

DISC/BRUSH CASSETTE SKIMMER HEAD

The disc/brush cassette skimmer head is designed to recover heavy viscous oils. The pick-up rate depends on the viscosity and thickness of the oil layer. In general the pick-up rates are increasing concurrently with viscosity, oil layer thickness and speed.

The main frame is constructed from marine grade aluminium incorporating oil collection sump and mounting for disc/brush drive motors. The water content of the picked-up product can be very low, but tends to increase with increased speed. Shift from disc operation to brush operation is easily done.

Rigid heavy-duty (anti-static) plastic discs are used in order to reduce weight and simplify replacement and scraping. The rectangular twin bank format ensures full contact with the oil and offers simplicity of drive and disc replacement.



POWER PACK AND CRANE

The Desmi DSPP 110 kW EXPLOSION PROOF Zone 2 power pack delivers hydraulic power to the radio controlled skimmer and operates the built-in crane and the hose reel.

TECHNICAL SPECIFICATIONS:

Length:	3315 mm
Width:	1912 mm
Height:	2100 mm
Weight:	2950 kg incl. crane (full tanks)
Rated power:	119 kW at 2100 rpm
Max. pressure:	250 bar
Hydraulic oil flow:	320 l/min
Fuel capacity:	250 l
Hydraulic fluid capacity:	300 l

This system is available on board the EMSA Contracted Vessels in following variations:

Name of vessel	Skimmer head	Crane	Power pack	Flash point* Ex Class
Forth Fisher Galway Fisher Mersey Fisher	Weir	HIAB 035	Desmi DSPP, 110 kW	Zone 2
	Weir	HIAB 035	Desmi DSPP, 110 kW	Zone 2
Sara	Weir/brush/disc	Vessel crane	Hydraulic power provided by the vessel	N.A.
Salina Bay	Weir/brush/disc	HIAB 035	Desmi DSPP, 110 kW	Zone 2
Balluta Bay	Weir	Vessel crane	Desmi DSPP, 110 kW	Zone 2
Aegis I	Weir/brush/disc	HIAB 035	Desmi DSPP, 110 kW	Zone 2

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

DESMI TERMINATOR SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Desmi Terminator recovers all types of oil, including heavy oil and emulsions. The positive displacement screw pump installed in the skimmer can pump water and high viscosity oil at the same high capacity and will not emulsify the two during pumping.

The skimmer is fitted with a flotation system to provide the necessary buoyancy. The removable floats on the skimmer allow that the skimmer is suspended from a crane if rapid response is required. A discharge hose connects the skimmer to the storage tank. The hoses do not affect the buoyancy of the skimmer, as they are equipped with their own floats.

WEIR MODULE

The self-adjusting weir lip, which is mounted on the hopper, controlled by the pumping rate, enables the skimmer to handle products with very high viscosities even when contaminated with debris normally found in connection with oil spills.

PUMP

The Terminator offshore skimmer incorporates the Desmi DOP-250 pump that has a maximum capacity of 125 m^3/h and can develop discharge pressures up to 10 bar.

HOSE WINDER

The hose winder is designed to store hydraulic and oil transfer hoses. The winder is hand-operated and produced of sea water resistant aluminium.

The frame is equipped with lifting points and ISO corners. The storage capacity of the winder is 100 meters of hydraulic hoses and 50 meters of oil transfer hose.

TECHNICAL SPECIFICATIONS

Length	2100 mm	Power requirements	50 kW
Width	2330 mm	Hydraulic flow	162 l/min
Height	1100 mm	Hydraulic pressure	210 bar
Weight	162 kg	Pumping capacity	125 m^3/h
Deployment time	approx. 10 min.	Draught	700 mm

This system is available on board the following EMSA Contracted Vessel:

Name of vessel	Skimmer head	Crane	Power pack	Flash point* Ex Class
Ria de Vigo	Weir	Vessel crane	Hydraulic power provided by the vessel	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

FOILEX TDS 250 OCEAN WEIR SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Foilex TDS (Twin Disc Screw) 250 Ocean skimmer is a high performance weir skimmer for use in large oil spills and heavy duty offshore operations. It handles all types of oil, from light diesel fuel to heavy oil mixed with debris, and can easily be converted to a high capacity transfer- or off-loading pump. The skimmer system consists of the TDS 250 skimmer pump, a flotation frame, a hose package, a hose reel and a remote control.

The main part of the skimmer system is the hydraulic driven TDS 250 pump unit. Special cutting knives are fitted in both inlet and outlet end of the pump. The skimmer is also equipped with two hydraulic thrusters allowing the operator to manoeuver the system to where oil is most heavily concentrated.

The skimmer unit is powered by a diesel driven hydraulic power pack via hydraulic hoses. Recovered oil is discharged from the skimmer up to the collecting tank through the 6" discharge hose. All hoses can be stored on the hose reel and they are easy to handle with the double wheels system.

WEIR MODULE

By placing the pump unit vertically in the floating frame and then fitting it to the inlet flange, the pump is converted to an effective weir skimmer. The principle of function for the skimmer/pump is to work just below the liquid surface and skim the oil through its inlet hopper and then pump the oil up through the discharge hose to the storage tank concerned. The hopper is designed so that its upper edge is always adjusted parallel to the oil layer.

The distance to the oil surface is half automatically adjusted through the speed of the pump, as the hopper's float ring always endeavours to balance the incoming stream of oil with the outgoing quantity of pumped oil. The capacity of the skimmer therefore varies depending on the thickness of the oil layer.

KEY CHARACTERISTICS:

- High capacity offshore skimmer
- One PDAS Twin Disc Screw pump, capacity 140 m^3/h
- Weir skimmer module with cutting knives
- Two thrusters, remote control

TECHNICAL SPECIFICATIONS

Length	2700 mm	Power requirements	70 kW
Width	2450 mm	Hydraulic flow	125 l/min
Height	1100 mm	Hydraulic pressure	200 bar
Weight	190 kg	Pumping capacity	140 m^3/h
Deployment time	approx. 10 min.	Draught	800 mm

FOILEX TDS 250 OCEAN WEIR SKIMMER

Remark: The information is based on the manufacturer's documentation

PUMP

The TDS 250 pump is a positive displacement screw (PDAS) pump with a capacity of 140 m^3/h, hydraulically driven and with a twin disc dealing system for pressure build up. Both sealing discs are eccentrically attached to their respective axes. The discs then operate in an alternating fashion.

The pump can be used separately as a transfer- or off-loading pump for emptying of tanks and it is fully submergible. It can be used for oil with viscosity up to 1 million cSt.

TECHNICAL SPECIFICATIONS:

Length:	550 mm
Width:	390 mm
Height:	680 mm
Weight:	120 kg
Max. pressure:	10 bar
Debris handling:	4 cutting knives at inlet and 3 at outlet
Maximum solids:	Ø 65 mm

STEERING THRUSTERS AND REMOTE CONTROL

The Foilex TDS 250 is designed for deployment from a vessel into an area where oil has been contained. The skimmer is hydraulically operated and it is fitted with two hydraulically driven thrusters to allow the operator to manoeuver the skimmer to where oil is most heavily concentrated. The remote control allows the operation of the skimmer to different positions.

HOSE REEL

The reel is specially designed to accommodate 25 meters of 6" discharge hose and two sets of 35 meters 1" hydraulic hoses. Each of the two separate wheels has an independent brake/spoke stop.

TECHNICAL SPECIFICATIONS:

Length:	1200 mm
Width:	1150 mm
Height:	1300 mm
Weight:	350 kg

POWER PACK

The Markleen power pack (type DHPP 60 kW) is equipped with a diesel engine that operates below 200° C. This lower operating temperature, combined with additional shut down features, means that the power pack is designed to be used in areas where there is a strong potential explosion hazard. The flame protected engine is designed specifically to meet the European ATEX Directive Zone 2.

TECHNICAL SPECIFICATIONS :

Length:	2010 mm
Width:	1160 mm
Height:	1673 mm
Weight:	1810 kg
Max. pressure:	225 bar
Flow range:	0-150 l/min

This system is available on board the following EMSA Contracted Vessel:

Name of vessel	Skimmer head	Crane	Power pack	Flash point* Ex Class
Aktea OSRV	Weir	Vessel crane	Markleen DHPP, 60 kW, shared with the boom	Zone 2

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

FRAMO TRANSREC 150 HIGH-CAPACITY SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The TransRec system is a solution for oil recovery, transfer and off-loading of oil, allowing for independent installation onboard a vessel. The main components of the system are the integrated crane arm and a local control panel, two skimmer heads, a floating umbilical, a radio remote control system, an automatic emulsion breaker system and a diesel hydraulic power pack.

The TransRec system is equipped with two different skimmer heads to ensure optimal operation under different oil viscosity and weather conditions. The high viscosity skimmer is fitted with a hot water injection system. The system is designed for operation in hazardous area Zone 2.

The hydraulic power to the skimmer pumps is supplied through hydraulic hoses connected to the dedicated diesel hydraulic power pack. The unit also includes an automatic emulsion breaker system to separate the emulsion into water and oil.

The TransRec system can be operated under conditions of reduced visibility and darkness and only by one operator. The remote operation is also possible with the use of an explosion proof remote control system. All crane functions can in addition be operated from a local control panel. The unit is assembled on a standard 20 ft containerised frame with ISO twist lock fittings.

PUMPS

The weir skimmer is fitted with one centrifugal pump with capacity 400 m^3/h.

The HiVisc skimmer is fitted with two positive displacement Archimedes screw (PDAS) pumps with total capacity 180 m^3/h.

KEY CHARACTERISTICS:

- Weir skimmer module with a centrifugal pump and two thrusters
- High viscosity skimmer module with two PDAS pumps, two thrusters and water injection system
- Integrated crane

TECHNICAL SPECIFICATIONS

Length	6751 mm	Power requirements	190 kW
Width	3546 mm	Hydraulic flow	285 l/min
Height	3891 mm	Hydraulic pressure	280 bar
Weight	18,800 kg (TransRec unit)	Pumping capacity	400 m^3/h (Weir skimmer)
Deployment time	approx. 5 min.		180 m^3/h (HiVisc skimmer)
Max. towing speed	4 knots	Operational temperature (air)	-40 °C to 50 °C
Efficient in waves	up to 6 m	Operational temperature (water)	-2 °C to 40 °C

FRAMO TRANSREC 150 HIGH-CAPACITY SKIMMER

Remark: The information is based on the manufacturer's documentation

WEIR SKIMMER

The weir skimmer head is designed to recover large quantities of light to medium viscous oil with a viscosity of 1–15,000 cSt. The skimmer head is equipped with two powerful thrusters to keep the skimmer in position while an automatically adjusted wave compensated weir skirt gives a minimum of free water intake.

TECHNICAL SPECIFICATIONS:

Length:	2300 mm
Width:	2300 mm
Height:	2000 mm
Weight:	approx. 560 kg
Max. oil flow:	285 l/min
Max. pressure:	280 bar

HIGH VISCOSITY SKIMMER

The HiVisc skimmer head is designed to handle extremely high oil viscosities as well as oils with high wax content. Typical emulsion viscosities range from 10,000-1,000,000 cSt. Two powerful thrusters are used to manoeuvre and force the skimmer head into the oil.

TECHNICAL SPECIFICATIONS:

Length:	2154 mm
Width:	2290 mm
Height:	1712 mm
Weight:	approx. 1450 kg
Max. oil flow:	330 l/min
Max. pressure:	280 bar
Max. water injection capacity:	20 m^3/h at 16 bar

HOSE WINDER

The unit is designed for the storage and handling of the floating umbilical and the skimmer heads. All functions are hydraulically operated and the unit is powered either by the vessel hydraulic system or by a portable hydraulic power pack. The system is operated from the remote radio control panel. The drum and crane arm can rotate 360°.

POWER PACK

A 190 kW diesel driven hydraulic power pack is included to power the TransRec system. The unit is sound insulated and consists of a diesel engine and a hydraulic high-pressure pump. The power pack is containerised for easy transportation and may be used for other purposes such as emergency off-loading. It is compatible with the Framo range of portable pumps and is classified for hazardous area Zone 2 operation.

TECHNICAL SPECIFICATIONS:

Length:	2900 mm
Width:	1500 mm
Height:	2620 mm
Weight:	2800 kg (full tanks)
Max. hydraulic pressure:	280 bar
Max. hydraulic oil flow:	336 l/min

This system is available on board the EMSA Contracted Vessels:

Name of vessel	Skimmer head	Crane	Winder	Power pack	Flash point* Ex Class
Ria de Vigo	Weir/HiVisc	Integrated	Hydraulic with 360^0 turntable and 95 m umbilical hose	DHPP, 190 kW	Zone 2
GSP Orion	Weir/HiVisc	Integrated	Hydraulic with 360^0 turntable and 95 m umbilical hose	DHPP, 190 kW	Zone 2

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

LAMOR LAS 125 ARCTIC SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

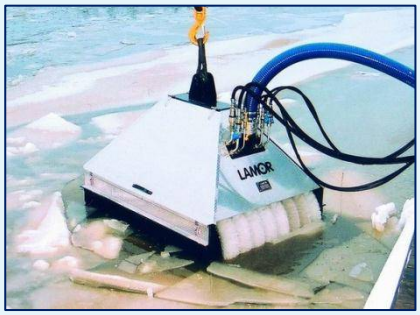
The Lamor arctic skimmer (LAS) is a special purpose oil recovery system designed for operation in extreme cold and broken ice conditions.

The LAS is normally deployed by a crane or davit but can be also used as free floating skimmer utilizing the optional floats when required. The LAS is equipped with a warm water heating system to improve recovery in arctic conditions.

The Lamor LAS provides an efficient and practical solution to recovery in arctic conditions.

BRUSH MODULE

The LAS incorporates static ice deflection pipes and rotating brush wheels for oil separation and collection. The two brush wheels collect and separate the oil from the water. Any encountered ice pieces are crushed by the ice crushing screws inside the hopper. These screws also feed the oil to the built-in Lamor pump.



PUMP

A Lamor GT A 115 Positive Displacement Archimedes Screw (PDAS) type oil transfer pump is used to recover the oil, with capacity of 115 m^3/h. The efficiency of the GTA 115 pump is increased due to a water/steam annular injection on the inlet and a debris cutting knife to handle solids such as seaweed, plastics and ropes. The pump is constructed from robust seawater resistant aluminum for the casings and stainless, acid proof steel internals with special seals that ensure that the pump remains "dry".

KEY CHARACTERISTICS:

- Oil spill recovery in arctic conditions
- One PDAS pump, capacity 115 m^3/h
- Brush skimmer module with ice crushing screws
- Warm water heating system
- Skimmer floats enable operation as free-floating skimmer

TECHNICAL SPECIFICATIONS			
Length	2980 mm	Power requirements	80 kW
Width	3110 mm	Hydraulic flow	185 l/min
Height	2182 mm	Hydraulic pressure	210 bar
Weight	840 kg (without floats)	Pumping capacity	115 m^3/h
Deployment time	approx. 10 min.	Free water collected	below 5 %

LAMOR LAS 125 ARCTIC SKIMMER

Remark: The information is based on the manufacturer's documentation

HOSE WINDER

The Lamor arctic skimmer hose winder is designed to store hydraulic and oil transfer hoses. The winder frame is produced from steel and is protected with marine grade painting. The winders are of sea water resistant aluminium.

The construction allows the transfer hoses and hydraulic hoses to be winded and locked separately.

The frame is equipped with 4-point lifting points forklift channels.

The maximum capacity of the winder is to store 40 meters of hydraulic hoses and lay-flat transfer hose.

FLOATS

The sea water resistant aluminium floats can easily be connected to the skimmer. In this way, the skimmer is converted from a crane operated skimmer to a free floating offshore skimmer.

The floats are shaped to guide the oil into the brush skimmer. The robust floats are equipped with four point lifting eyes.

TECHNICAL SPECIFICATIONS:

Length:	2980 mm
Width:	790 mm
Height:	900 mm
Weight:	165 kg each

POWER PACK

The Lamor LPP 90 Cu power pack is powered by a water cooled Cummins 4.5 liters turbocharged diesel engine and serves as a high capacity multipurpose power pack. The power pack is containerised within a steel frame designed to ensure a good air circulation inside the power pack frame.

TECHNICAL SPECIFICATIONS :

Length:	2300 mm
Width:	1400 mm
Height:	1800 mm
Weight:	2000 kg
Hydraulic pressure:	210 bar
Hydraulic flow:	320 l/min
Power:	90 kW at 2200 rpm

This system is available on board the EMSA Contracted Vessels in following variations:

Name of vessel	Skimmer head	Crane	Power pack	Flash point* Ex Class
OW Copenhagen	Brush	Vessel crane	Lamor LPP 90 Cu, 90 kW	Zone 2
Kontio	Brush	Vessel crane	Hydraulic power provided by the vessel	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

LAMOR LFF 400W OFFSHORE SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Lamor free floating offshore skimmer is a high capacity free-floating skimmer designed for open sea oil recovery operations.

The LFF 400W is designed for deployment from a vessel into an area where oil has been contained. It is fitted with two hydraulic thrusters, allowing the operator to manoeuver the system to where oil is most heavily concentrated.

The radio remote control system, which is included in the skimmer system, can operate the skimmer functions from a distance of up to 200 meters.

BRUSH MODULE

Oil adheres to the rotating brush wheels and is separated and cleaned from the brushes into a collection sump. The LFF 400 brush wheels collect all types of oil, including diesel, fresh crude, high viscosity bunker oil and emulsions, while collecting almost no free water (below 2%).

PUMP

Oil collected in the sump is off-loaded by a powerful Lamor positive displacement Archimedes screw (PDAS) type GT A 115 pump and transferred via the supplied floating hose.

KEY CHARACTERISTICS:

- Free-floating offshore skimmer
- One PDAS pump, capacity 115 m^3/h
- Brush skimmer module with brush wheels
- Two thrusters, remote control

TECHNICAL SPECIFICATIONS			
Length	2280 mm	Power requirements	70 kW
Width	2280 mm	Hydraulic flow	160 l/min
Height	1955 mm	Hydraulic pressure	210 bar
Weight	750 kg	Pumping capacity	115 m^3/h
Deployment time	approx. 10 min.	Free water collected	below 5 %

LAMOR LFF 400W OFFSHORE SKIMMER

Remark: The information is based on the manufacturer's documentation

HOSE WINDER

The Lamor arctic skimmer hose winder is designed to store hydraulic and oil transfer hoses. The winder frame is produced from steel and is protected with marine grade painting. The winders are of sea water resistant aluminium.

The construction allows the transfer hoses and the hydraulic hoses to be winded and locked separately. The frame is equipped with 4-point lifting points and forklift channels. The maximum storage capacity of the winder is 60 meters of hydraulic hoses and oil transfer hose.

STEERING THRUSTERS AND REMOTE CONTROL

The LFF 400W is designed for deployment from a vessel into an area where oil has been contained. The skimmer is hydraulically operated and it is fitted with two hydraulically driven stern tunnel thrusters to allow the operator to manoeuver the skimmer to where oil is most heavily concentrated.

STORAGE CONTAINER

The 20 ft flat rack container for skimmer set is ISO standardised and is equipped with twist locks for transportation, lifting hooks and forklift channels.

The container is an open type, tarpaulin covered flat rack type unit to enable easy deployment of the system. The containers come equipped with twist lock for transportation, lifting hooks and forklifts channels.

POWER PACK

The Lamor LPP 90 Cu power pack is powered by a water cooled diesel engine and serves as a high capacity multipurpose power pack. The power pack is containerised within a steel frame designed to ensure a good air circulation inside the power pack frame.

TECHNICAL SPECIFICATIONS :

Length:	2300 mm
Width:	1400 mm
Height:	1800 mm
Weight:	2000 kg
Hydraulic pressure:	210 bar
Hydraulic flow:	320 l/min
Power:	90 kW at 2200 rpm

This system is available on board the EMSA Contracted Vessels in following variations:

Name of vessel	Skimmer head	Crane	Power pack	Flash point* Ex Class
OW Copenhagen	Brush	Vessel crane	Lamor LPP 90 Cu, 90 kW	Zone 2
Monte Anaga	Brush	Vessel crane	Lamor electric-hydraulic LPP 2 x 90 E, 180 kW, fixed in the engine room, shared with the sweeping arms	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

LAMOR LFF 100 2C OFFSHORE SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Lamor free-floating offshore skimmer is a high capacity skimmer designed for sea ocean oil recovery operations. The LFF 100 2C is fitted with two V-chain-pocket brush type conveyors for collection of all types of floating oil from light to high viscosity oils and emulsion. Each brush chain conveyor consists of four brush chains.

The LFF brush wheels collect all oil types, including diesel, fresh crude, high viscosity bunker oil and emulsions, while collecting almost no free water.

The skimmer is fitted with two hydraulic thrusters, allowing the operator to maneuver the system to where oil is most heavily concentrated. The skimmer can be operated remotely with a radio control system.

BRUSH MODULE

The skimmer is designed to collect heavy oil floating on the water surface or submerged below the surface and feed the oil into a collection tank. The four brush chains of the conveyor are driven by a hydraulic motor which handles the rotation of the belts via a set of V-belt wheels, one for each belt section. To improve the flow the skimmer unit is equipped with a flow impeller behind the brush conveyors.

PUMP

The oil is pumped out by means of a positive displacement Archimedes screw (PDAS) type pump Lamor GTA 115.

KEY CHARACTERISTICS:

- High capacity offshore skimmer
- One PDAS pump, capacity 115 m^3/h
- Brush skimmer module with four brush chains
- Two thrusters, remote control

TECHNICAL SPECIFICATIONS			
Length	2740mm	Power requirements	70 kW
Width	2280 mm	Hydraulic flow	200 l/min
Height	1950 mm	Hydraulic pressure	210 bar
Weight	895 kg	Pumping capacity	115 m^3/h
Deployment time	approx. 10 min.	Free water collected	below 2 %

LAMOR LFF 100 2C OFFSHORE SKIMMER

Remark: The information is based on the manufacturer's documentation

HOSE WINDER

The Lamor hose reel is designed to store hydraulic and oil transfer hoses. The frame is produced is steel protected with marine grade painting. The reels are made of sea water resistant aluminium.

The construction allows the transfer hoses and the hydraulic hoses to be winded and locked separately. The frame is equipped with 4-point lifting points and forklift channels. The maximum storage capacity of the winder is 60 meters of hydraulic hoses and 60 meters of oil transfer hose.

STEERING THRUSTERS AND REMOTE CONTROL

The LFF 100 2C is designed for deployment from a vessel into an area where oil has been contained.

The skimmer is hydraulically operated and it is fitted with two hydraulically driven stern tunnel thrusters to allow the operator to manoeuver the skimmer to where oil is most heavily concentrated.

The radio control system can operate the skimmer functions remotely.

STORAGE CONTAINER

The 20 ft flat rack container for the skimmer set is ISO standardised and is equipped with twist locks for transportation, lifting hooks and forklift channels.

The container is an open type, tarpaulin covered flat rack type unit to enable easy deployment of the system.

There is an anti slip floor for safety and brackets and shelves for equipment to be safely secured.

POWER PACK

The diesel hydraulic power pack LPP 109 D is containerised within a steel frame.

TECHNICAL SPECIFICATIONS:

Length:	2000 mm
Width:	1300 mm
Height:	1900 mm
Weight:	2500 kg
Max. pressure:	280 bar
Max. oil flow:	330 l/min
Fuel tank capacity:	200 l
Hydraulic oil tank :	400 l

This system is available on board the EMSA Contracted Vessels in following variations:

Name of vessel	Skimmer head	Crane	Power pack	Flash point* Ex Class
Bahia Tres	Brush	Vessel crane	Lamor LPP 120 E, 120 kW	Zone 2
Bahia Uno	Brush	Vessel crane	Lamor LPP 109 D, 109 kW, shared with sweeping arms	N.A.
Kontio	Brush	Vessel crane	Lamor LPP 109 D, 109 kW, shared with sweeping arms	N.A.
GSP Orion	Brush	Vessel crane	Lamor LPP 109 D, 109 kW, shared with sweeping arms	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

LAMOR LWS 1300 OFFSHORE SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The free-floating offshore weir skimmer LWS 1300 is a high capacity weir skimmer designed for offshore oil recovery operations.

The skimmer can efficiently recover and pump a wide range of oils from light products to medium and heavy viscous debris-laden emulsions.

The skimmer is hydraulically operated and fitted with two thrusters to allow the operator to maneuver the skimmer to where oil is most heavily concentrated. The hydraulic power is transferred to the skimmer via hydraulic hoses.

Recovered oil is discharged from the skimmer up to the collecting tank through the transfer hose.

WEIR MODULE

The skimmer is equipped with a floating weir lip to separate and collect the oil into the hopper. The floating weir lip has separate small ballast weights that can be independently adjusted for very good floatation even in difficult sea conditions. The oil on the surface of the water is drawn into the skimmer by gravitational flow over the weir lip.

PUMPS

The weir module is equipped with one MSP 150 pump with a capacity of 360 m^3/h. To improve the recovery capability of heavy oils, the skimmer is also fitted with a Lamor GT A 140 pump with a capacity of 140 m^3/h.

KEY CHARACTERISTICS:

- High capacity offshore skimmer
- One centrifugal pump for the weir skimmer and one PDAS pump for the brush skimmer
- Weir skimmer module with self-adjusting weir lip
- Brush skimmer module with three rotating brush drums
- Two thrusters, remote control

TECHNICAL SPECIFICATIONS

Length	2510 mm	Power requirements	70 kW
Width	2765 mm	Hydraulic flow	160 l/min
Height	1413 mm	Hydraulic pressure	210 bar
Weight	457 kg	Pumping capacity	GTA - 140 m^3/h
Deployment time	approx. 10 min.		MSP - 360 m^3/h

LAMOR LWS 1300 OFFSHORE SKIMMER

Remark: The information is based on the manufacturer's documentation

BRUSH MODULE

The Lamor brush adapter is a brush-type oil recovery module designed to fit quickly and easily onto the hopper of the Lamor weir skimmer (LWS). The purpose of the device is to improve the overall recovery efficiency, by reducing free water recovered with oil, and to optimise the performance in case of recovery of very high viscosity oils.

The brush module has three brush drums, which rotate downward into the oil layer creating a strong inflow. The recovered product is scraped and squeezed off of the brushes by a special cleaner that directs the product into the collection hopper above the LWS pump.

HOSE WINDER

The Lamor hose reel is designed to store hydraulic and oil transfer hoses. The frame is produced of steel and protected with marine grade painting. The reels are made of sea water resistant aluminium.

The construction allows the transfer hoses and the hydraulic hoses to be winded and locked separately. The frame is equipped with 4-point lifting points and forklift channels.

The maximum storage capacity of the winder is 60 m of hydraulic hoses and 60 m of oil transfer hose.

STORAGE CONTAINER

The 20 ft flat rack container for skimmer set is ISO standardised and is equipped with twist locks for transportation, lifting hooks and forklift channels. The container is an open type, tarpaulin covered flat rack type unit to enable easy deployment of the system.

POWER PACK

The Lamor LPP 77 power pack is powered by a Deutz 77 kW diesel engine and serves as a multipurpose power pack designed for the operation of many types of hydraulic equipment.

TECHNICAL SPECIFICATIONS :

Length:	1800 mm
Width:	1200 mm
Height:	1600 mm
Weight:	1800 kg (with hydraulic oil)
Diesel engine:	Deutz F6L912
Power:	77 kW at 2300 rpm
Max. pressure:	200 bar
Max. oil flow:	200 l/min

This system is available on board the EMSA Contracted Vessels in following variations:

Name of vessel	Skimmer head	Crane	Power pack	Flash point* Ex Class
Alexandria	Weir/brush	Vessel crane	Lamor LPP 77, 77 kW	N.A.
Enterprise	Weir/brush	Sweeping arm crane	Lamor LPP 90 Cu, 90 kW, shared with the boom	N.A.

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

MARKLEEN WMS 280 WEIR SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Markleen WMS skimmer is a high performance weir skimmer for harbour, coastal or offshore oil spills. The unit handles all types of hydrocarbons, from light diesel fuel to heavy crude oil mixed with debris. The skimmer is mounted on a robust stainless steel frame which sustains the four floats and protects the pump. By removing the floating structure, the skimmer can easily be converted to an efficient submersible transfer or discharge pump.

WEIR MODULE

This skimmer features a self-adjusting flow-controlled inlet weir, with automatic parallel weir lip movement to water surface. Weir working depth is controlled by pump flow rate, and determines the quantity of water in the recovered product.

PUMPS

The skimmer incorporates two heavy duty submersible Archimedes twin disc screw pumps, type Foilex TDS 250, which provide 70% higher capacity than traditional screw pumps. The pumps are hydraulically driven and need as such a hydraulic power pack for their operation. The stainless steel pump casing provides high resistance against corrosion and abrasive wear.

KEY CHARACTERISTICS:

- Two Twin Disc Screw pumps, total capacity 280 m^3/h
- High recovery capacity at low pump revolutions
- Large 360° inlet opening with strong cutting knives for efficient debris handling
- Easy dismantling for maintenance and cleaning
- Two thrusters, remote control

TECHNICAL SPECIFICATIONS

Length	3180 mm	Power requirements	70 kW
Width	2500 mm	Hydraulic flow	150 l/min
Height	1400 mm	Hydraulic pressure	200 bar
Weight	380 kg	Pumping capacity	2 x 140 m^3/h
Deployment time	approx. 10 min.	Pump weight	2 x 120 kg

MARKLEEN WMS 280 WEIR SKIMMER

Remark: The information is based on the manufacturer's documentation

STEERING THRUSTERS AND REMOTE CONTROL

The skimmer is designed for deployment from a vessel into an area where oil has been contained. The skimmer is hydraulically operated and it is fitted with two hydraulic driven thrusters to allow the operator to manoeuver the skimmer to where oil is most heavily concentrated.

The remote control allows the operation of the skimmer to different positions.

HOSE WINDER

The winder is specially designed to accommodate 60 meters of oil transfer and hydraulic hoses.

POWER PACK

The Markleen DHPP 90 diesel power pack is designed to operate the hydraulic machinery. All frames and hydraulic oil tanks are made of stainless steel and other components are made of corrosion resistant materials.

TECHNICAL SPECIFICATIONS:

Length:	1770 mm
Width:	1170 mm
Height:	2000 mm
Weight:	1480 (with oil)
Max. power:	93 kW
Max. hydraulic flow:	235 l/min

This system is available on board the EMSA Contracted Vessels in following variations:

Name of vessel	Skimmer head	Crane	Power pack	Flash point* Ex Class
DC Vlaanderen	Weir	Vessel crane	Markleen DHPP 90, 93 kW	Zone 2
Interballast 3000	Weir	Vessel crane	Markleen DHPP 90, 93 kW	Zone 2

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

NORMAR HIGH-CAPACITY SKIMMER

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The NorMar oil recovery and transfer system consists of a weir skimmer and a high viscosity soft shovel skimmer cassette. The skimmer head is connected to the outer end of the floating umbilical. A dedicated power pack provides the necessary supply. The system is a complete integrated unit with a built-in crane arm.

The system is all hydraulically operated, and therefore suited for deck operation during an oil spill. The NorMar skimmer and hose handling system is designed to recover oil and oil emulsions with medium to high viscosity from the sea surface under calm to rough weather conditions. The skimmer has two thrusters to secure the best recovery position in the floating containment boom. The thrusters are hydraulically driven and controlled from the remote control box.

The NorMar free floating transfer hose is designed so that the hydraulic lines inside the transfer hose can easily be inspected or replaced without disturbing the floating transfer hose. The NorMar skimmer system is operated from an operator's platform.

PUMPS

Using two Desmi positive displacement Archimedes screw (PDAS) pumps in vertical design, type DOP-250 DUAL, the skimmer (NorMar 200TI) is able to efficiently recover light as well as heavy oil, also when mixed with debris normally found in oil spills. A Mariflex MSP-150 centrifugal screw pump with 360 m^3/h capacity can also be used (for NorMar250TI) to recover light to medium oil.

KEY CHARACTERISTICS:

- Two PDAS pumps for the weir skimmer and one centrifugal pump for the brush skimmer
- Weir skimmer module with two thrusters
- Brush skimmer module with inlet guard
- Integrated power pack and crane
- Unit assembled on 20' flat rack with standard twist locks and 360° turntable

TECHNICAL SPECIFICATIONS (NorMar 200TI/250TI)

Length	6058/6241 mm	Power requirements	110 kW
Width	2965/2645 mm	Hydraulic flow	160 l/min
Height	3878/3995 mm	Hydraulic pressure	210 bar
Weight	9000 kg	Pumping capacity	250 m^3/h (NorMar 200TI)
Deployment time	approx. 10 min.		360 m^3/h (NorMar 250TI)
Max. towing speed	4 knots	Operational temperature (air)	-40 °C to 50 °C
Efficient in waves	up to 4 m	Operational temperature (water)	-2 °C to 40 °C

NORMAR HIGH-CAPACITY SKIMMER

Remark: The information is based on the manufacturer's documentation

WEIR SKIMMER

The NorMar weir skimmer is built into a protective frame made from seawater resistant aluminium, ensuring safe operation and low weight. The skimmer frame is equipped with two thrusters 15 hp each. The weir is built with a self adjusting floating ring. The external skimmer floats can easily be removed for storage, or for hook up of the heavy oil shovel brush cassette.

TECHNICAL SPECIFICATIONS (NorMar 200TI/250TI):

Length:	2000/1825 mm
Width:	2000/1825 mm
Height:	1500/1810 mm
Weight:	250/180 kg approx.

BRUSH / DISC CASSETTE SKIMMER

The NorMar brush/disc skimmer is designed to recover oil with viscosities ranging from light to heavy oil. The cassette is equipped with four Archimedes screw soft shovels on all sides giving heavy oil recovery capacities up to 200 m^3/h (250 m^3/h for NorMar 250TI). The skimmer is not sensitive to floating debris due to the inlet guard mounted in front of the soft shovel segments.

TECHNICAL SPECIFICATIONS (NorMar 200TI/250TI):

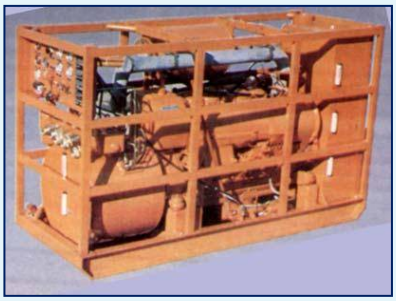
Length:	1914/1910 mm
Width:	1914/1910 mm
Height:	1006/1600 mm
Weight:	280/550 kg

HOSE WINDER

The hose-reel is designed for storage of 50 meters (80 meters for NorMar 250TI) of floating hose and is hydraulically driven. The hose reel is built together with a crane arm. The hose reel and crane arm is mounted on a common foundation with a 20 ft container footprint with twist locks in each corner, allowing for 360° rotation. The crane is an integrated part of the hose handling reel, has a capacity of 6 tons and an outreach of 5.5 meters.

POWER PACK

The diesel hydraulic power pack provides the necessary hydraulic power to the skimmer system. The power pack is mounted on the storage and handling system's lower foundation and is suitable for operation in Zone 2 areas.



TECHNICAL SPECIFICATIONS (NorMar 200TI/250TI):

Length:	2250/2300 mm
Width:	1020/1070 mm
Height:	1420/1740 mm
Weight:	1950 kg
Rating:	110/120 kW at 2400 rpm
Hydraulic pressure:	250/320 bar
Hydraulic oil flow:	217/200 l/min

This system is available on board the EMSA Contracted Vessels in following variations:

Name of vessel	Skimmer head	Crane	Winder	Power pack	Flash point* Ex Class
Santa Maria (NorMar 200TI)	Weir/brush/disc	Integrated	Hydraulic with 360º turntable and 50 m umbilical	DHPP, 110 kW	Zone 2
Aktea OSRV (NorMar 250TI)	Weir/brush/disc	Integrated	Hydraulic with 360º turntable and 80 m umbilical	DHPP, 120 kW	Zone 2

* Depending on the location of the equipment on board, the vessel may be classified with a flashpoint above or below 60°C.

Slick Detection Systems

CONSILIUM SELUX ST 250/340 SLICK DETECTION SYSTEM

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The Selux ST 250/340 system is a ship remote sensing system for oil spill detection. Onboard an oil recovery vessel, the system provides continuous oil spill detection during emergency response operations.

The main features of the system are:

- Ability to present relative signal dumping (oil concentration/thickness) inside the oil slick pattern
- Automatic oil spot contour detection and area calculation
- Assessment of the oil slick position, speed and direction
- Recording of the operating history and instant screen dumps
- Instrumental maximum oil spill detection range up to 12 Nm
- Real-time processed images with selectable integration time between 30 seconds up to 2 minutes
- Information display about wind conditions
- Ability to increase the antenna rotation speed up to 44 revolutions per minute
- Able to operate under all kinds of visibility conditions
- Possibility to integrate external sensors and devices
- Capacity to interface and receive signals from up to 2 radar sensors (up to four optionally) and allows the operator to select the transceiver to be used for oil spill detection

TECHNICAL SPECIFICATIONS

Detection range	12 Nm (depending on antenna height)	Display	Location and area of oil spill
			Oil spill drift history
Weather limitations	Not effective when the surface of the sea is flat		Oil spill speed and direction
Vessel Movement Compensation	Real-time		Slick thickness

CONSILIUM SELUX ST 250/340 SLICK DETECTION SYSTEM

Remark: The information is based on the manufacturer's documentation

RADAR (X or S band)

The Consilium Selux has been tested with antennas 20 meters long (from transceiver to the antenna pedestal), taking into account that transmitted/received power is halved for every 10 ms added.

The use of an S-band transceiver is the optimal choice to reduce rain clutter reflections and increase long range detection. Longer antennas for X-band are less susceptible to rain and sea clutter. Long transmission lines, coaxial cables for S-band and waveguide for X-band down mast transceiver can affect the radar performance.

Usually the contradictory specifications are solved with installation of more than one antenna, for example one at 30 meters for long range detection and one at 20 meters for optimal detection of low intensity echoes in sea clutter.

TECHNICAL SPECIFICATIONS:

Frequency:	50/60 Hz or 300/400 Hz
Antenna length:	20 meters
Antenna height:	20 meters (from sea level)
Field of view:	360° (Azimuth)
	12 nm (Range)
Pulse width:	0.07 μs / 0.25 μs / 0.80 μs
PRF:	3000 Hz / 1500 Hz / 750 Hz
Rotation speed:	15-60 rpm

HARDWARE

The hardware consists of a monitor, a display core unit and a keyboard. Thanks to the modular design the Selux ST can be either assembled to form a stand-alone cabinet or mounted into a mechanical bridge console. The basic configuration always includes an electronic, built-in interswitch for dual radar installation.

TECHNICAL SPECIFICATIONS :

Dimensions:	350 x 460 x 150 mm (H x W x D)
Weight:	9 kg
Power consumption:	65 W
Trigger amplitude:	TTL to 40 V (peak)
Serial interface input:	RS232 or RS422
Speed serial electronic input:	RS422 standard NMEA or RS232
Gyrocompass serial input:	RS422 standard FNMEA or RS232

This system is available on board the following EMSA Contracted Vessel:

Kontio

MIROS OIL SLICK DETECTION SYSTEM

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

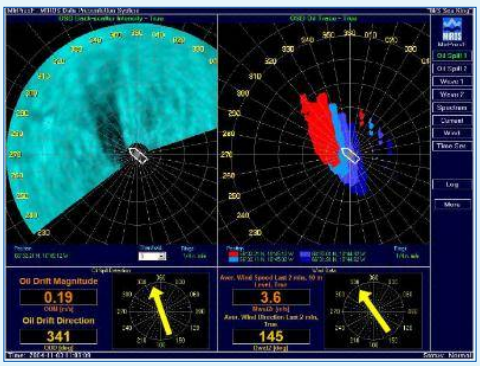
The Miros oil slick detection (OSD) system is a ship borne remote sensing system for oil spill detection and surveillance. It processes radar images from an X-band navigation radar to give real time oil spill surveillance data. Onboard an oil recovery vessel, the system provides continuous oil spill detection during emergency response operations. The Miros OSD system can work both as a stand alone system together with a hand-held IR-camera, or as part of a complex remote sensing network.

The system is designed and manufactured to comply with classification society's for operation in hazardous area Zone 2, corresponding to the deck area of an oil recovery vessel under oil recovery operations.

Miros OSD can ensure continuous oil spill detection in sea-states Beaufort 2-6 independent of visibility and light conditions. The system has the ability to detect oil spills in complete darkness enabling 24 hours oil recovery operation. It utilizes raw data from a standard X-band navigation radar to perform complex digital processing and tactical presentation.

In order to perform surveillance, the vessel establishes a search pattern of the suspected oil spill area. The search grid is typically one nautical mile, well within the reliable detection range of the Miros OSD system. Then Miros OSD provides automatic oil detection and images processed to ease detection of oil by visual inspection.

When an oil slick is detected, the vessel surveys the slick by the use of GPS-positioning, a hand-held infrared camera (in darkness) or visual color assessment (in daylight), identifying areas of combatable oil thickness. Usually, the part of the slick containing combatable oil is located in the front (downwind) end of the slick. The recovery vessel then manoeuvers its oil recovery equipment using the Miros OSD tactical navigation display.



TECHNICAL SPECIFICATIONS

Detection range	2-4 km distance for recovery operations Above 4 km for surveillance (depending on antenna height)	Display	Location and area of oil spill
			Oil spill drift history
Operational wind speed	Above 2 m/s		Oil spill drift prediction (speed and direction)
Operational window	Wind conditions and sea state up to Beaufort 6	Image sampling grid	Cartesian
Weather limitations	Not effective when the surface of the sea is flat	Vessel Movement Compensation	Real-time

MIROS OIL SLICK DETECTION SYSTEM

Remark: The information is based on the manufacturer's documentation

RADAR X-BAND

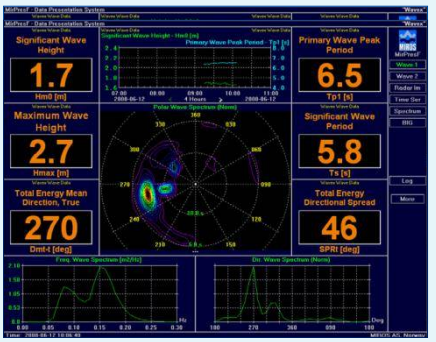
The Miros is recommended for use with a X band radar and an associated minimum 6 ft antenna, but can be connected to any other on board standard X band radar.

TECHNICAL SPECIFICATIONS:

Frequency:	X-band
Antenna length:	6 ft or longer
Min. antenna height:	15 meters (above water surface)
Polarization:	Horizontal
Antenna beam width:	max. 1.3 degrees
Pulse width:	50-80 ns
Peak power:	25 kW and more
PRF:	1000 Hz or more, depending on antenna rpm
Rotation speed:	24-48 rpm

MIROS WAVEX SYSTEM

To identify an oil spill, the MIROS oil spill detection system (OSD) uses advanced image-processing algorithms on radar images extracted by the Miros Wavex system, which also must be present and operational when the OSD system is in use. In addition to oil spill display information the system displays as well the wave, wind and current parameters. The Miros OSD is based on the fact that areas covered by oil will reflect less microwave power due to dampening of the sea surface capillary waves. Areas containing oil will be shown as dark areas in the radar sea surface images.

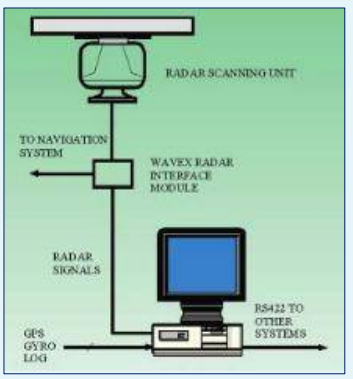


The Wavex system measures surface wave parameters on the basis of digitized sea clutter images provided by standard navigational X-band (3 cm) marine radar. Since "a copy" of the raw radar signal is used, the Wavex system does not interfere or affect the radar signals to the navigation radar display. By collecting sea clutter data in "sets of images" during a defined time period, the system performs its parameter calculations.

HARDWARE

The Miros OSD system hardware comprises the following components:

- A dedicated, type approved maritime computer with a built-in Miros Wavex Special Purpose Radar Data Acquisition Board
- A flat-screen LCD monitor with night vision dimming functionality
- A buffer amplifier and radar interface box
- A Gyro compass interface
- A GPS interface
- A Wind sensor interface



This system is available on board the following EMSA Contracted Vessels:

Name of vessel	Name of vessel
Forth Fisher / Galway Fisher / Mersey Fisher (in total 2 Miros OSD systems are available)	GSP Orion
Sara	Enterprise
Bahia Uno	Aktea OSRV
DC Vlaanderen 3000	Alexandria
Interballast III	

SEADARQ OIL SLICK DETECTION SYSTEM

Remark: The information is based on the manufacturer's documentation

GENERAL DESCRIPTION

The SeaDarQ system processes data from sea surface acquired from conventional X-band radar in order to detect and monitor oil spills. The system is able to handle all the radar data, mix it with information from other sensors and store it in real time on disc or RAM. This gives the possibility to measure and process radar images in real time.

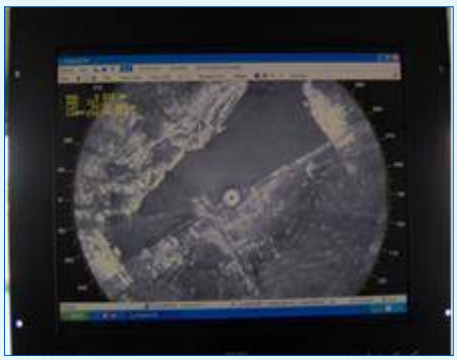
The platform is based on a Microsoft environment and all kinds of connections to the system are possible. Network support offers functionality control on a distance and interchange of data with other platforms.

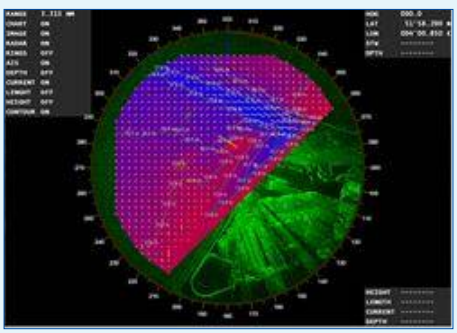
The images are displaced in layers. Layers can be switched on and off. One layer can be a map, the next layer can be the radar image, a current or an oil spill etc. The colours and transparency between the layers can be modified.

The SeaDarQ system consists of the following main components:

- Radar X-band
- Antenna 8 feet
- Interface kit
- Monitors
- Junction box

The hardware part is made up of a computer with an interface that receives the signal from an X band radar. The data is processed by the computer and presented to the user on a standard 15" TFT screen. The system is completed with the associated radar and antenna. The interaction of the operator with the system is through a standard keyboard and mouse.





TECHNICAL SPECIFICATIONS

Detection range	0.1-3.5 km distance (depending on antenna height)	Image Presentation	Logarithmic display of amplitude
			Zooming, panning, scrolling overlay of geocode information
			Software STC (Sensitive Time Control) correction
Detection Resolution	Better than 3.75 m (short pulse)	Static object enhancement	Up to detection resolution in real time
Operational wind speed	Above 2 m/s	Image sampling grid	Cartesian
Weather limitations	Not effective when the surface of the sea is flat	Vessel Movement Compensation	Real-time

SEADARQ OIL SLICK DETECTION SYSTEM

Remark: The information is based on the manufacturer's documentation

RADAR X-BAND

The SeaDarQ is usually provided with a X band radar Sperry Marine Bridge Master E 180 and an associated 8 feet antenna, but can be connected to any other on board standard X band radar with 8 ft antenna, operating in short or medium pulse mode and, if available, with a low noise amplifier input.

The SeaDarQ can be connected with the following radar brands:

- FURUNO
- ALPHATRON JRC
- TERMA
- GRUMMAN SPERRY
- RATION
- SAM

TECHNICAL SPECIFICATIONS:

Frequency:	X-band
Antenna length:	8 ft or longer
Min. antenna height:	15 meters (total)
Polarization:	Vertical
Field of view:	360° (Azimuth) > 2500 m (Range)
Pulse width:	50 ns / 250 ns / 1µs
Peak power:	25 kW and more
PRF:	1800 Hz / 1300 Hz / 650 Hz
Rotation speed:	48 rpm

HARDWARE

The hardware consists of a standard computer with an interface. The interface provides the connection to the radar, AIS and the ships navigation instruments, if applicable. The interface is designed to serve as many radar brands as possible. Four NMEA inputs are available and for each input an output is provided for signal throughput. Each radar line is stored with all the information about location azimuth, AIS, heading, time on disk.

The SeaDarQ Spill Master processor is mounted in an 19"rack and will not take up bridge space. The display is mounted on a collapsible arm for optimal operator viewing and handling of the system.

TECHNICAL SPECIFICATIONS :

Dimensions:	180 x 430 x 515 mm (H x W x D)
Video input:	0-1 Volt Analog, 75 Ohm *
Trigger Input:	TTL*
Azimuth Input:	TTL/RS422 pulses, up to 4096 pulses/revolution*
North Reset Input:	TTL/RS422 pulses, up to 4096 pulses/revolution*
Data Communications:	RS232/RS422*

*Signal levels can be customized

This system is available on board the following EMSA Contracted Vessels:

Name of vessel	Name of vessel
OW Copenhagen	Balluta Bay
Ria de Vigo	Salina Bay
Bahia Tres	Santa Maria
Monte Anaga	